

Attractive and profitable “Mageler Es”



©Bram van den Broek

Team 1508

Bram van den Broek - Irene Buoga - Rutger Olthof

Ronald Smit - Eefke Vennegoor op Nijhuis

Coaches: dr.P. de Waard and S. Nortier

Expert: prof. dr. H. Siepel

March - May 2015

ACKNOWLEDGEMENT

We have a few persons we want to thank for this end result. Henk Siepel for helping us delivering a report with good quality. Pieter de Waard and Stefan Nortier who helped us guide through this project. Jan Toerse who gave us valuable information and made it possible to stay in Den Ham for two nights to do interviews. At last we want to thank the people who we have interviewed and the ones who have filled in our online questionnaire.



SAMENVATTING

De Mageler Es is een hoog gelegen agrarisch gebied. Het ligt op een zandgrond en nabij Den Ham in de regio Twente, Nederland. Er liggen twee Joodse begraafplaatsen met historische waarde op de Mageler Es. Sinds de 13e eeuw wordt het gebied gebruikt als landbouwgebied. Het meest verbouwde gewas in het gebied is maïs. Dit gewas kan een hoogte van twee meter bereiken, wat de zichtbaarheid van het gebied belemmert. De zichtbaarheid is voor de toeristen en de inwoners van Den Ham van grote waarde. De toeristen informatie van Den Ham wil maïs vervangen door zogenoemde oude gewassen zoals tarwe, spelt, gerst, haver en winterrogge. Dit wordt gedaan om zowel de zichtbaarheid als de culturele geschiedenis naar hun vroegere staat te herstellen.

De data is verzameld met kwalitatieve en kwantitatieve methoden. Er zijn interviews gehouden met verschillende belanghebbenden. Tevens is er een online enquête gemaakt die de bewoners van Den Ham konden invullen. De verkregen data is gebruikt voor een stakeholder (belanghebbende) analyse betreffende hun perceptie van het gebied. Het in kaart brengen van het huidige ondernemingsplan is gedaan met behulp van interviews en informatie die is verkregen door het raadplegen van internetbronnen. Dezelfde methode is toegepast voor het berekenen en bepalen van het nieuwe ondernemingsplan.

Er is een literatuurstudie over de bijeffecten van landbouw gedaan. Mest en het milieu wordt gezien als een belangrijk punt, aangezien veel boeren vee hebben. Het maïs wordt voornamelijk verbouwd voor voedsel voor hun vee. Maïs heeft tevens een hoge mest tolerantie vergeleken met andere gewassen, dit betekent dat de afvoerkosten voor mest lager zijn wanneer maïs wordt verbouwd. Het afschaffen van de melkquota zorgt er waarschijnlijk voor dat er meer maïs wordt verbouwd in de toekomst. Dit komt omdat boeren dan meer melk mogen produceren, dus is er meer voedsel nodig om de koeien meer melk te kunnen laten produceren. Gewas karakteristieken zijn beschreven om de geschiktheid van de gewassen voor de Mageler Es te bepalen. De beschreven gewassen zijn aardappelen, suikerbieten, maïs, tarwe, spelt, gerst, winterrogge en haver. Pesticide gebruik, vooral voor de lelies, wordt gezien als een probleem voor andere gewassen die worden verbouwd in het gebied. Het gebruik van gewas rotatie kan helpen om de bodemkwaliteit te verbeteren en het gebied aantrekkelijker te maken. Namelijk doordat hierdoor de Joodse begraafplaatsen beter zichtbaar worden. Subsidies kunnen het project stimuleren en eventueel de boeren motiveren om hun productie te veranderen.

Bloemstroken zijn een optie om in het gebied te plaatsen. Dit maakt het gebied aantrekkelijker en beschermt gewassen tegen plaagdieren (insecten). De wegwijzers die worden neergezet zijn er om meer bewustzijn te creëren, over waar het gebied ligt en hoe het te bereiken is.

Voor de stakeholder analyse zijn de boeren, lokale ondernemingen en inwoners geanalyseerd. De meeste boeren zijn bereid om oude gewassen te verbouwen indien er compensatie plaats vindt voor het prijsverschil tussen maïs en de 'historische gewassen'. De



lelie boer was ook geïnterviewd om informatie te verkrijgen over de lelieteelt. Verschillende lokale ondernemingen in het gebied verkopen op dit moment geen lokale producten uit de Mageler Es. Er is interesse om dit te doen, echter alleen als de markt voor deze producten groot genoeg is. De brouwerijen en de distilleerder zagen beide gewassen van de Mageler Es als een optie. Dit is omdat producten gemaakt van lokale gewassen en een lage ecologische voetafdruk op dit moment populair zijn. De reden dat de ecologische voetafdruk laag is komt doordat de gewassen niet van heinde en verre komen. Dus minder CO₂ uitstoot door minder transport afstand. Voor de inwoners geldt dat 42% maïs niet als een probleem ziet, terwijl 38% dit wel als een probleem ziet, vooral in relatie met de zichtbaarheid van de Mageler Es.

De data analyse laat zien dat tarwe een optie is, de extra kosten zijn namelijk €0,24 per kg (kilogram). Een kg tarwe is een kg meel. Een brood wordt gemaakt van 500g (gram) meel. Dus een kg of meel kan twee broden produceren. Dit maakt dat per brood de extra prijs €0,12 wordt. Voor jenever geldt dat een kg tarwe een liter jenever is. Een fles jenever (1 liter) wordt dus €0,24 duurder. Voor beide producten is de prijs toename niet te hoog, dus tarwe is een optie om verbouwd te worden in het gebied.

Spelt is een ander gewas wat als optie gezien kan worden. De prijs toename per kg is €0,45. Voor spelt geldt hetzelfde als voor tarwe wat betreft het brood. Dit betekent dat per brood de prijs €0,23 toeneemt.

Gerst is een andere optie voor het gebied. De prijs voor gerst zou per kg €0,29 toenemen. Dit betekent dat de prijs per bier (0,33l) €0,03 toeneemt, een kg gerst is vier liter mout. De prijs voor jenever (1 liter fles) stijgt met €0,29, omdat een kg gerst een liter jenever is. Een pilot is nodig om te bepalen of gerst van de Mageler Es van de juiste kwaliteit is.

Voor winterrogge en haver is berekend dat deze niet rendabel zijn om te verbouwen in het gebied. Dit komt omdat de extra kosten voor deze gewassen te hoog zijn. In combinatie met de lage vraag naar deze producten worden beide gewassen niet als rendabel gezien.

Deze bevindingen hebben geleid tot verschillende aanbevelingen voor het gebied. Allereerst wordt een gewas rotatie voor gesteld, dit is op de lange termijn winstgevender voor de boeren. Wij bevelen een gewas rotatie aan met hetzelfde patroon, dat bestaat uit (één van) de volgende gewassen: Aardappelen, suikerbiet, tarwe en maïs. Er is gekozen voor dit plan omdat dit relatief makkelijk te managen is, meer bereidheid bij boeren, en de zichtbaarheid van het gebied vergroot. Wij zien tarwe als een gewas dat nu verbouwd kan worden en in de toekomst maïs kan vervangen. Dit 'vervangen' wordt gedaan over een lange tijdspanne zodat boeren zich kunnen aanpassen aan een verhoogde tarwe productie. Ook hebben wij de aanbeveling om bewegwijzering te plaatsen. Dit maakt het namelijk makkelijker voor toeristen om de Mageler Es te vinden.

Er zijn verschillende onderwerpen betreffende de Mageler Es welke verder onderzocht kunnen worden. Als eerst is er de Rabobank welke de capaciteit heeft om leegstaande boerderijen en landbouwgronden op te kopen; delen van de Mageler Es kunnen zo



opgekocht worden. Het tweede waar naar gekeken kan worden is quinoa. Dit is een gewas wat steeds populairder wordt en daardoor winstgevend kan zijn om te verbouwen. Als derde kan gekeken worden naar landschap maïs, dit groeit minder hoog dan de maïs die normaal wordt verbouwd. Het vierde punt voor onderzoek is marktonderzoek. Dit onderzoek maakt het mogelijk om te bepalen naar de haalbaarheid van lokale producten, is er een markt en is het economisch rendabel. In dit onderzoek kan tevens worden gekeken of de molen van Ommen en Kalkwijck distilleerderij betrokken kunnen worden in dit plan. Het vijfde punt van onderzoek is gewas rotatie, wat zijn de mogelijkheden en hoe beïnvloeden verschillende gewassen elkaar? Als laatste kan er nog gekeken worden naar toerisme. Hoe kunnen boeren van toeristen profiteren. Tevens kan nog onderzocht worden hoe het toerisme zich gaat ontwikkelen na het uitvoeren van dit plan.



EXECUTIVE SUMMARY

The Mageler Es is elevated agricultural field on a sandy soil near the village of Den Ham in Twente, the Netherlands. Two Jewish cemeteries, with historical value, are situated on the Mageler Es. Since the 13th century the area is used for agriculture. One of most cultivated crops in the area is corn, which can grow one to four meters high, reducing the visibility of and within the area. The visibility of the area is of high interest for tourists and the villagers of Den Ham. Tourist info Den Ham wants to replace the corn with “old crops” such as wheat, spelt, barley, oats and winter rye; to restore the visibility and cultural history.

Data collection was done using quantitative and qualitative methods. Semi-structured and structured interviewed as well as online survey were conducted to data. This data was used for analysing the stakeholders’ perception on the area. Computation for current business model was done using gathered data in collaboration with information obtained from internet sources. This data was also used to get ideas for the new business model.

Literature study on issues affecting agricultural production in the area was done. Manure and environment was considered as major concerns, since farmers rearing dairy cattle grew corn as feed for their animals. Corn has ability to accept high usage of manure compared to other crops, thus they do not incur penalties for manure accumulation. Milk quota abolishment would even increase the production of corn further since farmers can increase the number of livestock reared. Crops characteristics was done to determine suitable old crops, to substitute corn gradually as farmers adapt to changes of corn production. Pesticide application especially on lilies was seen as hindrance to other crops being grown on the areas. Use of similar crop rotation land management practices would be suitable to achieve the attractiveness view of the Jewish Cemetery as well as retaining the soil fertility of the area. Subsidies can stimulate this project and would motivate farmers to shift from corn production to wheat production which was seen as the best alternative crop from the new business analysis generated.

Flower strips were proposed to add to the attractiveness to the landscape of the area as well as control of pests from affecting crops. The road signs should create more awareness and what the area entails and increase accessibility by all.

The stakeholder analysis was done for farmers, local businesses and the inhabitants. Farmers were willing to change to ‘historic crops’ production if they would be compensated for the difference in profit margin. The lily farmer was also interviewed to gather information on lily cultivation. The local businesses were not producing local products from the Mageler Es. Despite this, they were interested in selling local products, but only if there was a market availability for these products. The breweries and the distillery saw crops from the Mageler Es as an option to promote their product, using these crops will lower their carbon footprint they argued. For 42% of the inhabitants corn production was not a problem while for 38% corn production was a problem.



The data analysis showed wheat to be an option, as wheat will only cost €0.24 per kg. One kg of wheat is one kg of flour. A loaf of bread is made from a 500 g of flour. Thus one kg of flour can produce two loaves of breads. This means that a loaf of bread will be €0.12 more expensive. For gin one kg of wheat produces one liter of gin and thus per bottle of one liter the extra price will be €0.16. The price increase for both products suggests wheat is an option. Only €0.12 per bread extra, especially when looking at the prices of several breads. For gin the same applies, as gin is an expensive product this extra costs for the consumers is not seen as a problem.

The price of spelt increases per kg is €0.45. The same rules as for wheat regarding bread applies for spelt. This means the price per bread increases by €0.23.

The price for barley would increase with €0.29 per kg. This means that the price per bottle of beer (0,33l) increases with €0.03, one kg of barley is four liter of malt. The price of gin (1 liter per bottle) increases with €0.29, one kg of barley is one kg of gin. A pilot is needed to determine if the quality of the barley from the Mageler Es is good enough.

For winterrye and oats is determined they are not profitable to cultivate on the Mageler Es. This is because the extra costs for these crops are very high. Also there is not that much demand of these products, which makes that these crops are not an option to cultivate.

These findings led to several recommendations for the area. At first, there should be a crop rotation as this is more profitable in the long term for farmers. We recommend a similar crop rotation pattern for the farmers, consisting of potatoes, sugar beet, wheat and corn. There is chosen for this option, as it increases the visibility of the Mageler Es and the idea is manageable. We see wheat as an option to include and in the long run corn should be replaced by wheat. This is done over time so wheat will be profitable enough to cultivate.

There are several topics regarding the Mageler Es which are viable for further investigation. The Rabobank which has the capacity to buy empty farms and agricultural land; Mageler Es can be bought with help of this initiative. Secondly, quinoa a crop that is becoming popular in the Netherlands is an option to cultivate in the area. Thirdly, landscape corn which grow lower than the 'normal' corn. Fourthly, market research to investigate the marketability of local products. Within this market research there could also be looked at the possibilities regarding the mill in Ommen and Kalkwijck distillery. Fifth is about the crop rotation, what possibilities are there for crop rotations and how do different crops affect each other. Lastly, tourism can be researched on how farmers can benefit from the increase in tourism and how tourism in the area will develop in the future, especially after implementing this plan.



DISCLAIMER

Students of Wageningen University produced this report as part of their MSc-programme.

This report is not an official publication of Wageningen University or Wageningen UR and the content herein does not represent any formal position or representation by Wageningen University.

Dit rapport is gemaakt door studenten van Wageningen Universiteit als onderdeel van hun MSc-opleiding.

Het is géén officiële publicatie van Wageningen Universiteit of Wageningen UR. Wageningen Universiteit neemt middels dit rapport geen formele positie in, noch representeert het haar visie of mening in deze.



Table of contents

ACKNOWLEDGEMENT.....	ii
SAMENVATTING.....	iii
EXECUTIVE SUMMARY.....	vi
DISCLAIMER.....	viii
CHAPTER ONE.....	1
1. INTRODUCTION.....	1
1.1 Land consolidation.....	1
1.2 Stakeholder framing matrix.....	3
1.3 Research objective.....	5
1.4 Research questions.....	5
CHAPTER TWO.....	6
2. METHODOLOGY.....	6
2.1 Qualitative data.....	6
2.2 Quantitative data.....	6
2.3 Literature study.....	6
CHAPTER THREE.....	7
3. LITERATURE STUDY.....	7
3.1 Environmental issues on usage of manure.....	7
3.2 Milk quota.....	8
3.3 Flower strips.....	8
3.4 Crop characteristics.....	14
3.5 Pesticides.....	17
3.6 Subsidies.....	18
3.7 Crop rotation.....	21
CHAPTER FOUR.....	24
4. RESULTS.....	24
4.1 Stakeholder analysis.....	24
4.2 Data analysis.....	30
CHAPTER FIVE.....	37
5. RECOMMENDATIONS AND CONCLUSION.....	37
5.1 Crop rotation.....	37
5.2 Information and road signs.....	37
5.3 Flower strips.....	38



CHAPTER SIX	39
6. DISCUSSION	39
6.1 Rabobank.....	39
6.2 Quinoa.....	40
6.3 Landscape corn	40
6.4 Market research.....	40
6.5 Crop rotation.....	41
6.6 Tourism.....	41
REFERENCES	43
APPENDIX A	53
APPENDIX B	54



CHAPTER ONE

1. INTRODUCTION

The village of Den Ham was located in the 13th century at a very strategic place on the trade route of Zwolle to Twente: to protect their agricultural lands, farmers co-operated and established the local community 'Magele'. In the 17th century, land parcels owned by private parties as a reward for their services increased. Therefore, inhabitants were expanding to the rural surroundings outside the village Den Ham. They settled especially in Magele and along the edge of the 'Mageler Es' (Pruf'n en loer'n op en rondom De Mageler Es, 2015).

Since the 13th century, the Mageler Es has been used for agriculture. The Es is an elevated agricultural field on a sandy soil. Its high location is partly because of the way farmers fertilized the agricultural area in the past and partly because of geological influences (Stichting Brinkdorp Den Ham, 2014). The area is from a natural point of view higher situated due to geological processes years ago (Pruf'n en loer'n op en rondom De Mageler Es, 2015).



Figure 1.1: Left: The Jewish cemetery on top of the Mageler Es. source: De twentsche Courant Tubantia. Right: The Jewish stone with inscription on the cemetery. Photograph taken by authors.

The area is also rich in Jewish history. The Jewish community used to live here for a long time, in the year 1869 there were 72 Jews living in this area. The two Jewish cemeteries are a landmark of the Jewish history and are located in the Mageler Es. The cemetery on top of the Mageler Es is marked by a stone with the inscriptions 'תנצבה' which means; *her soul together in the bundle [of souls] of life* (fig. 1.1) (Stichting Brinkdorp Den Ham, 2014). The two cemeteries are classified as a "Rijksmonument", meaning that they are protected by law (Rijksmonumenten, 2015)

1.1 Land consolidation

Throughout the history, land parcel ownership changed from one person to another. The second legal land consolidation in Den Ham - Lemele took place from 1978 until 2008 and changed the structure of the area, quality and sustainability of the Mageler Es (Dienst Landelijk Gebied, 2015). This land consolidation was different from the first one. Not only agricultural interests played a role, but also social developments were taken into account.



Representatives of nature, landscape and environment sector became more important in designing the area. Businesses were very small and water management was not sufficient. In 1985, 344 farms were present in the area (Canon van Overijssel, 2015).



Figure 1.2: The Mageler Es in 1832. (Watwaswaar, 2015)

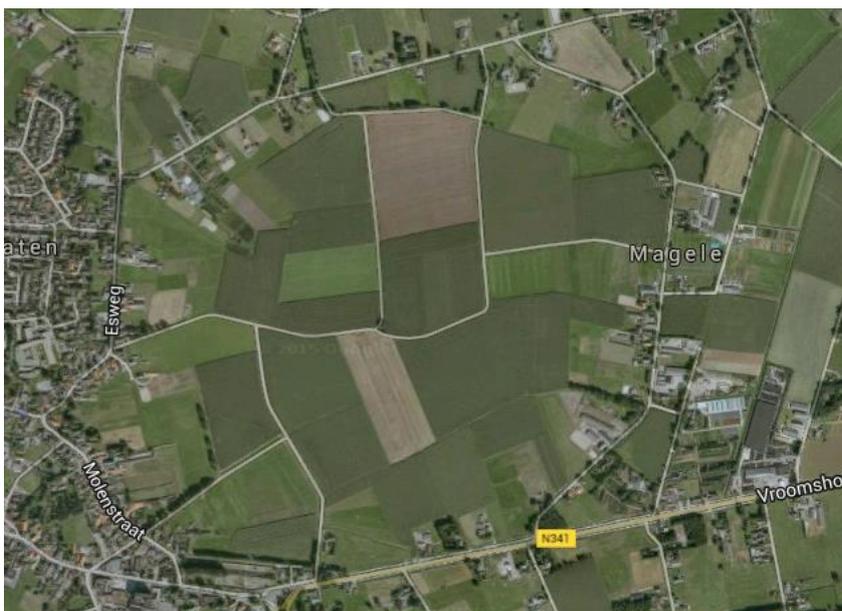


Figure 1.3: The Mageler Es in 2010. (Google Maps, 2015)

During the land consolidation several things happened. Ditches were dug, roads have been improved, nature areas were created, farms resettled and the consolidation was strongly improved. However, the small diversity and mosaic of agricultural lands took place for the more monotonous bigger agriculture land owned by several farmers (Canon van Overijssel, 2015). Figure 1.2 shows the area in 1832. This is long before the land consolidation but it still gives an idea of how the landscape changed over time. The difference is clearly shown when comparing it with figure 1.3 which shows the area after the land consolidation. Figure 1.2



show a lot of small parcels of lands, whereas in figure 1.3 fewer but bigger parcels on the Mageler Es can be seen.

The cultivated products in the past were exclusively used for their own needs, animals and humans. Owners of the land owned different companies, cultivated different crops; so the parcels were small (Tourist Info Den Ham, 2015). Last decades mechanization in agriculture increased and the parcels were getting larger. Currently the area is used for growing mainly corn, which is used for animal feed production (Tourist Info Den Ham, 2015). Farmers, who cultivate the land, but do not have to be the owners, make use of crop rotation and make their own profit. Crop rotation is a practice of growing different crops in the same area in sequential seasons ((Encyclopedia Britannica, 2014). Den Ham has 1740 inhabitants (Stadindex, 2014), who make use of the Mageler Es in different ways. Not only for farming, but also for recreation. Due to its convenient location local villagers and tourists go there for a walk and enjoy the area. Along with the strong connection to the inhabitants of Den Ham, the Mageler Es has also a cultural value because of the Jewish cemeteries and the agricultural history. The corn growing on the Mageler Es can grow up to two meters (van Schooten et al., 2014), reducing the visibility of the Mageler Es and the two cemeteries. Therefore, the perception of the area may change and reduces people's relation to the area. To improve the nature value and the perception of the Mageler Es, tourist info Den Ham has started a project where they want to increase the visibility of the Jewish cemetery by replacing the cultivation of the currently grown corn with 'old' crops such as wheat, spelt and winter rye among other crops. These local and 'old' crops are expected to be purchased by local businesses such as bakeries and breweries. The tourists will then eat and drink local products that are made with products originating from the Es. This would be the ideal situation so that the villagers and the tourists can Pruf'n en loer'n (taste and view) the Mageler Es.

1.2 Stakeholder framing matrix

Several stakeholders are involved. Tourist info Den Ham is highly interested as it was the organisation that started the initiative to improve the nature value and the perception of the Mageler Es (Tubantia, 2015d). Other stakeholders with high interest were Landschap Overijssel, Municipality Twenterand and Village council Den Ham. We arranged these stakeholders to their level of interests and their level of influence in a stakeholder matrix (table 1). Even though these stakeholders were considered to have high level of interest concerning the subject, they had to be kept informed on the project progress thereafter updating the local villagers and tourists. Although Landschap Overijssel conserved and protect landscapes, they do not have real influence in the area (Meeting, 2015). Despite that they had the possibility to help, for example by funding the project or by giving advice. This was the same for the municipality Twenterand and Village council Den Ham. Both wanted a nice landscape for tourists and villagers to visit but they did not have the power to determine which crops are cultivated by farmers. The inhabitants of Den Ham and the tourists that came from all parts of the Netherlands (Meeting, 2015) had high level of



interest. The possible changes would be made for them and they would benefit from it. Even though, they do not have much decision power.

The local businesses were also placed in the group with minimal effort. Local businesses are considered to be trading entities that are located locally, in and around, and sell their products to the inhabitants of Den Ham: Bakeries, restaurants, hotels, pubs, breweries (including one distillery). Most of them trade products from other areas. The new business plan would increase accessibility and availability of the crops for trade to the local businesses; so local products could be produced. Moreover, not all the local businesses are probably willing to cooperate, but the information has to be disseminated to all for awareness creation on the economic implication of different crops. This enables local businesses to determine what to make from the local crops and how to promote these products. There will be differences in how the products and crops would be used by the different businesses in this group. For example a bakery needed wheat from the Mageler Es, while a restaurant for example does not need this wheat. The restaurant needs the bakery for supplying the bread made from wheat of the Mageler Es. So within these groups there are direct (using the crops itself to make a product) and indirect (sell the local product produced by someone else) uses, thus the complex group.

The key player were the farmers as they determined how the area would look like. They had high interests, they need enough land in the area to increase their yield hence generating more profit. They also determine what would be grown in the area, they have no restrictions or rules determining the crops to be cultivated. This meant that they determine how the landscape would eventually look like. This is especially the case for two farmer companies, who own one-third of the whole area. They are one of the key players involved in this project, therefore it was important to contact these companies as well and talked with them. All farmers, including the two companies, determine what would be grown and therefore influencing the visibility of the area. Differences in crop heights may alter the view and thus the nature perception. This made the farmers being the key player in this area.

The municipality Twenterand, tourist info Den Ham and the inhabitants were the most involved. These stakeholders were also part of the solution, as they could give information and insights.

Most stakeholders hope that the area would get a better view so it becomes more attractive and indirectly better for businesses, local economy and more pleasant for the locals and tourists to visit.



Table 1.1: . A stakeholder power/interest matrix. (adapted from Olander, S., & Landin, A. (2005). The involved stakeholders are shown and are divided among 4 categories based on the level of interest the stakeholder has and the amount of power regarding the Mageler Es.

	Low level of interest	High level of interest
Low level of power	Minimal effort <ul style="list-style-type: none"> Local businesses 	Keep informed <ul style="list-style-type: none"> Tourist info Den Ham Landschap Overijssel inhabitants of Den Ham Tourists Municipality Twenterand Village Council Den Ham Local businesses
High level of power	Keep satisfied	Key players <ul style="list-style-type: none"> Farmers

1.3 Research objective

The goal of our research is to create a profitable business plan for the Mageler Es. This business plan aims to increase the perception of the area by improving the natural, historical and cultural values.

1.4 Research questions

What business model has to be developed to meet the stakeholders' expectation: increasing the view of the landscape and maintain profitability for the farmers?

By using different sub-questions, we try to answer this question. The following sub-questions are defined:

1. What is the situation of the Mageler Es when taking into account nature value, nature perception, the cultivation of current crops, economic implications?
 - How are different stakeholders related to the area?
 - What is the current production situation?
2. What is the alternative business model?
 - What is the expectation for the new business in economic and environmental aspects?
 - What is the new crop production situation?

We will study the possibilities of introducing historical crops, instead of the corn which is mainly cultivated. Finally we will give some recommendations on how to improve the Mageler Es by giving an overview of the different options and discussing their feasibility.



CHAPTER TWO

2. METHODOLOGY

Qualitative and quantitative research survey was used to gather the explanatory (holistic) opinion of different stakeholders and descriptive information on the economic viability of the project.

2.1 Qualitative data

The qualitative data was used for the stakeholder analysis. Different questions were used for different categories of respondents who were selected randomly. The data was obtained through interactive interviews with the breweries and local businesses using semi-structured questionnaire. The observation made during our stay in Den Ham were merged with the interviews for analysis. For inhabitants, an online survey (which can be found in the appendix) was conducted. The online survey, was useful for obtaining more respondents within a shorter time period. The survey questions were open and closed, to get a better insight of the perception and attitude of the villagers towards the project. The survey questions focused on their attitude, perception, awareness of corn cultivation and if it was hindering the visibility of the Jewish cemetery and the kind of local products available in the area. In total two breweries, nine local business and 122 inhabitants were interviewed. Nine inhabitants that live along the Mageler Es were also interviewed in an interactive way.

2.2 Quantitative data

A different questionnaire was used to interview farmers and contractors. The two categories were grouped together and in total eight farmers were interviewed using structured and semi structured questionnaire. The questions covered respondent details, land size and crop production, cost of production and earnings, cross-compliance issue on subsidies, manure issues and environment. This helped us in determining the economic implication for the current business model and the new business models.

2.3 Literature study

Literature studies on the pesticides, subsidies, milk quota, crop characteristics, manure usage and environment, the flower strips and crop rotation were obtained and the information were useful for advising the way forward on production in Mageler Es.

Crop yield data was obtained from Central Bureau of Statistics (Centraal Bureau voor Statistiek (CBS), 2015), while the crop cost were from Schreuder et al (2012) and the market price were obtained from (Lei, 2015). These were used to determine the current and the alternative business model of the area.



CHAPTER THREE

3. LITERATURE STUDY

During the project, we faced different topics which were important for us. We conducted a literature study to obtain the relevant information we needed to bring this project to a good end and make sound conclusions. The following topics of interest will be explained below: Manure use, milk quota, flower strips, crop characteristics, the use of pesticides, subsidies and crop rotation.

3.1 Environmental issues on usage of manure

The disposal and usage of animal manure has been seen to be harmful to human health, air pollution as well as reducing quality of water in Europe (Sharpley, 1994). Thus excessive use of nitrogen and phosphor are harmful to the environment. This has been a major concern of the European countries to reduce the use of animal waste in corn and grassland. According to Schröder (2005), manure application in grassland is maintained from 330 – 340 Kg Nitrate per ha per year and when the grassland is used for cutting and grazing the application drops by 60 Kg Nitrate per ha per year to meet the environmental goal. Corn being used for silage manure usage is 170 – 200 Kg per ha per year.

Currently, overall deposition in the Netherlands is limited to 170kg nitrogen per hectare per year (Rijksdienst voor Ondernemend Nederland, 2015a). But exceptions can be made if farmers fulfil certain rules that is 80% grassland and 20 % corn (derogation). When farmers fulfil the conditions, they are allowed to deposit more manure on their land. Only farmers with a lot of grassland are qualified. For 2014-2017 the derogation limit for sandy soils in Overijssel is set at 230kg nitrogen per hectare per year. One kg of manure contains around 0.5% of nitrogen (Bokhorst, 2015; Distrimest, 2015; Ecochem, 2015; Hengel, 2015; Saskatchewan Soil Conservation Association, 2000). Farmers on the Mageler Es may therefore deposit $(230\text{kg}/0.005\text{kg})=46000\text{kg}$ manure on their land (Rijksdienst voor Ondernemend Nederland, 2015a).

In the Netherlands grass and corn are grown for feeding dairy animals (Schröder, 2005). Corn and grass harvested, there share on feeding the animals and climatic conditions are factors contributing to the amount of manure to be used. Finally limiting the application of manure in grass and corn to 45-60 Kg and 30-35 Kg per ha per year.

Farmers are challenged on the best management practices to use to dispose of manure without incurring additional penalty for overproduction. Sharpley (1994), reported that farmers should use their cooperatives to establishing cost sharing programs; thus both producers and consumers share the cost of manure and lifting the burden from the farmers only. Even though, this impacts negatively on the consumer who might again be the producer; they determine the demand for the farm products. Thus the cost implication is widely spread. Hence all are liable for sustainable environment.



The use of conventional tillage has also been seen to be a good practice for crops such as wheat grown during winter; taking up nitrogen at least 27% to 33% (Raun, 1999). Conventional tillage is a land management practices that improve soil moisture content, reduces cost of production and impact positively on sustainable environment. Therefore this practice shows the advantage of growing wheat in Den Ham compared to corn (Holland, 2004).

3.2 Milk quota

Another important topic we had to take in consideration is the milk production by dairy farmers. Several farmers in the area keep cattle for milk production. The cattle feed mainly on grass and corn. These farmers grow corn to feed their animals. Corn is an important feed for the cows due to its high quality which is fundamental for a high milk production (Delaval, 2015). From the 1st of April 2015, the milk quota was abolished in the European Union (EU). This gives the farmers the opportunity to increase the number of dairy cows kept for milk production. Jongeneel et al, (2015) reported that there will be about 17% increase in milk production in the coming decade. This increase is related to inter alia the milk price. It is expected that milk prices will drop because of the price war which is setting to break out after abolishment. Abolishment of the milk quotas allows dairy farmers to produce as much milk as they like without suffering a financial penalty. This is especially the case for countries like Ireland, Germany and the Netherlands, who plan to boost exports of milk and other dairy products (Poulter, 2015).

Through interactive conversations with the local farmers, we gathered that the Netherlands was always lagging behind in the milk production, due to milk quota, despite being efficient in the sector. With abolishment of the milk quota resulting to increase on number of animal hence high milk production, farmers have to increase corn cultivation as feed. Therefore it is difficult to refrain from their current corn production. So we can conclude that the abolishment of the milk quotas is for this project a unpleasant side issue.

3.3 Flower strips

3.3.1 The importance of flower strips in agricultural areas

Pollination plays an important role in the conservation of wild flowers and agricultural production (Potts et al., 2011; Gallai et al., 2009). Global changes led to a decrease in biodiversity. An example is the intensification in the agricultural sector which had an enormous impact on the biodiversity of insects (Schweiger et al., 2007). This intensification causes a strong decline of the insect biodiversity in agricultural areas (Benton et al., 2003). Besides the honeybee (*Apis mellifera*) 2000 other bee species exist in Europe. In a lot of countries this group shows a big decline (Rasmont and Mersch, 1988; Biesmeijer et al., 2006; Goulson et al., 2008).

The flower strips are designed mainly for increasing the landscape quality. In addition, the strips have positive ecological values. Flower strips attracts a lot of pollinators like hoverflies



(Olthof, 2014) and can therefore act as a natural pest control. Hoverflies, beetles, spiders and parasitic wasps who all are attracted by the flower strips, feed on aphids that can damage agricultural crops (Alebeek, 2008; Landis, Wratten & Gurr, 2000).

Also Winkler (2007) showed that flower strips are resources for the natural enemies of possible pests. A positive correlation could be observed between parasitism by wasps and the presence of flowers (fig. 3.1).

Parasitism in presence and absence of flowers

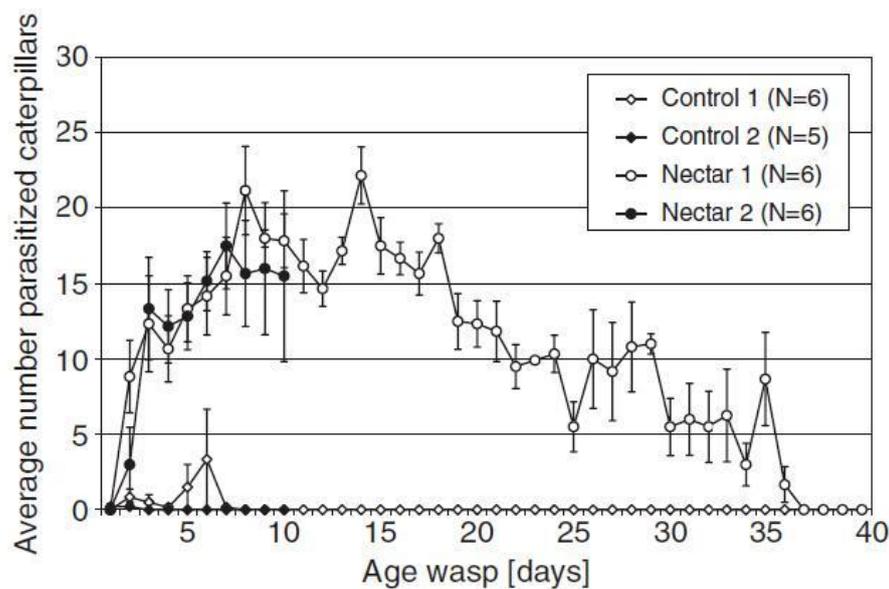


Figure 3.1: The relation between parasitism by wasps and the absence of flowers (Winkler, 2007)

In total, the flower strips can increase the landscape perception and attracts fauna species who act as either crop pollinators or as pest predators. This makes it very interesting for farmers to create flower strips along their field margins.

3.3.2 Design

By using google earth and images of the Mageler Es, we defined potential places where flower strips can be created. In total we defined six potential sites for flower strips and one extra potential green path (fig. 3.2). There were already plans made about where to create green paths and we will not explain that. We only defined one extra green path. The flower strips have a width between minimum 1 m and maximum 3 m. The lengths also differ between the field margins namely 54 m until 288 m. The only green path is located on the south of the Mageler Es (fig. 3.7). This green path has a width of 2.80m and a length of 217m.



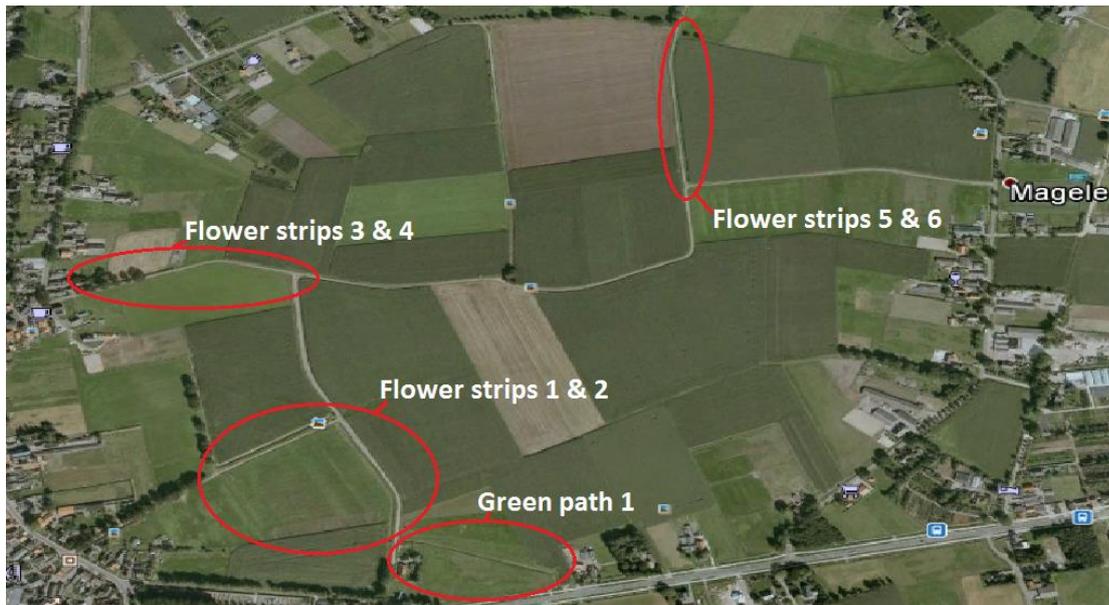


Figure 3.2: : An overview of the locations where to create the flower strips and the extra green path: (Goole Maps, 2015)

Table 3.1: Flower strip numbers and their characteristics. * costs are calculated by using the price index given by Cruydt-Hoeck (2015b)and can differ in reality.

Flower strip number	Length(m)	Width(m)	Surface area(m2)	Sowing costs (euro)
1	209	2.60	543.4	110.11
2	157	3.00	471	95.44
3	278	1.50	417	84.50
4	54	1.00	54	10.94
5	264	1.50	394	79.84
6	288	1.50	432	87.54
Total	1250	11.1	2311.4	468.37

Table 3.1 gives an overview of the different flower strips and their characteristics. We want to create flower strips along the field margins or road margins when possible. As can be seen from the images of google earth (fig. 3.2-3.7) we identified six potential places for flower strips and one for a green path. Flower strip 1 are located along the 'Vroomshoopseweg' next to the ditch. Flower strip 2 is located along the 'Zuivelstraat' and has the greatest width (3m) and is along the land parcel number N1448 (fig. 3.3). Flower strip 3 and 4 are located along the 'Holleweg' (near the Esweg; fig. 3.4). Flower strip 3 starts at the 'Esweg' till the junction with the 'Vroomshoopseweg'. Flower strip 4 is the smallest one and is located along land parcel N1515 between land parcel N1448 and the fence for entering parcel N1165. The last two strips are also located along the 'Holleweg' (fig. 3.5). These strips will be created on both sides of the road to make it more attractive when walking. Figure 3.7 gives an impression of what it will look like.





Figure 3.3: The location of flower strip number 1 and 2, the flower strips are yellow highlighted (Google Maps, 2015)



Figure 3.4: : The location of flower strip number 3 and 4, the flower strips are yellow highlighted (Google Maps, 2015)



Figure 3.5: The location of flower strip number 5 and 6, the flower strips are yellow highlighted (Google Maps, 2015)





Figure 3.6: The location of the extra green path number 1, the green path is yellow highlighted (Google Maps, 2015)



Figure 3.7: An impression of a flower strip along a wheat field (Alebeek, 2008)

The margins have enough width and no other agricultural crops will probably overgrow the flowers. More places are possible for creating flower strips but the risk is too high that the flowers will not thrive well enough. Probably because sunlight is being caught by the longer agricultural crops or the width was too small which can cause overgrown.

3.3.3 Flower species

A lot of flower species are able to grow on this type of soil. In general two distinction can be made in types of flower strips. Flower strips which grow one year and must be sown every year and flower strips which grow for several years and must be sown every few years depending on the flower species. The flower strips with species growing for several years have the purpose to enhance the biodiversity and provide food for the pollinators (Cruydt-Hoeck, 2015; Scheele & Gulp van, 2006). The strips growing for one year aim to provide e.g. birds shelter places for their natural enemies (Scheele & Gulp van, 2006). We try to identify flower species which can enhance the biodiversity and pollination of the crops. Therefore we propose the use of flower strips which grow for several years. This type of flower strips provide habitat for pollinators who need a stable environment for several years for their development (Cruydt-Hoeck, 2015). This means that pollinators will benefit from these



flower strips. A practical advantage of flower strips grown for several years is that they need less work and cost less (MediGran, 2015).

After some study we came up with a list of possible flower species which grow for several years and are suitable for pollinators (table 3.2)

Table 3.2: Flower species, their Dutch name and their colour: (MediGran, 2015).

Flower species	Dutch name	Colour
Achillea millefolium	Duizendblad	white
Centaurea nigra	Zwart Knoopkruid	purple
Campanula persicifolia	Prachtklokje	blue
Daucus carota	Wilde Peen	white
Galega officinalis	Galega	pink
Glebionis segetum	Gele Ganzenbloem	yellow
Lathyrus pratensis	Veldlathyrus	yellow
Lupinus perennis	Overblijvende Lupine	blue
Malva moschata	Muskuskaasjeskruid	pink
Medicago sativa	Luzerne	purple
Melilotus officinalis	Citroengele Honingklaver	yellow
Pastinaca sativa	Pastinaak	yellow
Solidago virgaurea	Echte Guldenroede	yellow
Veronica longifolia	Lange Ereprijs	blue

3.3.4 Maintenance

The flower species are sown in April (the whole month is suitable) along the land margins. Before sowing the seeds the location where to create the flower strips must be free of weeds. The less weed, the easier the maintenance of the strips the coming years. To remove nutrients from the soil, top soil removal can be done. This decreases the risk of overgrown by grasses later. The amount of seeds which must be sown is 2 gram per m². This brings our total amount at (2*2311,4=) 4,62kg of seeds. The sowing depth is about 1 of 2 cm and the seeds are covered with a little bit of soil. Afterwards the soil is being pressed with a Cambridge roller (Syngenta 2013). After 3-4 years sowing may again be necessary, because the flower diversity will decrease in time (Buzzy Seeds, 2015), due to high nitrogen and phosphor levels.

Another point of attention is the mowing activity. Mowing is needed in order to prevent the flower strip been overgrown. The flower strips must be mown two times in the first and second year. The mowing itself should be done end June-half July and half September on 10 cm. The coming years only once a year namely end June-half July (Syngenta, 2013). It is wise to do not dispose the cuttings immediately after mowing. This ensures the remaining seeds to drop, which can results in a germination of the seeds next year (Buzzy Seeds, 2015). Leaving the cuttings too long, results in a enrichment of the soil which can lead to overgrown (Morgenster-zaden, 2015).



Fertilizing of the flower strips should be prevented. A flower strip will do better on a soil which is relatively poor of nutrients (Ecoflora, 2015).

A part of the costs for creating and maintaining flower strips can be covered by subsidies. The subsidies which can be useful are explained later in this report in the subsidy part.

3.4 Crop characteristics

The crops explained below will be used in the data analysis. Barley, oats, rye, spelt and wheat are chosen, because they are seen as 'old' crops and are low growing plants. Potatoes and sugar beets are a good alternative for low growing crops and are probably more profitable than the 'old' crops. The crop that is used in agriculture the most nowadays is corn.

3.4.1 Barley (*Hordeum vulgare*)

Barley is a member of the grass family, and is the main cereal for Mediterranean agriculture (Zohary et al., 2012). The crop is cultivated for the grain yield and is used for different purposes. Initially it was used as a source for human food, for example bread and porridge, and animal feed. In early history the processes of malting and brewing were invented. The barley was and still is, used for making beer and whiskey. Another advantage of barley, apart from being an important agricultural crop for food and feed, is that it is used as a model species for biological research. (Von Bothmer et al., 2003) The height of the plant, when flowering, is 0.5-1.30 metres (Soortenbank, 2015). Barley is an annual crop, so every year the crop has to be re-sown. It can grow under a wide variety of circumstances, however the growth and development depend to a considerable extent of the temperature, light, water and minerals. (Timmer, 1999) The harvest of the crop is taking place in August. The harvested area is 5,558 ha and it has a gross income around 8.3 euro per 1000 kg for the year 2014. (Centraal bureau voor statistiek (CBS), 2015).

3.4.2 Corn (*Zea mays L.*)

Corn belongs to the family of grasses and originally comes from Central America. It is the most important crop for dairy farmers, where it is used as silage. In 2014, 60% of the corn is cultivated on sandy soils in the provinces Overijssel, Gelderland and Noord-Brabant. The height of the crop varies between one to four meters. (van Schooten et al., 2014.) The development, production and quality of the corn depends on several environmental factors: light intensity, length of the day, temperature, amount of nutrients needed and water supply. Corn needs about 160 to 190 liter water per kg, which is very low when compared with other crops. Dewatering of the area has also to be good, otherwise the soil will be too wet, which will decrease the yield of corn. (van Schooten et al., 2014) corn can be grown continuously, because it is not much affected by diseases in the soil. However it has a negative impact on the soil quality, because the harvest is probably done under wet conditions, which causes structural damage. Crop rotation in comparison with continuously growing of corn gives an increase of profit of about 3-7 %. (van Schooten et al., 2014.) The



harvested area is 226,151 ha per year and the gross income of corn in 2014 is 47.7 euro per (1000) kg (Centraal bureau voor statistiek (CBS), 2015).

3.4.3 Oats (*Avena sativa*)

During the Middle Ages Oats became an important crop in the food production for man and animal. It was used for soup, bread and oatmeal. Besides wheat and barley, oats was also used for the distillation of beer. The feed was mainly given to horses. (Darwinkel and Zwanepol, 1994) Nowadays it is cultivated much less. However it is a robust crop that does not need much manure and fertilizers. It also has a high resistance against diseases and needs a low amount of nitrogen, therefore it is a sustainable crop. (Anonymous, 2015) Oats is also part of the grass family. Height of oats is between 0.6-1.20 meters (Soortenbank, 2015). It fits well in different kinds of cultivation, thereby it plays an important role for the fertility of the soil. The only disadvantage is that oats is sensitive to rainfall and gusts. This does not have big consequences for the seed production, but makes harvesting oat much more difficult. (Anonymous, 2015) The harvested area is 1,751 ha and the gross income of oats in 2014 is 5.7 euro per 1000 kg. (Centraal bureau voor statistiek (CBS), 2015)

3.4.4 Potatoes (*Solanum tuberosum* L.)

Potato originates from South America a very long time ago. Around 1550 the potato was introduced in the Netherlands. The popularity of the potato grew because the farmers could produce potatoes on a large scale and grow it on fallow grain land. It has become a staple food. (National potato council, 2015) It exist of stems, roots and tubers. The germination starts from seeds potatoes, which are tubers which are grown to be disease free and provide consistent and healthy plants. The height of the plant is between 0.5-1.00 meter and the flowering time is between July and September. (Soortenbank, 2015) The yield of potatoes is influenced by climatic factors, for example drought and heavy rainfalls. For consumption potatoes, drought is not really a problem, because the consumption potato is compensated by a higher price (for better quality) than for starch potatoes. (Schaap et al., 2009) The potato is also sensitive for diseases controlled by climatic circumstances. It is recommended to use crop rotation for root-crops with cereals. This way the structure of the soil and plant improves and diseases by nematodes will decrease. (Schaap et al., 2009) The harvested area is 74,608 ha and the gross income of consumption potato in 2014 is 52.3 euro per ton. (Centraal bureau voor statistiek (CBS), 2015)

3.4.5 Rye (*Secale cereale*)

For a long time rye has been the main crop to make bread (Allen, 2015). This changed after the 18th century, when wheat became over time the most popular crop for bread. Rye is still used for making bread, whiskey and beer (Nieuwe Granen, 2015). It has a length of around one meter, thus does not reduce visibility of the Mageler Es (Botanical-online, 2015). Also there is option for winter rye, as this type is more frost resistant and can be planted later than summer rye. This means there is less crop loss and the shorter planting-harvesting period means less man hours are needed, making it less labour intensive and thus more cost efficient (Timmer et al., 2015). The last reason is that rye is very weather resistant and thus



will generate an income every year as the chance it fails are very slim (Allen, 2015). The harvested area is 1,720 and the gross income is around four euro per 1000 kg. (Centraal bureau voor statistiek (CBS), 2015)

3.4.6 Spelt wheat (*Triticum spelta*)

Spelt wheat could be an option as well for the Mageler Es. Spelt is a type of wheat that has increased in popularity in recent years (Dominicus, 2014, Ravenshorst, 2014). It is an old European crop that can survive harsh conditions and can be grown without pesticides (Bonafaccia et al., 2000). The height of spelt can be around 60-140 cm (soortenbank.nl). The increased popularity of bread made from spelt is because it is supposed to be healthier than normal bread. Furthermore, it is regarded as an old grain, increasing its popularity even more. Spelt is also used in products such as beer (the Pauw brewery uses spelt in their beers). This increase in popularity could be used in the business model for the Mageler Es. During a phone conversation with the miller in Ommen, he also indicated that spelt has increased in popularity and that the demand has increased.

3.4.7 Sugar beet (*Beta vulgaris subsp. vulgaris var. altissima*)

Sugar beet is a plant that contains sucrose in its roots. It is grown for sugar production. The photosynthesis in the rosette of leaves from the sugar beets forms the sugar and is stored in the root. The root exist of 75% water and 25% dry matter. 5% of the dry matter is pulp which is used for animal feed. And 75% of the dry matter is sugar, so this gives a sugar content in the beet if about 18%. It prefers a humid climate with dry and sunny periods just before harvest. The roots can have a length of 15-35 cm. In the first year the sugar beet produces sugar. If the growing cycle continues, the second year the sugar beets will be reproductive. All the sugar is used to produce seeds. That is why sugar beets are sown in spring and harvested in autumn, early winter. Transportation after harvesting has to be fast, because the sugar content drops rapidly when sugar beets are lifted. The harvest of sugar beets last for three months. The sugar beet has to be delivered to the factory located within 30 km radius by the growers. To preserve the sugar content the storage time has to be as short as possible. One ton of sugar beets yields between 130 to 160 kg sugar, 500 kg of wet pulp and 38 kg of molasses, a viscous syrup used for alcohol fermentation and yeast. (FAO, 2009) Sugar beet plays an important role in the crop rotation cycle. The rotation for the crop is 1:4 years. (Veeneklaas et al., 2001) The harvested area is 75,094 and the gross income of sugar beet in 2014 is 90.7 euro per ton (1000 kg). (Centraal bureau voor statistiek (CBS), 2015) Because of the relative high and fixed saldo, sugar beet is an important crop in the agriculture. (Veeneklaas et al., 2001)

3.4.8 Wheat (*Triticum aestivum*)

Wheat provides 21% of the people of food and is cultivated on 200 million hectare all over the world. 5000 years ago wheat arrived in the Netherlands coming from the Middle-East. Wheat is also part of the grass family like corn. It is mainly used for baking of bread, because of the proteins and animal feed. (Schaap et al., 2009) Also pasta, biscuit and starch are



produced by wheat and in the future it can probably be used as alternative energy source (bio)ethanol. Wheat can grow under divergent circumstances, however the development, production and quality of the wheat is influenced by several environmental factors such as temperature, light intensity, water and nutrients. (Darwinkel, 1997) The harvest of wheat depends on drying of the grain and stalk. For processing the wheat into food, especially (light) bread the grain has to be dry enough. When the quality of wheat does not meet the requirements for making bread it is used for animal feed. (Darwinkel, 1997) Wheat is preferred in crop rotation to keep the pressure of diseases low. The population of nematodes, which are harmful for root-crops decreases, because they cannot multiply during a year with wheat (Schaap et al., 2009). The height of the plant is between 0.7-1.60 meter and the flowering time is between June and July (Soortenbank, 2015) The harvested area is 142,212 ha and the gross income of wheat in 2014 is 9.7 euro per ton (1000 kg). (Centraal bureau voor statistiek (CBS), 2015)

3.5 Pesticides

Most crops are being sprayed with several pesticides in order to protect them from pests. Possible environmental and human health problems are due to usage of pesticides, creating pressure against their use. In the past few weeks there were a lot of worries about the use of pesticides in Twente (Tubantia, 2015a; Tubantia 2015b), especially pesticides being used for lily cultivation. In the Mageler Es, lilies are cultivated, hence the discussion was also relevant for this project.

The regional newspaper the 'Tubantia' also commented on the use of Metam-Natrium. This is a harmful pesticide causing human health problems (Coster et al., 2008). According to the lily owner in Mageler Es the pesticide has been forbidden and not being used for pest control. Also other lily farmers claimed that most farmers do not use metam-natrium anymore (Tubantia, 2015c)

The European Union has forbidden the use of Metam-Natrium in Europe because of its toxicity, but European countries can be exempted for using Metam-Natrium. The Netherlands has that exemption for the bulb cultivation to combat the stem nematodes in the soil (*ZEMBLA: Lelies met een luchtje*, 2013). Also to the 'Koninklijke Algemeene Vereeniging voor Bloembollencultuur' (*kavb*, *english: the 'Royal General Bulb Growers' Association*) says that it is not forbidden to use Metam-Natrium, but since last year it is that difficult to use Metam-Natrium in practice, that it is practically not applied anymore. Rules include: keeping enough distance to buildings, 100m to be exactly. Also after using Metam-Natrium the land must be covered with a special type of foil, the use of facemasks and gloves are required etc. Because of all these rules and restrictions, users of Metam-Natrium are looking for alternatives. Therefore the *kavb* expected that there will be in 2015, no use of Metam-Natrium anymore in Twente. On 27 May 2014, the pesticide Metam-Natrium is provisionally forbidden in the Netherlands (Telegraaf, 2015; Vroegevogels, 2014). Later that year, August 2014, the use of Metam-Natrium is again allowed under certain conditions



mentioned earlier (De Gelderlander, 2014; RTV Oost, 2014; Nederlandse Voedsel- en Warenautoriteit (NWVA), 2015).

Lily farmers try to minimize the use of the pesticides by applying a wide crop rotation. This is not required by law, like it is for the potato industry. Lily farmers know by own experience that intensively using their land leads to more crop diseases.

Kavb reported that lilies are mainly grown on the East of the Netherlands since it had hardly been cultivated before in that area. This corresponds to the fact, that lily farmers apply a wide crop rotation as earlier mentioned, hence higher yields and healthy flower bulbs.

What pesticides do lily farmers use to protect their lilies? According to the board of lily cultivation, farmers are allowed to use these days the pesticides given appendix 1. But every lily farmer has its own preferences and it depends also for which pest they use it.

In the future, an alternative approach for pest control can be used (U.S. Environmental Protection Agency, 2015). Non-chemical alternatives are cultural practices, choice of resistant varieties, creation of an environment favourable for natural enemies of pests, and use of biological products and agents, including beneficial insects. To farmers using chemical pesticides, we advise them to alternate between different pesticides to prevent resistance. More research is needed to gain more knowledge on the consequences of using pesticides, especially regarding the environment and human health.

3.6 Subsidies

3.6.1 LEADER and project subsidy culture Twenterand

The Dutch rural development programme (POP3) has 59.2 million euros available for the period 2014-2020 in Overijssel (Provincie Overijssel, 2014). Part of this programme is the LEADER subsidy, also known as “Community-Led Local Development”(CLLD). It is a European subsidy program for rural development, funded by European Agricultural Fund for Rural Development (EAFRD) (The European Network for Rural Development (ENRD), 2015). This subsidy aims to support small innovative projects who contribute to a liveable and economic agricultural area. According to Noord-Holland Noord, those initiatives do not have enough support for planning and financial contributions. Therefore cooperation and improving organizational capacity of a local community is very important (Ontwikkelingsbedrijf Noord-Holland Noord, 2014). For instance, in the province of Overijssel local organisations have to send in a local development plan before the 1st of May, 2015. The quality of the plans are judged by a national committee. If the plan is approved, in October 2015, the local organisation will receive subsidy. (Provincie Overijssel, 2014) LEADER is not only a financial support but also gives advice to promoters. This is done by the local group who knows the area. The Mageler Es is a project which is still eligible to receive LEADER subsidy.

This project meets the objectives of the LEADER approach, which are: Strengthening the identity of nature, culture and history; merging of nature, history and agriculture area with touristic and recreational value; strengthening of the relation between village and



agricultural area; strengthening the transmission of knowledge from institutions to rural enterprises; and collaboration. There are also criteria which should be met by the project, for example the project needs to have equal opportunities for all parties and it should be a small scale project. (LEADER West Twente, 2015)

In the budget design the Mageler Es is subsidised with 5000 euros for creating an education route (“Pruf’n en loer’n op en rondom De Mageler Es”). This subsidy is called project subsidy culture Twenterand and is part of the ‘Oranje fonds’. It is for organisations, which are socially meritorious on the area of art, culture, health and tourism. (Twenterand Actief, 2015) The organisations receive a small contribution to the costs of cultural activities in the project. These activities can improve the accessibility for a broad audience. Such a subsidy is mostly temporary. Moreover a subsidy is mainly meant to bridge a transition from one situation to another. It’s not aiming to cover all the costs but should stimulate the realisation of the project. In the end the project should be self-sustaining. (de Haas, 2015a) A project like the Mageler Es is eligible for this subsidy. A lot of other funds and subsidies of the province Overijssel could also be useful for this project. For example the new ‘Noaberschap’ fund, which is meant for small social initiatives coming from neighbourhoods, villages (de Haas, 2015b). We will not look further into subsidies as it is a very broad topic which needs his own research report. It is only mentioned to give an idea of the subsidy possibilities. Currently they are out-sourcing for subsidy possibilities for Mageler Es.

3.6.2 Subsidy for potential flower strips

To establish flower strips on field margins, money is often needed to stimulate this. Therefore farmers can rely on the ‘Botanisch waardevol akkerland’ subsidy which is from the national subsidy program by the management organization ‘Subsidiestelsel Natuur en Landschap (SNL)’. Farmers may qualify for two different types of subsidies which aim for a higher flora diversity (Portaal Natuur en Landschap, 2015). The subsidies aim to conserve and expand the botanical values of agricultural lands. To reach this goal it is important that a seedbank of field weeds is present in the soil. Farmers who want to make use of this type of subsidy must grow grain species in a rotation of six years with the exception of corn. To be more specific minimal three of the six years, grain species must be grown on the land. The decision on the kind of crop to grow on the remaining years depends on the farmer as corn is not allowed. One extra point of attention is that the farmer is not allowed to use fertilizers. Because no fertilizers are being used and the restriction of controlling weeds, make the conditions very favourable for the development of flora along the field margins. Below there are explanation for two different subsidies and their requirements and the amount of subsidy. Note that the amount of subsidy is based on numbers for the year 2015 (Portaal Natuur en Landschap, 2015).



A02.02.01 'Akker met waardevolle flora'

Subsidy requirements

- The management unit consists of agricultural land.
- The management unit has a size of at least 0.5 hectare.
- Make use of the other types of 'Botanisch waardevol akkerland' subsidy is not allowed.
- The year before the contract, four different crops must be grown at company level including grain. Waste land/ undeveloped land is also considered as a crop species.
- Growing corn during the whole period of this subsidy is not allowed.
- During the years grain species are grown (corn not allowed), no fertilizers are used.
- During the years grain species are grown (corn not allowed), no mechanical weed control is allowed in the management unit from the moment of sowing (summer grains) or from the 1st April (winter grains). The use of chemical weed control and pesticides is not allowed, except for patch wise use for creeping thistle, bitter dock, cleavers or bindweed.

Differences in the amount of subsidy exist, because of the differences in crop rotation. The amount of subsidy for arable fields with valuable flora is:

- A02.02.01a Arable field with valuable flora: three of the six years grain species are grown, with the exception of corn € 149.63
- A02.02.01b Arable field with valuable flora: four of the six years grain species are grown, with the exception of corn € 441.76
- A02.02.01c Arable field with valuable flora: five of the six years grain species are grown, with the exception of corn € 521.60

A02.02.03 'Akkerfloraranden'

Subsidy requirements

- The management unit is used as agricultural land.
- The management unit is located on field margins.
- The management unit has a size of at least 0.3 hectare.
- Make use of the other types of 'Botanisch waardevol akkerland' subsidy is not allowed.
- Only grain species must be grown (corn not allowed) during the management period.
- During the years grain species are grown (corn not allowed), no mechanical weed control is allowed in the management unit from the moment of sowing (summer grains) or from the 1st April (winter grains). The use of chemical weed control and pesticides is not allowed, except for patch wise use for creeping thistle, bitter dock or cleavers.
- The use of fertilizers and grazing is not allowed.
- The management unit cannot be used as 'wendakker' which is the field margin on which the farmer turns his plow.

Field margins which meet the requirements for flower strips can get € 1652.31.



It is possible for the farmers on the Mageler Es who want to establish flower strips along their field margins, to get subsidy for that. Especially the last one (A02.02.03 'Akkerfloraranden') is more for establishing flower strips along field margins. However, to qualify for the subsidy a lot of requirements must be met. It can be difficult to achieve these for the farmers, therefore it depends mainly on the willingness of the farmers/ owners of the land to create flower strips or not.

The municipality of Twenterand owns also grass margins along the road and along some ditches on the Mageler Es. These margins could be very useful in establishing flower strips. Therefore there is ongoing consultation with different parties to look at the possibilities for subsidies. (Portaal Natuur en Landschap, 2015).

3.7 Crop rotation

Crop rotation is cultivation of crops in a given pattern. For example a farmer cultivates one year corn, the year thereafter potatoes, the year thereafter grass and then again corn etc. This is the principle of crop rotation. If crop rotation is done the right way the yield of crops can be higher. The reason is that usage of crop rotation can restore soil quality ((Encyclopedia Britannica, 2014); Reeves, 1997; Karlen et al., 2006). This yield is increased because the different crops have different effects on the soil. To make this clear Professor Philip Poole quoted (Turner et al., 2013): "Changing the crop species massively changes the content of microbes in the soil, which in turn helps the plant to acquire nutrients, regulate growth and protect itself against pests and diseases, boosting yield". So crop rotation is good way to restore soil quality and increasing the yield.

To ensure the farmer remains on the same income level, we should include crops in the crop rotation which are just as profitable as or even more profitable than corn. For instance, growing of wheat or barley together with potatoes in one crop rotation is in favour of the potato production. Potatoes are susceptible for potato nematodes. Potato yields increase on average when using wheat or barley in the same crop rotation, because these two historic crops are poor hosts which reduce the risk of nematode damage. As comparison, corn is an intermediate host (Hopkins et al., 2004).

The order of the crops in a crop rotation could also be of importance. Hopkins et al. (2004) indicated that inserting of a grass crop (such as wheat, barley or corn) between broadleaf crops (such as potatoes and sugar beets) allows a farmer to use a phenoxy herbicide. This has the advantage that it is less costly and has its effect in a different way than other pesticides (Hopkins et al., 2004).

To increase the historic crops gradually and the current lower prices for potatoes we propose to start with a crop rotation with the following crops: corn, sugar beets and a historic crop such as wheat. We assume a crop rotation of four years. From the start of the project the crop rotation could be two years of corn, one year of sugar beets and one year



the historic crop. When the farmers are satisfied, the amount of years corn is grown can be reduced. Then the rotation could be: one year corn, one year sugar beets and two years a historic crop.

Unfortunately a crop rotation with corn, sugar beets, potatoes and wheat leads to a high risk of wireworms which can affect the yields (Gibson, 1958). Also the combination of sugar beets and corn in one rotation increases the risk of root rot in sugar beets, because corn acts like a host plant for the *Rhizoctonia solani* pathogen (Büttner & Petersen, 2004).

Berzsenyi et al. (2000) showed that the yields of corn and wheat were lower in a monoculture than in a crop rotation. For corn this is especially the case after a dry winter, particularly if the summer was also dry (Berzsenyi, Győrffy & Lap, 2000). Also according to Feizabady (2013), wheat being used in a crop rotation with sugar beets, potatoes and/or corn resulted in an increasing yield of wheat compared to a monoculture of wheat (table 3.3).

The study investigated the following crop rotations with wheat. An overview is given in table 3.3:

- wheat-wheat-wheat-rapeseed-wheat (wwwrw)
- wheat-sugar beets-wheat-potatoes-wheat (wswpw)
- wheat-corn-wheat-potatoes-wheat (wcpw)
- wheat-wheat-wheat-wheat-wheat (wwwww)

Table 3.3: The different crop rotations and their yields; W, R, S, P and M are wheat, rapeseed, sugar beet, corn and potato, respectively. (Feizabady, 2013)

Crop rotation	Returning crop residues to soil (%)	Economic yield (kg.ha ⁻¹)			
		2007	2008	2009	2010
WWWRW	0	5542.0 W*	3698.0 W	3681.0 W	7006.0 W
	50	6252.0 W	3934.0 W	3896.0 R	8071.0 W
	100	6011.0 W	3904.0 W	3889.0 R	8488.0 W
WSWPW	0	77833.0 S	3838.0 W	21519.0 P	7033.0 W
	50	86667.0 S	3594.0 W	25407.0 P	6514.0 W
	100	81333.0 S	4528.0 W	23130.0 P	7279.0 W
WMWPW	0	49491.0 M	4438.0 W	19012.0 P	7524.0 W
	50	57942.0 M	4090.0 W	22668.0 P	7538.0 W
	100	58461.0 M	4644.0 W	25790.0 P	7970.0 W
WWWWW	0	5792.0 W	3386.0 W	5607.0 W	5751.0 W
	50	6972.0 W	3505.0 W	6163.0 W	5873.0 W
	100	6417.0 W	3506.0 W	5430.0 W	5639.0 W

Because these are possible crop rotation with wheat included, farmers can decide to use one of these rotation patterns. Again, farmers can choose in the beginning for a crop rotation with two years corn. An example could be: corn-wheat-corn-potato. We assume that if



farmers prefer another historic crop, which is possible. This is because the historic crops we researched, belong to the same group, cereal grains. Also Aubinet et al. (2009) mentioned that a crop rotation such as sugar beets-wheat-potatoes-wheat is typical for Western Europe.



CHAPTER FOUR

4. RESULTS

4.1 Stakeholder analysis

4.1.1 Farmers

For changes to be made in the management and business model of the Mageler Es, the most important (as shown in the stakeholder matrix) stakeholders for analysis were the farmers and contractors that have land or rent land on the Mageler Es.

A total of five farmers and three contractors that have or rent land on the Mageler Es were interviewed. All farmers and contractors interviewed, indicated that they grow corn, either always (in combination with grass) or in rotation (with for instance beets and potatoes) to ensure the quality of the soil.

Although most farmers have other lands in the vicinity of the Mageler Es, they prefer to grow their corn on the Mageler Es because of the soil quality. The reasons for growing corn is either for feeding their own cattle (and sell the milk) or to sell the corn to other farmers who use it for cattle feed. Corn was seen as an important source of the livelihoods of the farmers and contractors. For most of the interviewed farmers, the (in) direct incomes from the corn cultivation are their main incomes. Most of the farmers also said that corn was the most profitable (and least labour intensive) crop to cultivate. According to the farmers interviewed, changing from corn production to “old crops” such as wheat and barley, would result in a decrease in yield leading to a declined income compared to current income level. However, most of them (six out of eight) were willing to change if they would be compensated for the margin difference in income level either through subsidies or increase on the price of new crop introduced. Two farmers were not willing to change, since one of them cultivate corn to feed his cattle and argued that it is cheaper to grow corn than to buy corn as feed for the cattle. To another farmer, corn production was his business entity and feared shutting down as he will lose his business and the effective use of his specialized corn processing machine.

For the dairy farmers, changing to alternative crop will give an additional problem. This is because they use the manure from their cattle on corn cultivation. According to the farmers a lot of manure is applied (highest amount on grass). Therefore changing to alternative crop, probably less manure would be used resulting to excess manure at their disposal. Hence incurring additional cost of disposing manure. Thus need to compensate farmers for the extra cost to produce an alternative crop.



Lily farmer also rent approximately 2.5 hectares of land on the Mageler Es for production of the flower. Farmers had different opinion towards cultivation of lilies. To some the pesticides applied on the lilies destroys the soil. While other farmers were not certain of the consequences of cultivation of lilies. According to the lily farmer he uses the same pesticides applied on potato farms. The problem is that lilies requires frequent spraying hence pesticides amount used is distributed over a long duration as they handle limited amount per spraying compared to potatoes. After the lilies are removed, the soil is restored and he pays a lot of money for that. He also commented that the use of dangerous pesticides such as metam natrium had been forbidden since December 2014 and stopped using the product ten years ago. It was also remarked by farmers that the prices of renting land in Mageler Es has gone up due to the lily farmer paying 2500 euros per hectare, while earns about 50,000 euros per hectare.

4.1.2 Local businesses

4.1.2.1 Breweries

There are two breweries in the area, brewery Berghoeve and brewery De Pauw, analysed differently due to their different viewpoints.

Brewery Berghoeve

Berghoeve is a brewery with a nationwide market. It produces products with malt delivered from a German moulter. They sell beer with extreme flavours, for example beer with a coffee taste or beer with spices in it. For this reason, Berghoeve does not have interest in the Mageler Es for promotion of local products, as they state only 1% of their market is regional. The reason why they have interest in products from the Mageler Es is the reduction of carbon footprint. Although the barley cultivated here has to be transported to Zeeland (Province in the Netherlands), which also results in CO₂ emission making the carbon footprint bigger. This is because 'Zeeland' has the capacity to moul small amounts of barley. Thus, the question if malt made in Zeeland makes it a local product? Quality of the products is also a problem, there is no guarantee that the quality of the cultivated barley would be good. It would use the barley when the quality is guaranteed.

Brewery De Pauw

De Pauw has a regional market, in contrast with Berghoeve. There are also interested in barley from the Mageler Es. Although the Brewer thought that barley from the Mageler Es would have only a marginal extra value. Probably because the local market is located in Ommen and not Den Ham. In Ommen they drink more specialty beer and in Den Ham they are more Grolsch drinkers (nationwide beer brand).

There are differences between the two breweries. Berghoeve is only interested in local production because of decrease in carbon footprint, and is doubting what the lower limit of the carbon dioxide should be. De Pauw brewery is interested in the barley and has no problems with the quality since it buys malt from somewhere else. Both understand that there are higher costs when buying barley from the Mageler Es, but the costs should be



reasonable. The market for their product is low in Den Ham and both the breweries are producing at full capacity. Thus they are not able to increase their level of production, in case of increase in demand for their products. Thus producing beer as local product is not the best option for Mageler Es.

4.1.2.2 Kalkwijck Distillery

Kalkwijck distillery is located in Vroomshoop and is interested in rye and barley for their gin, liquors and whiskey production. They are the smallest distillery in the Netherlands, but the only distillery in the BENELUX (Belgium-Netherlands-Luxembourg) which use their own grown crops as wheat, potatoes, rye and corn. According to Kalkwijck distillery, they want more land to expand their distillery to increase production capacity; the Mageler Es would be an option. Since they have a nationwide market promoting their products. So the distillery is not an option to produce local products. The reason they are interested is that crops from the Mageler Es have a lower carbon footprint. Lowering carbon footprint is a hot topic at the moment they said. This in combination with the other hype, using local products, makes the distillery seeing cultivated crops from the Mageler Es as an option. Despite that the Kalkwijck is a local businesses the crops will not be used for local products, but for increasing the image of the distillery. As seen from a market perspective, wheat coming from the Mageler Es is not interesting, because the market is wide. For example a buyer in Groningen does not know the Mageler Es and is not willing to pay more, because the wheat is from the Mageler Es.

4.1.2.3 Bakeries

There are four bakeries in Den Ham. Due to circumstances we were only able to interview two of them. The two interviewed bakeries are willing to use wheat from the Mageler Es. Although what they will do with it will differ. One will only use the bread not as a main bread: bread will be made in small quantity. The amount of wheat from the Mageler Es would probably be too low to produce large quantity of bread to be sold as a main bread. The other bakery would produce sandwiches to sell in their terrace. They are certain the price of local products will be higher and have no problems with that but there would be a maximum. When the prices will be too high the bread will be too expensive and the consumers will buy cheaper alternative products. Thus, they are willing to cooperate and buy wheat from the Mageler Es to make local bread and sell.

4.1.2.4 Flower shop

Next to the Mageler Es, there is a flower shop, Weideman Bloem & Groen. This flower shop uses coniferous trees to make the line of demarcation visible. The reason the flower shop is a stakeholder, is because of the search for a possibility to remove these trees. The owner is willing to remove these trees, but he will not pay for their removal. He also grows Christmas trees, which he is not willing to remove. He owns 4 hectares of land planted Christmas trees next to his shop; his main source of income. He has a conflict with the council of Den Ham since his land is not rectangular; has all kinds of projections. Although the Christmas trees will not be removed, one has to wait for their beauty on landscape.



4.1.2.5 Hospitality industry

The hotel and catering industry is relatively big in Den Ham due to the big amount of tourists who visit the area in the summer. There is one enterprise which is really focussed on the local and regional products, the campsite 7 Zaligheden. They state there is a market for these products, although the other enterprises state this market is not really there. When looking at the market they doubt if local products will work. At the moment they are not really bought, mostly by tourists. So there is no certainty local products will work. The good point is that the enterprises have no problem with an increased price for a local product but the price has to be reasonable.

4.1.2.6 Miller in Ommen

In Ommen, there is a miller who sells flour and bread, made from grains that are partly grown by him. The owner of miller was aware of the project and was enthusiastic about keeping historical values of places like the Mageler Es (Hammer Es as he called it). He uses about 60 tons of grain per week and willing to buy his raw materials from the Mageler Es if concrete plans would be made. He also commented on the raising popularity of spelt wheat and oats which are of high interest to him. This shown the importance to look for outside market rather than only Den Ham.

In conclusion, local businesses are interested in local products but the following shall be taken into consideration; the quality of the crops grown, the price of the local products as well as promoting sale of the local products to increase consumer preference to increase their demand. To ensure that local products have a long life and will be sold, promotion is needed. Cooperation also help to promote the products and that their market is big enough as it is then sold everywhere and enough money is invested to keep the production at a high level and the costs low to sustain these products.

4.1.3 Inhabitant

The perception of the inhabitants of Den Ham is important. If we know their perception we can have more insight about the current situation of the Mageler Es. If the values and norms which people have about the area is neutral regarding corn, no certain action might be necessary. Therefore, a survey was placed on the Facebook page “Leven in Den Ham”, to see how people think about the Mageler Es. 122 followers filled in the survey, 61 filled it in completely, 61 only the first two questions, which was about the age and gender. The results of the survey show that the people are connected to the area and want to give their opinion. Most of them like to go to Mageler Es for a walk, because of the view, nature and silence. There are a few people that do not visit the area. They see the area as a farmland, not as a special area. The answer to the question ‘*what makes the Mageler Es special, according to you/ what are the characteristics*’ is very diverse. Openness, sand paths, the road to the cemetery, location and view are mentioned. A few said something about the agriculture crops and quality of the soil. An important characteristic is the Jewish cemetery, with the



seven trees, on the top of the Es. Almost all respondents know that corn is cultivated and grass is grown on the Mageler Es. Other listed crops are rye, potatoes, beets, bulbs, lilies, wheat. The answer to the question *“Do you think the crops hinder the visibility of the Mageler Es? If yes, which crops would you recommend to improve the visibility and attractiveness of the Mageler Es?”* is divided. Some respondents answered that you have to leave the Mageler Es the way it is, because it is part of the area. Others would like to have low growing crops, which makes the area more attractive and create more view. Examples mentioned are potatoes, rye, oat, barley, linseed, wheat and lavender. Another opinion is using a lot of crops, to increase the diversity on the Mageler Es. The response to the first question is shown in figure 4.1. 42% indicated that they think corn is not a problem and 38% percent indicated it was. The other 20% either did not give an answer (3%) or did not know (17%). This shows that the opinions are divided and that about half of the respondents with a usable response did not think corn was a problem, while the other half thought it was. Second part of the survey is about local products. 31% of the respondents never buys a local product, whereas 62% do buy a local product. 7 % of the respondents had a reply that was not applicable. The reason that people do not want to buy local products is because they think it is too expensive or do not know where to get it. The people that buy a local product, often bread, are doing it weekly or monthly. 49% of the respondents are not willing to buy a local product coming from the Mageler Es for an additional price (fig 4.2). However when there is no additional price added to local product people are willing to buy more local products monthly from the Mageler Es than local products elsewhere (fig. 4.3). There is a decrease in buying local products daily when the products are coming from the Mageler Es. Bread is the product people prefer to buy if the local product is coming from the Mageler Es (fig 4.4). Also honey, which is not yet made on the Mageler Es, is preferred.

Overall can be concluded that people are connected to the area and want to give their opinion. The perception about the Mageler Es is divided. For some, corn as a crop on the Mageler Es is no problem, it is part of the area. Others like to have a more attractive and visible Mageler Es with low growing crops. Most of the respondents do not want to buy local products from the Es for a higher price. However when local products from the Mageler Es are on the market for almost the same price as ‘normal’ products people are willing to buy.



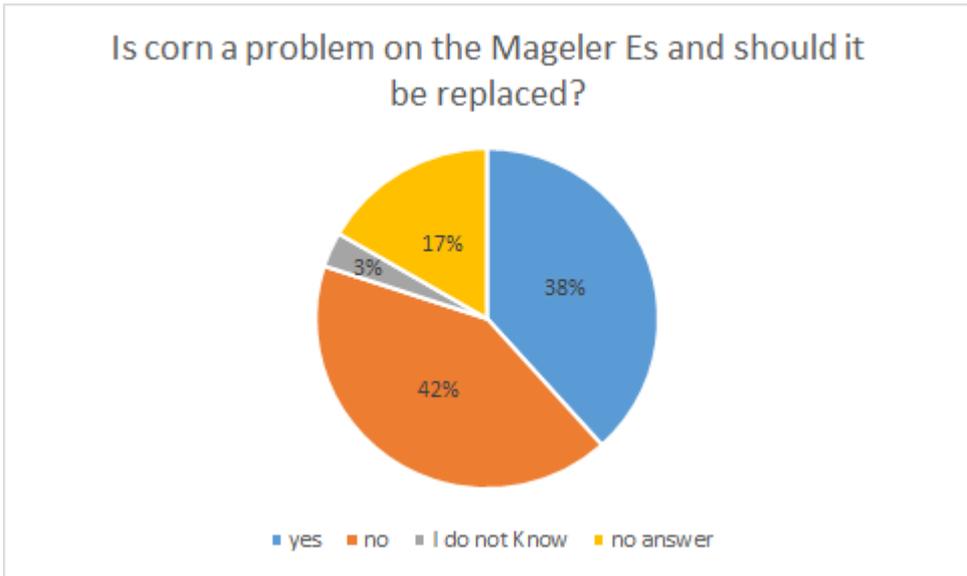


Figure 4.1: The responses of the inhabitants on an open question in the questionnaire about visibility problems because of crops. The answers were converted into yes, no, I do not know and no answer responses (n=61).

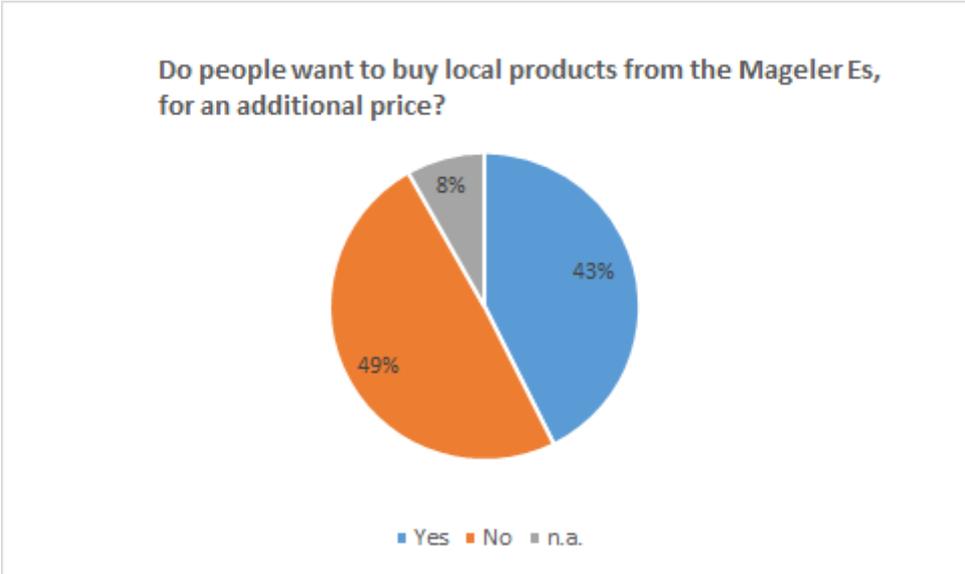


Figure 4.2: Percentage of respondents who want or do not want to buy local products for an additional price (n=61).



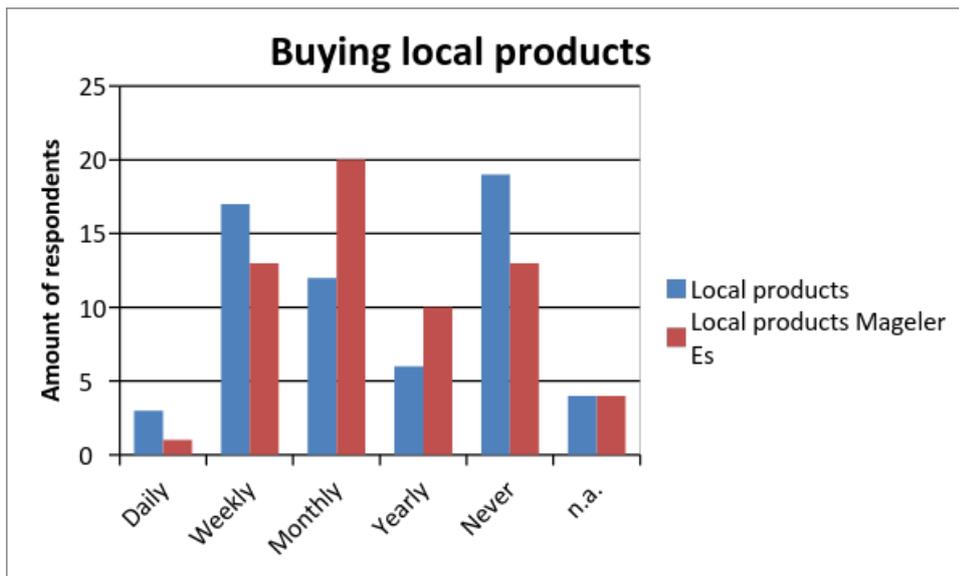


Figure 4.3: Comparison of the amount of respondents buying local products with the percentage of local products they are willing to buy when the products are coming from the Mageler Es (n=61).

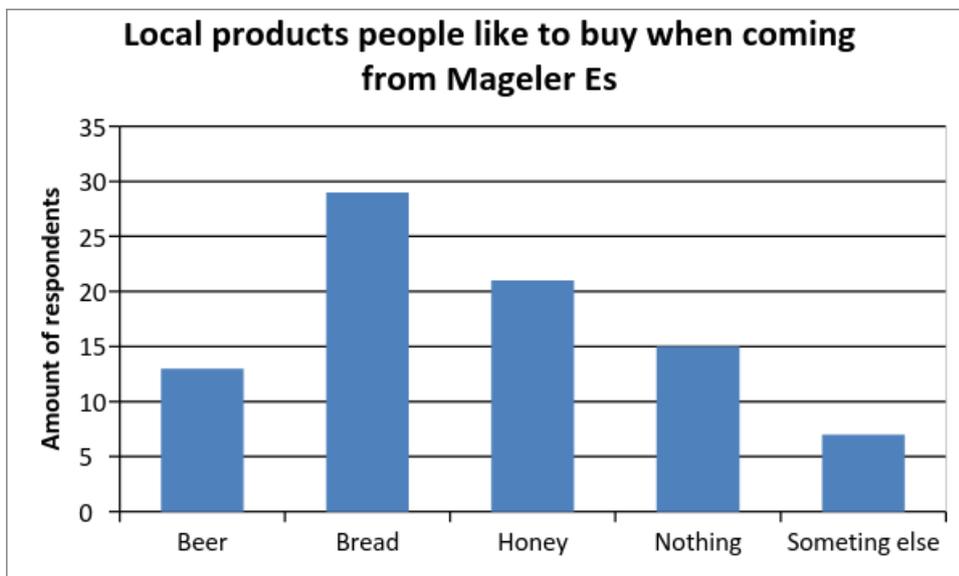


Figure 4.4: : Different local products which could be produced from the crops cultivated on the Mageler Es. Something else includes wine, vegetables, potatoes, fruit (n=61)

4.2 Data analysis

In table 4.1 the crops that might be an option to cultivate on the Mageler Es are shown. There was an idea to cultivate flax, however an article on the site of Groene Kennispoort Twente (Bakker and Ritsema, 2015) showed that it was not an option that could be seen as profitable enough to cultivate. As can be seen in the table lilies (only 1 in the 6 years), sugar beets and corn are the most profitable crops. Lilies are only shown because they are cultivated in the area, to give an indication of income for lily farmers. Therefore lilies are not preferred and will not be further analysed. Thus to replace corn, solutions have to be found to increase the income for different crops to make them profitable enough. Sugar beets and corn have low market prices, but are much more profitable. The reason is the yield in 1000



kg/ha. Figure 4.5 gives a good overview about the yield of different crops over several years. It shows that the most profitable crops are the ones with the highest yield and not with the highest market price. The profit of potatoes is negative. This loss has appeared due to a decrease in prices for 2015 which are not profitable enough. Potato prices are dropping, but when looking at whole years the price is high enough to make potatoes profitable (Lei, 2015). Table 4.2 shows how much each crop should be worth to equal the price of corn. The table does not contain lilies and potatoes. Lilies are not preferred and potatoes are at the moment not profitable enough, which will probably be restored during/over the year but at the moment analysing is not possible. What has to be mentioned is that these numbers are based on last year's market prices. Figure 4.6 shows the market prices over the last four years. As can be seen the prices are not constant.

Table 4.1: the yield, market price, gross profit, costs per hectare and the net profit for several crops in the year 2015 in the Netherlands.

Crop	Year	Yield 1000 kg/ha	Market Price per/kg	Gross Profit	Costs per ha	Net Profit
Corn	2015	47	0.059	2773	658	2115
Sugar beets	2015	98.8	0.036	3556.8	844	2712.8
Potatoes	2015	51.7	0.0395	2042.15	2620	-577.85
Lilies	2015	-	-	45000	15000	30000
Wheat	2015	8.9	0.17	1513	722	791
Spelt	2015	5	0.55	2750	2125	625
Barley	2015	7.8	0.167	1302.6	657	645.6
Winter rye	2015	4.8	0.2	960	595	365
Oats	2015	5.1	0.1674	853.74	496	357.74



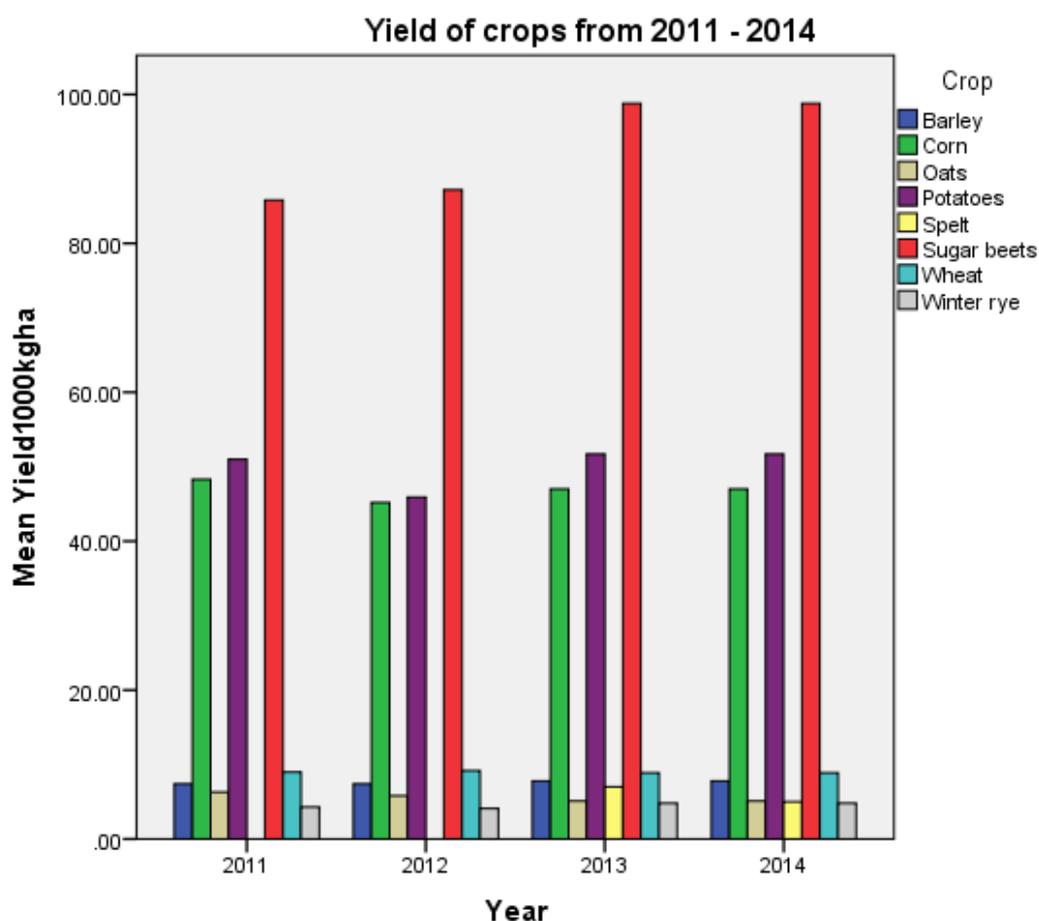


Figure 4.5: The yields in 1000kg/ha in 2011, 2012, 2013, 2014 for several common crop types.

Table 4.2: The old market prices, and the needed market prices to get the same profit per hectare as corn

	Old market price	Needed market price	Difference in euros	Needed price difference (including manure and machine costs)
Corn	0.06	0.06	0	0
Sugar beets	0.04	0.04	0	0
Wheat	0.17	0.32	0.15	0.24
Spelt	0.55	0.85	0.30	0.45
Barley	0.17	0.36	0.19	0.29
Winter rye	0.20	0.56	0.36	0.51
Oats	0.18	0.51	0.33	0.49

In table 4.2 the price for corn and sugar beets stay the same as they are the most profitable ones. There will not be further looked upon sugar beets, because they are already profitable enough. The other crops are not profitable enough in comparison with corn. So there will be looked at possibilities to compensate for this difference



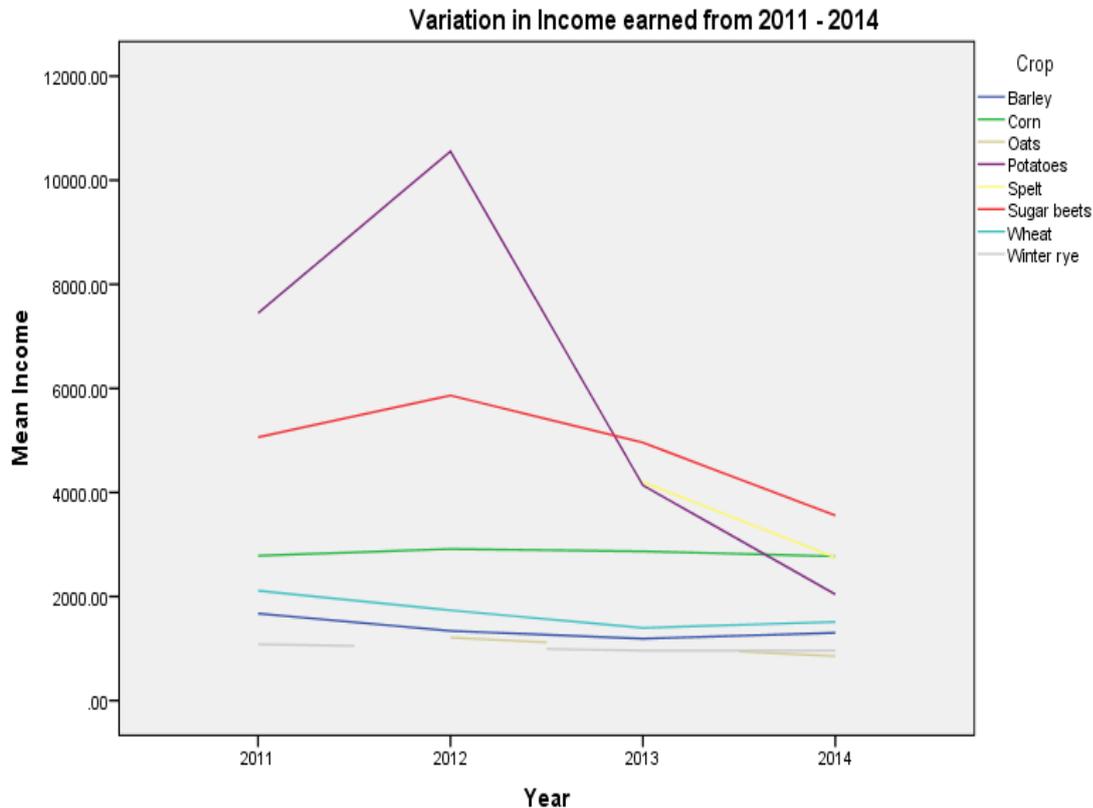


Figure 4.6: The variation in earnings per hectare over the last 4 years for several different crops.

4.2.1 New business model (options)

In this chapter we look at different old crops in the new business model. Here we will look how much the price of local products made from these crops has to increase, to make these crops profitable. This makes it possible to determine which crops are suitable for cultivation in the area.

4.2.1.1 Wheat

Wheat is the most profitable crop after corn and sugar beets. Several sources show that for baking one bread 500 grams of wheat flour is needed (Akkermolens, 2015; Bruinooge, 2015; Budgetstijl, 2015; De Nieuwe molen, 2015). One kg of wheat is one kg of flour. For one kg of wheat the extra paid price is €0.24 (see table 3). This is divided by two (two loaves of bread per kg wheat), which gives a price of 0.12 euro. This is €0.24 includes the compensation for the extra manure costs and the machinery costs. These calculations will be discussed later in this report. Because corn needs more manure than wheat, the extra manure cost for wheat are around €690 per hectare. Nowadays a bread made out of wheat in Den Ham costs about €1.95 and €2.50 for a more special bread, that is made of multiple grains and pumpkin. With the increase of 0.12 cents per bread the price of a bread will be €2.07. The increase in price is low, making that there is maybe room for an extra price increase. Therefore more market research is needed.



Wheat in addition to other grains is also used for the distillery. One kg of the product makes one litre of gin. So for a litre of gin €0.24 cents has to be paid (manure costs included). The question is if the distillery is willing to pay this extra amount per litre of gin. The price of gin is already high in general and it is expected that buyers are willing to pay this extra price, although it is for the lower carbon footprint.

4.2.1.2 Spelt

Spelt needs much more processing than wheat which means higher costs. This combined with the low yield makes the price for spelt higher. Bakker Bart (the biggest baker in the Netherlands) sells a spelt bread for €2.60 while a wheat bread costs €2.05. Their most expensive bread is €2.70. There is chosen for Bakker Bart to get an indication of prices, as only the price for one baker was known. This baker only made spelt bread in the weekend, which made the price for spelt bread very high and not representative. Same as for wheat, around 500g spelt is needed per bread (Yellow lemon tree, 2014; Nieuwe Granen, 2015; Natuur Diëtisten, 2015; Laura's Bakery, 2014). This means the extra price to pay per kilogram, €0.45 (see table 3), can be divided in two. Meaning an increase in price of €0.23 per bread. The increase in price for a bread made of spelt is higher than the price of bread made out of wheat. This increase may not be a big problem, as spelt is becoming more popular. So probably there is willingness to pay more for this product. However the interviewed spelt farmer thought the price for spelt will decrease due to increase in amount of farmers cultivating spelt. With the decrease of the price of spelt an increase in economical compensation for corn occurs, making bread more expensive. Another problem is that spelt is very labour intensive. It probably becomes difficult for the Mill in Ommen to process very large quantities of spelt.

4.2.1.3 Barley

Barley can be used by the breweries and the distillery. They produce special products for which people are willing to pay more. A pub owner said that people know they have to pay more for a special beer and are willing to do that. The main problem next to the costs is the quality of barley. Barley which is used for malt has to be of a certain quality to make it usable for beer and gins. One kilogram of barley produces around four litres of beer (Anonymous, 2015; Quora, 2015 ; Togetherfarm, 2012). Calculated the same way as for wheat and spelt (difference in costs (0.20, see table 3) divided by 12 bottles (4/0.33)), the extra price per bottle of beer (0.33 l) is €0.03. The ratio of barley with gin is 1:1, meaning 1 kg of barley produces 1 litre of gin. The price of a bottle, which contains 1 litre of gin, increases with €0.29. Gin is an expensive product, so the increase in price will probably not be a problem. Although this price increase is because the gin is more eco-friendly (lower carbon footprint) and not locally produced.

4.2.1.4 Winter rye

Winter rye is used for making gin and bread. To produce gin the quality of winter rye has to



be good. For bread flour mixtures are possible, therefore the quality can be lower than for the production of gin.

Bread made out of rye is a niche market in the Netherlands, It is not sold by all the bakers and supermarkets sell it in low amounts. Therefore the demand for bread made out of rye is probably low, so extra advertising is needed, increasing costs to sell winter rye. Combining advertising costs and low demand leads to a situation where winter rye is not profitable to cultivate.

For distillery Kalkwijck, rye is not an option. As they do not use rye for their products. They do cultivate it but do it for soil improvement and at the moment have no idea what to do with it. So winter rye is not an option in the Mageler Es or other buyers must be found.

4.2.1.5 Oats

The increase in market price needed for oats to compensate for the price of corn will probably not be reached. The oats market is small, because oats are sold in small packages and is used in products for breakfast like cruesli from Quaker. This is only bought by people who are already interested in it and this will probably not attract people who never buy. As people in general do not buy a product that they never bought because it is locally. Also only a small land is available for cultivation, making it probably also too expensive in relation to what it really delivers to the locals and tourists. This makes that there will not be looked upon other costs like the manure, as oats are not seen as an option.

4.2.2 Costs

In this part the extra costs the farmers are faced with when growing the crops are mentioned. These costs are compensated for by incorporating them in the increased product price (Bread, beer and gin).

4.2.2.1 Manure costs

Because of the cultivation of the historical grain species instead of corn, farmers have an extra excess of manure. This is because historical grain species do not need that much manure to grow. To get rid of this extra manure a farmer has to pay extra. We translated this extra cost into the price of the end product which ensures that the farmer is not being faced with extra costs when growing historical crops. To calculate how much the price of the end-product goes up, we make use of the maximum deposition of manure. In that case we assume that a farmer has to get rid of extra 230kg of nitrogen in manure per hectare per year. Nitrogen is seen as the limiting factor as it is stated by the RVO (Rijksdienst voor Ondernemend Nederland, 2015b), State Agency for enterprising Netherlands. To determine the maximal extra manure we assume that the historical crops don't need any manure.



Table 4.3: The amount of manure and the price to get rid of this amount of manure.

Manure (kg)	Costs for disposing manure (euro)
1000	15
230 (for 1 ha)	690

From research we know that a farmer in Twente pays 14 euros to get rid of 1000kg manure. One kg of manure contains around 0.5% of nitrogen (Bokhorst, 2015; Distriest, 2015; Ecochem, 2015; Hengel, 2015; Saskatchewan Soil Conservation Association, 2000). This means that per hectare $230\text{kg}/0.005\text{kg} = 46000\text{kg}$. This means the extra costs are $(46,000/1000)*15 = \text{€}690$ per hectare are €644 euros (table 4.3).

4.2.2.2 Machinery costs

For the new crops new machines are needed to harvest. There are two options: A farmer can buy a machine or hire each year a machine which will cost extra. These extra costs are taken into account. The reason for the €0.01 increase is not only because of extra manure costs but also these extra machine costs. Total extra costs for the Mageler Es are calculated, as the whole price is needed to hire or buy the needed machines. The extra €0.01 makes an extra profit of at least €5750. This is calculated based on crop yield in kg, the extra income and the total area of the Mageler Es. The lowest crop yield is from spelt (5000 kg), the extra income €0.01 and the area size is 115 ha. This is multiplied and makes the total profit €5750 for spelt. This is the lowest profit possible as spelt has the lowest yield. Despite the calculation it is not realistic to assume all the farmers will work with it, so the total of this income is halved to get a better idea, thus €2875. This is not that high although on the internet there are second hands to be found around this price. When there is cooperation it should be possible to rent different machines. As for wheat this price is namely already €5117.50 which is much higher. Due to lack of information there should be looked further upon this topic and how realistic these idea is that the extra cent can pay the extra renting and buying costs. This is based on the fact that one machine is bought by more farmers together and used together.

4.2.3 Concluding remarks

Wheat, spelt and barley are options to cultivate in this area. This is not the case for winter rye and oats, due to their low consumer demands. The most suitable is wheat as it has more options and the market is more constant than the market for spelt. Also the quality can be lower than the quality that barley should have. This makes that wheat is most suitable, but there are opportunities for spelt and barley. For spelt (and for wheat and barley), the mill in Ommen has to be contacted about the amount which they can handle. When barley is seen as an option a pilot of one year is needed. So it is possible to determine the quality of the barley, which will be grown there, is good enough to use for beers and gins. This means that there should be money available to compensate if the quality of barley is not good enough.



CHAPTER FIVE

5. RECOMMENDATIONS AND CONCLUSION

Based on the interviews, literature analysis and calculations, the following recommendations were made on how to proceed with improving of the Mageler Es:

5.1 Crop rotation

Crop rotation can be used as an approach to introduce cultivation of wheat in the Mageler Es and minimize corn production. Crop rotation is recommended, because it is good for the soil and increases the yield of the grown crops. Farmers on the Mageler Es need to adjust to this farm management practice gradually so that after several years wheat becomes more profitable and parcels corn were grown are reduced. This gives the farmers' time to adjust to cultivation of wheat and the local businesses to prepare for selling local products. Therefore, we recommend use of a similar crop rotation pattern for all farmers growing crops in Mageler Es. The recommended crops for rotation are potatoes, sugar beet, wheat and corn to be grown annually on consecutive years on the same land parcel.

Literature study revealed potential problems when using corn and sugar beets in one crop rotation. To avoid the problem, we suggest to use a crop rotation with sugar beet not grown adjusted to corn. Because historic crops are wanted, they should be included in a crop rotation. Also farmers have their preference and they would probably prefer corn in the crop cultivation. Currently potatoes are grown in the Mageler Es and could be profitable, we also suggest to use potatoes in the crop rotation.

Taking the study of Hopkins et al. (2004) into account, it can be an advantage to alternate between a grass crop (such as wheat, barley or corn) and broadleaf crops (such as potatoes and sugar beets). Farmers can in the end choose if they want to alternate between grass crops and broadleaf crops. However, the crop rotation which could be profitable is a crop rotation with: corn, potatoes and a historic crop. After all, the crop rotations preferred by the farmers should align with each other to minimize the amount of corn being grown in one year. The implementation of wheat is regarded as feasible. This is because with an increase of 0.15 cents per kg, the profit for wheat will be the same as for corn. The increase in price per kg has to be paid by local business who will sell their products for a higher price. Several local businesses indicated being interested in the Mageler Es as a source for their products. Business that we recommend for to include in this this plan are the Kalkwijck distillery, the mill in Ommen and the bakeries in Den Ham. Further exploratory meetings with the Mill in Ommen are recommended.

5.2 Information and road signs

For promotion and information purposes, information signs are recommended to be placed. The signs can be used to explain what is grown and what is made of different crops growing on the Mageler Es. In this way the visitors get more information about the production chain from the cultivation of crops to the selling of the end-product. We also suggest that those



signs could give information of where to buy the local products. Therefore people know where to buy it, and the seller has already its publicity. This can stimulate the willingness of the local businesses in contributing to the project.

Another point of attention are the road signs. According to us and some inhabitants, the road signs are absent in the area. When walking, cycling or driving around the Mageler Es, no road signs show you where to go for visiting the Mageler Es. This is for the 'Hammenaren' itself not a problem but for tourists it probably is, because they don't know the area. Therefore we would advise to place some road signs along the roads which are connected to the Mageler Es (fig. 5.1). Road signs can be place along the following connection roads; Achteres, Vroomshoopseweg (N341), Esweg, Molenstraat and Geerdijk.

This together makes that people know how to reach the Mageler Es and if they are there, what is grown on the Mageler Es, what is made of the crops and where they can buy the end-product. The connection between crop cultivation and the development of the end-product makes it more interesting for tourists. Gaining more knowledge about what is done on the Mageler Es and why, will increase the connection with this area and a better understanding of the activities done on the Mageler Es.



Figure 5.1: The potential locations of the road signs around the Mageler Es: obtained from Google Earth. Pictures are at the potential location Holleweg-Geerdijk. © Rutger Olthof.

5.3 Flower strips

Flower strips are designed mainly for increasing landscape quality. In addition, the strips have positive ecological values. Flower strips attracts a lot of pollinators who have a positive ecological influence. Hoverflies, beetles, spiders and parasitic wasps who all are attracted by the flower strips, feed on aphids that can damage agricultural crops (Alebeek, 2008; Landis, Wratten & Gurr, 2000). So flower strips could be used for different purposes.



CHAPTER SIX

6. DISCUSSION

Collecting data was a challenge to obtain useful information. Several stakeholders were interviewed to gather useful information but not all of them responded. Time constraints also played a part, because certain views could not be taken into consideration. The questionnaires were filled in by enough people, but about half of the people filled it in incorrectly due to difference in understanding and interpretation of the questions.

Obtaining data from one source about the current market of crop products was difficult. Therefore we used different sources for certain crops to come up with all the prices and compute the economic model. This might differ with the current market prices at the farmers' level in the area. However, still our conclusion and recommendation holds that wheat would be a better option to be grown gradually by the farmers in the areas, if visibility of the area is to be increased. This is because farmers are attached with corn production and abrupt change would demotivate them from production and lead to conflicts in the area. And despite the uncertainty of the exact prices and yields, the price of wheat as part of the price of the final product is very small but does not affect the conclusion.

Corn production can only be reduced in stages since most of the farmers grow the crop to feed their animals and with the abolishment of the milk quota demand for dairy production might increase. However farmers should be able to produce environmentally friendly, thus over application of manure on corn farms has to be limit. This will control the number of animals they rear. So promotion of wheat production is important, despite the high corn yield at the moment.

There are some examples of projects where almost the same has been done, setting up a new business plan with historic 'old' crops These examples are Ommen (province of Overijssel) and Liempde (province of Noord-Brabant), where corn is replaced by old crops. This shows that there are possibilities to replace corn.

The following topics are suitable for further research in the area;

6.1 Rabobank

Current trend shows that more and more agricultural lands are being abandoned; no crop grown (Platform31, 2015; Remie, 2014). To overcome this problem Rabobank is an alternative, because it is able to buy farms or land on the Mageler Es. Given the opportunity to buy the land and farms, the landscape beauty of the area can be sustained. Since similar crop rotation pattern recommended earlier can easily be applied as well as retaining the Jewish cemetery visibility. This can be done by opening a region bank account where the local businesses can deposit their money to earn interest. After a specific period of time the interest earned together with a certain amount donated by the Rabobank is used to acquire the farms or the land (Rabobank, 2015). The businesses have also the option to donate their extra income by interest to a foundation, to realize the plans. The Rabobank has also



Cooperation Funds for different regions (Rabobank, 2015). These funds are given by the Rabobank for specific projects. The plans have to be clear, realistic and they have to be finished within a year. So research can be done to see if there are possibilities to use one of these two options to make the Mageler Es more attractive.

6.2 Quinoa

Quinoa is also suitable crop to be grown in Mageler Es with yield of 2.5 tonnes per hectare, for and estimated profit of €1.30 per kilogram. The farmer incur €400 per hectare to plant and maintain the crop. Thus earning a profit of €2850 per hectare, even though labour costs have not been deducted. These costs might be high, since most of the maintenance activities are being done by hand as machinery and chemicals are not used in the production of the crop. This means everything has to be done by hand, like weeding and harvesting; labour intensive. This takes a lot of time and thus increase labour costs. Also a combine harvester is needed which is able to harvest the quinoa but not all farmers have such a machine and need to buy or rent it, also increasing costs.

The profit can thus be high, but further research is needed. Positive points about this crop is that the height for the species grown in the Netherlands varies between 1.20 to 1.60 m. The amount of nitrogen needed is 120-150kg per hectare which comparable with the amount of manure for corn.

There are also still many risks regarding the emergence of the plant and the harvesting of it. Plant emergence can be low thus more seeds have to be planted to account for this loss. The harvesting is also a problem. It is done in the first or second week of September which is late. It can occur that when the temperature is not right and September is too wet the plant will not be ripe enough to harvest, which means a crop loss and thus income loss.

So there are still a lot of things which have to be further researched about this crop. Because it has only be grown since 2014 and knowledge is lacking about the crop growth in the Netherlands. So when it is regarded as a good opportunity for the Mageler Es, further research needs to be done to get more insight in the options of quinoa.

6.3 Landscape corn

Another option could be the so called “landscape corn”. This corn is lower than the “normal” corn and will therefore keep the visibility of the area. The yield in kg of this crop per hectare is lower than the “normal corn”. In comparison with normal corn, landscape corn has a bigger corncob and the quality of the corn is higher. We did not investigate on the feasibility of this crop, but it might be an option to cultivate in the area.

6.4 Market research

Our calculations were based on the assumption that the farmers still get the same income by increasing the price of the end-product. This is probably not how the market price is expected to be computed. Therefore, research about the supply chain of the crop; from



harvesting to end product after adding value, ready for consumption, need to be incorporated for detailed price computation. Another possibility is to determine if prices can even increase more, resulting to higher profit. Hence, more profit made and there is the possibility to replace corn in the long term for these more profitable old crops. Within this market research there could also be looked at the possibilities regarding the mill in Ommen and Kalkwijk. Thus to see if our study is feasible, further market research is needed.

6.5 Crop rotation

As crop rotation can be part of the solution, more research has to be conducted regarding this topic. Questions which still needs to be answered in detail are: What is the sequences of the crops in the crop rotation and what are possible crop combinations.

6.6 Tourism

Lastly, tourism can be researched on how farmers can benefit from the possible increase in tourism. Topics which could be investigated are setting up a cycling route or walking trail which contains the whole production chain from growing the crop on the Mageler Es to a place where the end-product can be bought and tasted. Another topic which can be researched is how the tourism in the area will develop in the future, especially after implementing this plan.





REFERENCES

- Akkermolens. (2015). *Recepten*. [online] Available: <http://www.akkermolens.nl/Recepten.htm> [Accessed 23 Apr. 2015].
- Alebeek, F. (2008). *Functionele Agrobiodiversiteit (FAB)*. [Online] Available: <http://www.kennisakker.nl/kenniscentrum/document/functionele-agrobiodiversiteit-fab> [Accessed 24-04-2015]
- Allen, T. (2015). *The World Supply of Fall (Winter) Rye* [Online]. University of Saskatchewan. Available: http://www.usask.ca/agriculture/plantsci/winter_cereals/winter-rye/production.php [Accessed 22-04-2015].
- Anonymous. (2015). *Haver is een duurzaam gewas* [Online]. Wageningen UR. Available: <http://www.wageningenur.nl/nl/Onderzoek-Resultaten/Projecten/Haver/Teelt.htm> [Accessed 22-04-2015].
- Anonymous. (2015). *How much barley would it take to make sixteen gallons of beer*. [Online] Available: http://www.answers.com/Q/How_much_barley_would_it_take_to_make_sixteen_gallons_of_beer [Accessed 28 Apr. 2015].
- Aubinet, M., Moureaux, C., Bodson, B., Dufranne, D., Heinesch, B., & Suleau, M. et al. (2009). *Carbon sequestration by a crop over a 4-year sugar beet/winter wheat/seed potato/winter wheat rotation cycle*. *Agricultural And Forest Meteorology*, 149(3-4), 407-418. doi:10.1016/j.agrformet.2008.09.003
- Bakker, E. and Ritsema, H. (2015). *Deteelt van olievlas zand- en dalgrond*. [online] Stichting Vlasmanifestatie, p.24. Available at: <http://edepot.wur.nl/307710> [Accessed 29 Apr. 2015].
- Benton, T.G., Vickery, J.A. & Wilson, J.D. (2003). Farmland biodiversity: is habitat heterogeneity the key? *Trends Ecol. Evol.*, 18, 182–188
- Berzsenyi, Z., Gyórfy, B., & Lap, D. (2000). *Effect of crop rotation and fertilisation on corn and wheat yields and yield stability in a long-term experiment*. *European Journal Of Agronomy*, 13(2-3), 225-244. doi:10.1016/s1161-0301(00)00076-9
- Biesmeijer, J.C., Roberts, S.P.M., Reemer, M. et al. (2006) *Parallel declines in pollinators and insect-pollinated plants in Britain and the Netherlands*. *Science* 313, 351-354



Bokhorst, J., Ter Berg, C. (2001) *Vaste rundvee mest*. Bodemacademie. [Online]. Available: <http://www.bodemacademie.nl/documenten/87.pdf>. [Accessed 4-05-2015].

Bonafaccia, G., Galli, V., Francisci, R., Mair, V., Skrabanja, V. & Kreft, I. 2000. *Characteristics of spelt wheat products and nutritional value of spelt wheat-based bread*. Food Chemistry, 68, 437-441.

Botanical-online. 2015. *Characteristics of rye* [Online]. Available: <http://www.botanical-online.com/english/rye.html> [Accessed 22-04-2015].

Bruinooge, J. (2015). *Hoe bak ik een brood*. [online] Available at: <http://www.hoedoe.nl/eten-drinken/brood/hoe-bak-ik-een-brood> [Accessed 23 Apr. 2015].

Budgetstijl. (2015). *Zelf Brood Bakken Zonder Machine | Budgetstijl*. [Online] Available: <http://budgetstijl.nl/?p=302> [Accessed 23 Apr. 2015].

Bullock, D. (1992). Crop rotation. *Critical Reviews In Plant Sciences*, 11(4), 309-326. doi:10.1080/07352689209382349.

Büttner, G., & Petersen, J. (2004). *Rhizoctonia root rot in sugar beet (Beta vulgaris ssp. altissima) – Epidemiological aspects in relation to corn (Zea mays) as a host plant*. Göttingen: Institute of Sugar Beet Research.

Buzzy Seeds,. (2015). *Buzzy Seeds | Planten zaden, groentezaden, bloemzaden en kruiden zaden*. [Online] Available: <http://www.buzzy.nl/FAQ/toonitem/53400/53684/FAQ2.html>. [Accessed 1-05-2015]

Canon van Overijssel. (2015) *Ruilverkavelingen 1954*. [Online] Available: <http://www.regiocanons.nl/overijssel/salland/den-ham-vroomshoop/ruilverkavelingen> [Accessed 24-04-2015]

Centraal Bureau voor Statistiek (CBS). (2015). *CBS StatLine - Akkerbouwgewassen; productie, naar regio*. [Online]. Available: [http://statline.cbs.nl/Statweb/publication/?DM=SLNL&PA=7100oogs&D1=1-3&D2=a&D3=0&D4=6,\(I-2\)-I&VW=T](http://statline.cbs.nl/Statweb/publication/?DM=SLNL&PA=7100oogs&D1=1-3&D2=a&D3=0&D4=6,(I-2)-I&VW=T) [Accessed 22-04-2015].

Coster, S de., Larebeke, N van., Benoy, S. & Peer, L van. (2008). *Incidenten met metamnatrium/ metam-kalium: advies voor lokale hulpverleners en huisartsen*. Available : http://www.farmlandbirds.net/sites/default/files/Metamnatrium_0.pdf



Cruydt-Hoeck. (2015a). *Cruydt-Hoeck Wildeplantenzaden & Bloemenweidemengsels*. [Online] Available: <http://www.cruydt hoeck.nl/goede+plekken/agrarisch+natuurbeheer> [Accessed 23-04-2015]

Cruydt-Hoeck. (2015b). *A6 - Mengsel éénjarige akkerbloemen*. [Online] Available: <http://www.cruydt hoeck.nl/winkel/mengsel+a6+%C3%A9%C3%A9njarige+akkerbloemen/27> [Accessed 23-04-2015]

Curl, E. (1963). *Control of plant diseases by crop rotation*. Bot. Rev, 29(4), 413-479. doi:10.1007/bf02860813

Darwinkel, A. & Zwanepol, S. (1994). *Teelt van haver*. PAGV [etc.].

Darwinkel, A. (1997). *Teelthandleiding wintertarwe*. Praktijkonderzoek Plant & Omgeving BV Sector AGV, Wageningen.

De Gelderlander. (2014). *Telers mogen 'gevaarlijk' landbouwgif weer gebruiken*. [Online] Available: <http://www.gelderlander.nl/regio/achterhoek/telers-mogen-gevaarlijk-landbouwgif-weer-gebruiken-1.4514658> [Accessed 22-04-2015]

De Haas, E. (2015a). *Gemeente Raalte: subsidies voor kunst- en cultuurprojecten* [Online]. Available: <http://cultuurmakelaar.tumblr.com/post/111861256245/gemeente-raalte-subsidies-voor-kunst-en> [Accessed 17-04-2015].

De Haas, E. (2015b). *Noaberfonds* [Online]. Available: <http://cultuurmakelaar.tumblr.com/post/111862219640/noaberfonds> [Accessed 17-04-2015].

Delaval. (2015). *Voedingsstoffen*. [Online]. Available: <http://www.delaval.nl/-/Kenniskbank/Voeren/Voedingsstoffen/> [Accessed 14-04-2015]

De Nieuwe molen. (2015). *Recepten*. [Online] Available at: <http://www.denieuwemolen.nl/recepten.html> [Accessed 23 Apr. 2015].

Dienst Landelijk Gebied. (2015). [Online]. Available: <http://www.dienstlandelijkgebied.nl/> [Accessed 20-04-2015]

Distrimest. (2015). *Mesthandel Distrimest in- en verkoop van vast en vloeibare mest*. [Online] Available: <http://www.distrimest.nl/> [Accessed 23-04-2015]

Dominicus, L. (2014). *Grote vraag aan speltmeel drijft prijzen op*. Gelderlander



Encyclopedia Britannica. (2014). *Encyclopædia Britannica: Crop rotation* [Online]. Available: <http://www.britannica.com/EBchecked/topic/143973/crop-rotation> [Accessed 24-04-2015].

Ecoflora. (2015). *Ecoflora, ecologische kwekerij en tuincentrum*. [Online] Available: <http://www.ecoflora.be/nl/bloemenweiden> [Accessed 1-05-2015]

Ecochem. (2015). *Manure is an excellent fertilizer*. [Online] Available: http://www.ecochem.com/t_manure_fert.html [Accessed 4 May 2015].

FAO. (2009). *Agribusiness Handbook: Sugar Beet White Sugar*. Rome, Italy: Investment Centre Division FAO.

Feizabady, Z. (2013). *Effects of crop rotation and residue management on bread wheat*. *Afr. J. Plant Sci.*, 7(5), 176-184. doi:10.5897/ajps12.081

Gallai, N., Salles J M., Setelle J. et al. (2009) *Economic valuation of the vulnerability of world agriculture confronted to pollinator decline*. *Ecological Economics* 68, 810-821

Gibson, K. (1958). *Effect of some crop rotations on wireworm populations in irrigated lands*. Washington: U.S. Dept. of Agriculture.

Google Maps. (2015) [Online] Available: <https://www.google.nl/maps/search/ruilverkaveling+den+ham/@52.4679579,6.5116475,1170m/data=!3m1!1e3>

Goulson, D., Lye, G.C & Darvill, B (2008) Decline and conservation of bumble bees. *Annual Review of Entomology* 53, 191-208

Hengel, J. van den. (2015). *Al bekend met de geactualiseerde mestnormen in 2015? - Alfa Accountants en Adviseurs - Melkvee.nl - nieuws voor de melkveehouder*. [Online] Available: <http://www.melkvee.nl/partner/20/nieuws/6488/al-bekend-met-de-geactualiseerde-mestnormen-in-2015> [Accessed 4-05-2015].

Holland, J.M. (2004): *Agriculture Ecosystems and Environment: Environmental consequences of adopting conservation tillage in Europe* Vol 103 pg 1-25

Hopkins, B., Hutchinson, P., Patterson, P., Miller, J., Thornton, M., Hafez, S., & Alvarez, J. (2004). *Cropping sequence and rotation: impact on potato production and soil condition*. Idaho Potato Conference.



Johnson, G., Whittington, R., & Scholes, K. (2012). *Fundamentals of strategy*. Harlow, England: Financial Times /Prentice Hall.

Jongeneel, R. & Berkum, S. van, (2015). *What will happen after the EU milk quota system expires in 2015?; An assessment of the Dutch dairy sector*. Wageningen, LEI Wageningen UR (University & Research centre), LEI Report 2015-041.

Karlen, D., Hurley, E., Andrews, S., Cambardella, C., Meek, D., Duffy, M. and Mallarino, A. (2006). *Crop Rotation Effects on Soil Quality at Three Northern Corn/Soybean Belt Locations*. *Agronomy Journal*, 98(3), p.484.

Kollenberger Spelt. (2015). *Kollenberger Spelt*. [Online]. Available: <http://www.kollenbergerspelt.nl/teelt.html> [Accessed 24-04-2015].

Koninklijke Algemeene Vereeniging voor Bloembollencultuur. (2015).

Landis, D., Wratten, S., & Gurr, G. (2000). *Habitat Management to Conserve Natural Enemies of Arthropod Pests in Agriculture*. *Annu. Rev. Entomol.*, 45(1), 175-201.
doi:10.1146/annurev.ento.45.1.175

Leader West Twente. (2015). *Hoe werkt Leader?* [Online]. Available: http://www.leaderwesttwente.nl/index.php?option=com_content&view=article&id=4&Itemid=5&lang=nl [Accessed 17-04-2015].

Lei. (2015) [Online] Available: <http://www3.lei.wur.nl/prijzen/default.aspx?lang=0> [Accessed 28-04-2015]

Laura's Bakery, (2014). *Speltbrood - Laura's Bakery*. [online] Available at: <http://www.laurasbakery.nl/speltbrood/> [Accessed 23 Apr. 2015].

Morgenster-zaden. (2015). *Beheer meerjarige bloemenweide*. [Online] Available: http://www.morgenster-zaden.nl/beheer%20meerjarige_bloemenweide.htm [Accessed 1-05-2015]

MediGran. (2015). *Medigran - Overblijvend Akkerrandenmengsel AA - 10*. [Online] Available: <http://www.medigran.nl/mengsels.php?id=114> [Accessed 24-04-2015]

Meeting with Stolte, F., Toerse, J., ter Beek, A., Jongsma, E., de Jong, D., & Essing, D. in Den Ham on March 23 (2015).

National Potato Council. (2015). *National Potato Council: Potato Facts*. [Online]. Available: <http://www.nationalpotatocouncil.org/potato-facts/> [Accessed 24-04-2015].



Natuur Diëtisten, (2015). *Natuur Diëtisten Nederland | Speltbrood: oerbrood uit Groningen*. [Online] Available: <http://www.natuurdietisten.nl/detail.php?id=348> [Accessed 23-04-2015].

Nederlandse Voedsel- en Warenautoriteit (NVWA). (2015). *NVWA | Gebruik metam-natrium onder voorwaarden weer toegestaan*. [Online]. Available: <http://www.vwa.nl/actueel/mededelingen-plantenziekten-en-plagen/nieuwsbericht/2057301/gebruik-metam-natrium-onder-voorwaarden-weer-toegestaan> [Accessed 22-04-2015]

Nieuwe Granen. (2015). *Recept Volkoren Speltbrood - Nieuwe Granen*. [Online] Available: <http://www.nieuwegranen.nl/volkorenbrood.html> [Accessed 23-04-2015].

Nieuwe Granen. (2015). *Rogge - Nieuwe Granen* [Online]. Available: <http://www.nieuwegranen.nl/rogge.html> [Accessed 22-04-2015].

Olander, S., & Landin, A. (2005). *Evaluation of stakeholder influence in the implementation of construction projects*. *International Journal Of Project Management*, 23(4), 321-328.

Olthof, R. (2014). Bloemstroken als redmiddel voor het duurzaam bevorderen van zweefvliegen. Wageningen.

Ontwikkelingsbedrijf Noord-Holland Noord. (2014). *Het doel van Leader* [Online]. Available: <http://www.leaderkvn.nl/over-leader> [Accessed 15-04-2015].

Portaal Natuur en Landschap. (2015). *Beheerorganisatie SNL - Portaal Natuur en Landschap*. [Online]. Available: <http://www.portaalnatuurenlandschap.nl/themas/subsidiestelsel-natuur-en-landschapsbeheer/over-het-subsidiestelsel-natuur-en-landschapsbeheer/beheerorganisatie-snl/> [Accessed 20-04-2015].

Poulter, S. (2015). The cut-price pint! Cheap milk war looms as EU scraps quotas and farmers fear being driven out of business. *Daily Mail*.

Potts S.G., Biesmeijer, J.C., Bommarco, R. et al. (2011) *Developing European conservation and mitigation tools for pollination services: approaches of the STEP (Status and Trends of European Pollinators) project*. *Journal of Apicultural Research* 50(2), 152-164

Provincie Overijssel. (2014). *POP3* [Online]. Available: <http://www.overijssel.nl/thema%27s/economie/europaloket/pop3/> [Accessed 16-04-2015].



Quora. (2015). *How much barley is used per barrel of brewed beer?* - Quora. [Online] Available: <http://www.quora.com/How-much-barley-is-used-per-barrel-of-brewed-beer> [Accessed 28-04-2015].

Rasmont P, & Mersch P, (1988) *Première estimation de la derive faunique chez les bourdons de la Belgique (Hymenoptera, Apidae)*. Annales de la Société Royale zoologique de Belgique 118, 141–147

Ravenshorst, A. (2015). *Vraag naar spelt groeit nog steeds. Bakkerswereld*.

Reeves, D. (1997). The role of soil organic matter in maintaining soil quality in continuous cropping systems. *Soil and Tillage Research*, 43(1-2), pp.131-167.

Rijksdienst voor Ondernemend Nederland. (2015a). *Derogatie*. [Online] Available: <https://mijn.rvo.nl/derogatie> [Accessed 23-04-2015]

Rijksdienst voor Ondernemend Nederland. (2015b). *Dierlijke mest gebruiksnorm en gebruiksruijnte* [Online] Available: <https://mijn.rvo.nl/dierlijke-mest-gebruiksnorm-en-gebruiksruijnte> [Accessed 4-05-2015].

Rijksmonumenten, (2015). *Rijksmonumenten.nl - Alle rijksmonumenten van Nederland*. [Online] Available: <http://rijksmonumenten.nl/> [Accessed 29-04-2015].

RTV Oost,. (2014). *Strengere regels voor gebruik metam-natrium in bollensector*. Retrieved 22 April 2015, from <http://www.rtvoost.nl/nieuws/default.aspx?nid=196751&cat=1>

Sakatchewan Soil Conservation Association. (2000) *Solid cattle manure*. Available: http://www.soilcc.ca/ggmp_fact_sheets/pdf/Cattle%20manure.pdf [Accessed 4-05-2015]

Schaap, B., Blom-Zandstra, G., Geijezndorffer, I., Hermans, T., Smidt, R. & Verhagen, J. (2009). *Klimaat en landbouw Noord-Nederland: rapportage van fase 2*. Plant Research International Wageningen.

Scheele, H., & Gulp van, H. (2006). *Rapportage FUNCTIONELE AGRO BIODIVERSITEIT (FAB)*. Tilburg: LTO-FAB.

Schreuder, R., & Hendriks-Goossens, V. J. C. (2012). *Kwantitatieve Informatie Akkerbouw en Vollegrondsgroenteteelt 2012*. PPO-AGV.

Schröder, J.J., Aarts, H.F.M., van Middelkoop J.C., de Haan, M.H.A., Schils, R.L.M., Velthof, G.L., Fraters, B. & Willems, W.J. (2005) *Limits to the use of manure and mineral fertilizer in*



grass and silage corn production in The Netherlands, with special reference to the EU Nitrates Directive

Schweiger, O., Musche, M., Bailey, D. et al. (2007) *Functional richness of local hoverfly communities (Diptera, Syrphidae) in response to land use across temperate Europe*. Halle: Centre for Environmental Research Leipzig-Halle, Dept of Community Ecology.

Sharpley, A. N., & Withers, P. J. (1994). *The environmentally-sound management of agricultural phosphorus*. *Fertilizer Research*, 39(2), 133-146.

Sheldon, R. (2015). *Market research: Qualitative or quantitative — which method is for you?* [Online] Available: <http://www.marketingdonut.co.uk/marketing/market-research/qualitative-or-quantitative-which-method-is-for-you->. [Accessed 30-03-2015]

Soortenbank. (2015a). *SoortenBank.nl : Aardappel - Solanum tuberosum*. [Online]. Available: http://www.soortenbank.nl/soorten.php?soortengroep=flora_nl_v2&id=1674&menuentry=soorten [Accessed 23-04-2015].

Soortenbank. (2015b). *SoortenBank.nl : Gerst - Hordeum vulgare*. [Online]. Available: http://www.soortenbank.nl/soorten.php?soortengroep=flora_nl_v2&id=729&menuentry=soorten [Accessed 22-04-2015].

Soortenbank. (2015c). *SoortenBank.nl : Haver - Avena sativa*. [Online]. Available: http://www.soortenbank.nl/soorten.php?soortengroep=flora_nl_v2&id=651&menuentry=soorten [Accessed 22-04-2015].

Soortenbank. (2015d). *SoortenBank.nl : Spelt - Triticum spelta*. [Online]. Available: http://www.soortenbank.nl/soorten.php?soortengroep=flora_nl_v2&id=736&menuentry=soorten [Accessed 22-04-2015].

Stadindex (2014) *Hoeveel inwoners heeft Den Ham Overijssel?* [Online] Available: <http://www.stadindex.nl/den-ham-overijssel/>. [Accessed 27-03-2015]

Stichting Brinkdorp Den Ham. (2014). *Brinkdorp Den Ham*. [Online]. Available: <http://www.brinkdorpdendam.nl/ham/> [Accessed 10-4-2015].

Syngenta (2013). *Zaaien en onderhoud*. [Online] Available: <https://www3.syngenta.com/country/nl/nl/OverSyngenta/OperationPollinator/Pages/ZaaieEnOnderhoud.aspx> [Accessed 24-04-2015]



The European Network for Rural Development (ENRD) (2015). *Community-led Local Development (CLLD)* [Online]. Available: <http://enrd.ec.europa.eu/themes/clld/> [Accessed 15-04-2015].

Twenterand Actief. (2015). *Subsidies* [Online]. Available: <http://www.twenterandactief.nl/content/?id=37e949f8c3e57ca3d01a847b57f63664> [Accessed 17-04-2015].

Toeristen informatie Den Ham, Het verhaal van Overijssel, *PRUF'N EN LOER'N OP EN RONDONOM DE MAGELER ES*

Telegraaf. (2015). *Dijksma verbiedt gebruik van metam-natrium*. [Online] Available: http://www.telegraaf.nl/binnenland/22673100/Verbod_metam-natrium_.html [Accessed 22-04-2015]

Timmer, R., Korthals, G. & Molendijk, L. (2004). Teelthandleiding groenbemesters - Winterrogge. *Kennisakker. nl*, 2004.

Timmer, R. D. (1999). Teelt van zomergerst. Wageningen: Praktijkonderzoek Plant & Omgeving B.V.

Togetherfarm, (2012). *Grow Your Own Beer - Togetherfarm*. [online] Available at: <http://togetherfarm.com/grow-your-own-beer/> [Accessed 28 Apr. 2015].

Tubantia,. (2015a). Zorgen over gebruik kankerverwekkend bestrijdingsmiddel bij lelieteelt in gemeente Wierden.

Tubantia,. (2015b). PvdA in Tubbergen ongerust over lelieteelt in Geesteren.

Tubantia,. (2015c). Zorg om lelieteelt ongegrond.

Tubantia. (2015d). Plannen voor ontwikkeling Mageler Es in Den Ham *Tubantia*.

Turner, T., Ramakrishnan, K., Walshaw, J., Heavens, D., Alston, M., Swarbreck, D., Osbourn, A., Grant, A. and Poole, P. (2013). Comparative metatranscriptomics reveals kingdom level changes in the rhizosphere microbiome of plants. *The ISME Journal*, 7(12), pp.2248-2258. <https://www.jic.ac.uk/news/2013/07/crop-rotation/#> site of interview

U.S. Environmental Protection Agency. (2015). *Agricultural Pesticides | Ag 101 | Agriculture / US EPA*. [Online] Available: <http://www.epa.gov/agriculture/ag101/croppesticideuse.html> [Accessed 14-04-2015]



Van Schooten, H., Philipsen, A. & Groten, J. (2014). *Handboek snijmaïs*. Wageningen UR Livestock Research.

Veeneklaas, F., Farjon, J. & Vogelzang, T. (2001). Platteland Natuurlijk. *Een schets van het verwachte en gewenste grondgebruik in het agrarisch gebied in 2020*.

Von Bothemer, R., Van Hintum, T., Knüpper, H. & Sato, K. (2003). *Diversity in barley (Hordeum vulgare)*, Elsevier.

Vroegevogels. (2014). *Metam-natrium voorlopig verboden*. Retrieved 22 April 2015, from [http://vroegevogels.vara.nl/index.php?id=1006&cHash=5330917bac96439909a48f28deae9bd1&tx_ttnews\[tt_news\]=369041](http://vroegevogels.vara.nl/index.php?id=1006&cHash=5330917bac96439909a48f28deae9bd1&tx_ttnews[tt_news]=369041)

Watwaswaar. (2015) [Online] Available: <http://watwaswaar.nl/#iu-eG-7-1-1v-1-4VKC-2hOq--3eY> [Accessed 20-04-2015]

William R. Ruan and Gordon V. Johnson (1999): *Improving Nitrogen Use Efficiency for cereals production* Agronomy Journal Vol 91 No. 3

Winkler K, Wäckers F, Bukovinszkyne-Kiss G, et al. (2006) *Sugar resources are vital for Diadegma semiclausum fecundity under field conditions*[J]. Basic and applied ecology, , 7(2): 133-140.

Yellow lemon tree, (2014). *Foodblogswap: volkoren speltbrood met zaden en pitten | Yellow lemon tree*. [Online] Available: <http://www.yellowlemontreeblog.com/recept-zelf-bakken-speltbrood/> [Accessed 23-04-2015].

ZEMBLA: *Lelies met een luchtje*. (2013). Netherlands.

Zohary, D., Hopf, M. & Weiss, E. (2012). *Domestication of Plants in the Old World: The origin and spread of domesticated plants in Southwest Asia, Europe, and the Mediterranean Basin*, Oxford University Press.



APPENDIX A

Table 1: Pesticides which are allowed to use in agricultural: <http://www.lelieteelt.nl/plantgezondheid>

Probleem	Merknaam middel	Werkzame stof middel	Toepassing	Wordt ook gebruikt in o.a.
Onkruid	Asulam	asulam	spuiten	spinazie, zomerbloemen
Onkruid	Goltix	metamitron	spuiten	bieten
Onkruid	Pyramin	chloridazon	spuiten	bieten
Onkruid	Fusilade	fluazifop-P-butyl	spuiten	bieten
Onkruid	RoundUp	glyfosaat	spuiten	algemeen, onbeteelde grond
Onkruid	Dual Gold	S-metolachloor	spuiten	bieten, maïs
Onkruid	Stomp	pendimethalin	spuiten	ui
Onkruid	Chloor IPC	chloorprofam	spuiten	witlof, uien
Onkruid	Afalon	linuron	spuiten	aardappels
Luizen	Sumicidin Super	esfenvaleraat	spuiten	aardappels, bieten
Luizen	Olie H	minerale olie	spuiten	aardappels
Luizen	Plenum	pymetrozine	spuiten	buitenbloemen, glastuinbouw
Luizen	Teppeki	flonicamid	spuiten	aardappels, appels, peren, siergewassen
Luizen	Decis	deltamethrin	spuiten	groente, aardappels
Luizen	Calypso	thiacloprid	spuiten	aardappels, bieten, granen, glasgroenten
Luizen	Gazelle	acetamiprid	spuiten	glasgroenten
Schimmels	Tridex	mancozeb	spuiten	aardappels
Schimmels	Mirage Plus	prochloraz	spuiten	aardappels
Schimmels	Mirage Plus	folpet	spuiten	aardappels
Schimmels	Folicur	tebuconazool	spuiten	spruitkool, prei, fruit
Schimmels	Flint	trifloxystrobin	spuiten	fruit, tomaat
Schimmels	Rudis	prothioconazool	spuiten	prei, peen, kool
Schimmels	Collis	kresoxim-methyl	spuiten	roos, komkommer
Schimmels	Luna	fluopyram	spuiten	aardbei, roos, komkommer
Schimmels	Amistar	azoxystrobin	infrezen	aardappels
Aaltjes	Vydate 10G	oxamyl	infrezen	aardappels, bieten
Aaltjes	Nemathorin	fosthiazaat	infrezen	aardappels, bieten
Aaltjes	Nemater	kruidenmengsel	infrezen/spuiter	aardbeien



APPENDIX B

In this appendix the interview questions for farmers, contractors, local businesses and inhabitants are added. Because of lack of some information a follow up was done by mail and phone with some questions, also included in the appendix. Further, a questionnaire for the inhabitants was placed on a Facebook page, the questions can be found below.

Note: these Interviews are available in English upon request.

Interview questions

Farmers and contractors

Hallo, wij zijn van de Wageningen Universiteit en we zouden u graag wat vragen stellen. We zijn bezig met een onderzoek naar de Mageler Es en de zichtbaarheid ervan. Dit aangezien mais de zichtbaarheid van de Mageler Es en de joodse begraafplaats zou belemmeren. We willen graag een beter inzicht krijgen in het landgebruik van de Mageler Es en de mogelijkheden die er zijn.

Respondent No.....

Datum.....

Plaats naam.....

Naam

Leeftijd.....

Geslacht 0Vrouw 0Man

huishouden

aantal leden van huishouden.....

heeft een lid van het huishouden bijgedragen aan het inkomen?.....

hoe lang heeft uw hier gewoonte.....jaar

Uitgaven

Is boeren uw hoofdinkomen? 0Ja 0Nee

Wat is het jaarlijkse gemiddelde inkomen met boeren?.....

Ziet uw zichzelf als: arm/gemiddeld/rijk

Herinvesteert u in uw boerenbedrijf?.....

Land en akkerbouw

Heeft u een eigen stuk land of huurt u het stuk land? 0ja 0nee

Hoeveel kavels heeft uw en gebruikt uw die voor landbouw en hoe groot zijn ze? kavels.....hectare

Doet u aan gewas rotatie op dit land? (meerjarig gewassen plan) 0ja 0nee



Zo JA wat zijn de voordelen hiervan? Heeft het te maken met grond
kwaliteit?.....

Welke gewassen groeit uw op dit land?

Hoe gebruikt uw de producten?

- levensonderhoud
- intern verkopen binnen de Mageler Es
- extern verkopen

Wat is de gemiddelde opbrengst van het gewas?.....ton/Ha

Wat is de gemiddelde waarde van het product?.....Euro

Heeft u een bron die u gebruikt voor het bepalen van de waarden van de gewassen of algemene kennis?

.....
Is de agrarische productie toegenomen, het zelfde gebleven, of afgenomen in de laatste 5 jaar

- Toegenomen
- Afgenomen
- Hetzelfde gebleven

Waarom is het toegenomen?

- Kunstmest en pesticiden zijn toegenomen
- Mest gebruik is toegenomen
- Zaad kwaliteit is toegenomen
- Anders.....

Waarom is het afgenomen?

- Vruchtbaarheid is afgenomen...
- Lage prijzen
- Minder gebruik van kunst mest e.d.
- Anders.....

Beleving

Kent uw een gewas dat geschikt is om hier te groeien met vergelijkbare opbrengsten?

.....
Zou uw bereid zijn uw productie van mais te veranderen, als er goed alternatief is? OJA ONEE
Zo NEE waarom niet?

.....
Wat vindt uw van de lelieteelt? Kan het andere gewassen aantasten/beschadigen?

.....
Kunt u wat vertellen over uw mest gebruik op het land? Is het de beste manier om van mest af te komen en boetes te voorkomen of is dit geen probleem?

.....



Wat is de bodemkwaliteit van het gebied, is deze goed of niet?

.....

1. Wat is uw land, hoe groot, en welk gewas bent u van plan te gaan groeien dit jaar?
2. Welk gewas is het meest winstgevend. (mais?) Wat was de opbrengst?
3. Het idee van het vvv kantoor Den Ham was om de Mageler Es aantrekkelijker te maken door het groeien van oudere gewassen, zoals graan en spelt. Wat vindt u hiervan?
4. En wat als dit graan zou worden gebruikt voor lokale producten? Zoals Brood? Waardoor het misschien ook meer opbrengt?
5. Wat kan u vertellen over mest gebruik? Verschilt het per gewas?

Local businesses

Hallo wij zijn van Wageningen universiteit. Wij doen een onderzoek om de zichtbaarheid van de Mageler Es te verbeteren. Dit interview duurt 15 minuten en je bijdrage is vrijwillig. Je antwoorden zullen gebruikt worden om ons verslag te verbeteren en zal alleen voor dit verslag worden gebruikt, tevens is het anoniem. Als je benieuwd bent naar de resultaten contacteer Jan Toerse

Respondent No.....

Datum.....

Stadsnaam.....

Bedrijfsnaam

Jaren actief

Wat voor bedrijf heeft u?

Was er een drijfveer om uw bedrijf bij de Mageler Es te beginnen?

Waar koopt u de producten die u verkoopt? (voor restaurants bijvoorbeeld bij de bakker, voor de bakker of ze graan kopen van de Mageler Es)

- Intern (binnen Den Ham)
- Extern
- Beide

Indien gekozen voor intern, waarom kiest u hiervoor?

- Hoge kwaliteit
- Bereikbaarheid
- Consument voorkeur
- Lagere product prijzen
- Anders, namelijk:.....



Indien gekozen voor extern, waarom kiest u hiervoor?

- Hoge kwaliteit
- Bereikbaarheid
- Lagere product prijzen
- Anders, namelijk:.....

Weet u iets over het verbeteren van de zichtbaarheid van de Mageler Es?

.....

Zijn de producten gemaakt van de gewassen die er nu groeien gewild bij uw consumenten?

.....

Welke gewassen prefereert u in het gebied voor eigen interesse?

.....

Bent u bereid meer geld te betalen voor producten die van de Mageler Es komen? waarom?

Ja Nee

.....

Weet u of er een markt is voor lokale producten?

.....

Inhabitants

Geslacht (niet vragen gewoon noteren)

Man Vrouw

Gaat u wel eens naar de Mageler Es? Waarom wel/ waarom niet?

.....

Vindt u het een mooie plek om te bezoeken? Waarom wel/ waarom niet?

.....

Wat maakt volgens u de Mageler Es zo bijzonder/ wat zijn belangrijke karakteristieke kenmerken?

.....

Wat (denkt u) groeit/ wordt er verbouwd op de Mageler Es?

.....

Vindt u dat gewassen het zicht belemmeren van de Mageler Es? Zo ja, waarom?

.....



Koopt u op dit moment lokale producten (brood, bier etc.)? Zo ja wat?

.....

Hoe vaak koopt u nu lokale producten? (brood, bier etc.)

.....

Zou u lokale producten afkomstig van de Mageler Es kopen, ook eventueel voor een hogere prijs?

- Ja
- Nee

Wat voor lokaal product (afkomstig van de Mageler Es) zou u kopen?

.....

Zou u nog iets aan de Mageler Es willen veranderen? Zo ja, wat/ zo nee waarom?

.....

Follow up

Farmers

Hallo wij zijn studenten van de Wageningen universiteit. Wij hebben vorige week met jullie gesproken over de Mageler Es. Echter blijkt op dit moment dat wij nog gegevens missen om ons onderzoek voort te zetten. Deze vragen gaan over geld. De antwoorden die worden gegeven hoeven geen exacte waarden te zijn, als de gegeven waarde maar in de buurt ligt van de werkelijkheid zodat deze voor ons bruikbaar is. Hopelijk bent u bereid alles in te vullende, de enquête is tevens anoniem.. Alvast bedankt voor uw medewerking en de moeite die u heeft gedaan.

Met vriendelijke groet,

Bram van den Broek
Rutger Olthof
Ronald Smit
Eefke Vennegoer op Nijhuis

Doordat we verschillende boeren enquêteren kan het zijn dat bepaalde vragen niet van toepassing zijn. Deze vragen kunt u overslaan.

1. Heeft u vee, zo ja wat voor vee? Zo nee, ga verder naar vraag 4.
2. Hoeveel kg maïs geeft u uw vee op maandbasis? Geeft u ook graan, zo ja hoeveel?
3. Komt dit maïs allemaal van uw eigen land, of moet u dit bijkopen? en hoeveel. Zo, ja waar koopt u dit, en wat betaalt u hiervoor?
4. Wat is de oogst in kg per hectare op jaarbasis? (van maïs, en eventueel andere gewassen als u die heeft)
5. Wat is de opbrengst van deze gewassen per hectare?
6. Oogst u dit zelf, of laat u het oogsten/ heeft u uw eigen machine? En wat zijn de kosten daarvoor?
7. Als u uw gewas/oogst verkoopt, wat levert dit op kg per hectare?



8. Een aantal vragen over mest gebruik: Heeft u een tekort aan mest/ teveel aan mest?
 - Wanneer tekort: Waar haalt u uw mest vandaan, hoeveel kost dit per kg
 - Wanneer teveel: Waar brengt u uw mest naartoe(welk bedrijf), hoeveel kost dit per Kg
9. Maakt u gebruik van pesticiden om uw gewassen mee te beschermen?
 - zo ja, welke pesticiden, en hoeveel kosten deze op jaarbasis?
 - zo nee, waarom niet?
10. Wat vindt u de meest beperkende regels in de akkerbouw waarvan u hinder ondervindt?
11. Wat zijn uw totale kosten van u bedrijf per jaar?
12. Wat zijn uw totale inkomsten van uw bedrijf per jaar?

Local businesses

Hallo wij zijn studenten van de Wageningen Universiteit. Wij doen een project om de Mageler Es aantrekkelijker te maken. Om dit te doen wordt gekeken naar de mogelijkheden om maïs te vervangen door lager groeiende gewassen. Hierbij maken wij een business model, waarbij wij gegevens nodig hebben wat betreft inkomsten en uitgaven. Dit maakt het mogelijk een totaalplaatje te creëren en te kijken of het verbouwen van nieuwe gewassen economisch mogelijk is. Tevens willen wij kijken naar de mogelijkheid van het verkopen van lokale producten en willen wij de marktwerking achter deze producten bepalen vandaar dat wij u benaderen om hier betere inzichten in te krijgen. De antwoorden die worden gegeven hoeven geen exacte waarde te zijn, als de gegeven waarde maar in de buurt ligt van de werkelijkheid zodat deze voor ons bruikbaar is. Hopelijk bent u bereid alles in te vullen, de enquête is tevens anoniem. Alvast bedankt voor uw medewerking en de moeite die u heeft gedaan.

Met vriendelijke groet,

Bram van den Broek
 Rutger Olthof
 Ronald Smit
 Eefke Vennegoor op Nijhuis

1. Doordat wij geïnteresseerd zijn in lokale producten zijn wij benieuwd naar welke producten u inkoop om uw product te produceren?
2. Waar koopt u deze producten in, bij een boer, bij een bedrijf of iemand anders. Kunt u indien mogelijk ook de naam geven? Dit antwoord maakt het mogelijk om indien noodzakelijk de tussenpersonen te benaderen en te kijken of er winst te behalen valt op de productie kosten door mensen uit het proces weg te halen die geld kosten.
3. Wat betaalt u voor deze producten? Is dit een hoge of lage prijs? Door het antwoord van deze vraag kunnen we bepalen wat de kosten zijn en de hele kostenlijn bepalen. Zo wordt het mogelijk om te bepalen hoeveel winstmarge er zit op een product en wat een ander gewas dan maïs op kan leveren
4. Voor wat voor prijs verkoopt u uw producten (niet altijd noodzakelijk maar kan in sommige gevallen handig zijn)?
 Zoals al in de mail stond, hartelijk bedankt voor uw medewerking en de antwoorden die zijn ingevuld.



Questionnaire inhabitants

Wat is uw leeftijd

- 0-20
- 20-30
- 30-40
- 40-50
- 50-60
- >60

Geslacht

0 Man 0 Vrouw

Gaat u wel eens naar de Mageler Es? Waarom wel/ waarom niet?

.....

Vindt u het een mooie plek om te bezoeken? Waarom wel/ waarom niet?

.....

Wat maakt volgens u de Mageler Es zo bijzonder/ wat zijn belangrijke karakteristieke kenmerken?

.....

Wat (denkt u) groeit/ wordt er verbouwd op de Mageler Es?

.....

Koopt u op dit moment lokale producten (brood, bier etc.)? Zo ja wat?

.....

Hoe vaak koopt u nu lokale producten? (brood, bier etc.)

- Dagelijks
- Wekelijks
- Maandelijks
- Jaarlijks
- Nooit

Zou u lokale producten afkomstig van de Mageler Es kopen, ook eventueel voor een hogere prijs?

- Ja
- Nee

Hoe vaak zou u een lokaal product (afkomstig van de Mageler Es) kopen?

- Dagelijks
- Wekelijks



- Maandelijks
- Jaarlijks
- Nooit

Wat voor lokaal product (afkomstig van de Mageler Es) zou u kopen?

- Bier
- Brood
- Honing
- Niets
- Anders, namelijk:

Zou u deelnemen aan activiteiten zoals een natuurtocht met een expert over de Mageler Es?

.....

Vindt u dat gewassen het zicht belemmeren van de Mageler Es? Zo ja, waarom?

.....

Zou u nog iets aan de Mageler Es willen veranderen? Zo ja, wat/ zo nee waarom?

