2015 Nuffield Schollarship

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More with less...?

Supported by Rabobank

Foreword

Sustainability is like love. It is a vague notion we recognize, but no-one knows exactly what it is..
(Louise O Fresco, president Wageningen University and research centre)

It is not so much this phrase that triggered me, but a statement that was made during a Global Farmers Master Class (GFMC Rabobank) by the previous chairman of WU, Aalt Dijkhuizen: *Sustainability is producing more output with less input, especially in connection with the increasing demand for food and resources becoming more and more limited. He concluded that organic for that reason is not sustainable, as it needs more land base and inputs compared to intensive farming.*

Quite a shock for an organic farmer like me. Beside producing something that consumers like and value, I believed it was also the best way forward to feed the world. The GFMC opened my eyes, realizing that the broader perspective was more complicated than my small world in Western Europe. Feeding the world is a challenge and will become even a bigger challenge on the longer term. But what about that longer term? What is the impact on soils and farming models if the only route will be to scale up and push to more volume with less input on the short term?

Thanks to my Nuffield Scholarship, supported by Rabobank, I have been able to travel the world and discuss these topics with stakeholders within the food supply chain. The openness of all the people visited, contributed to a more common sense approach towards insights in how to feed the world for the longer term.

Looking back on the gathered knowledge, it has definitely contributed to the conversations we are having currently with our customers and other stakeholders in the supply chain and even more in our strategy for the coming years.

Gerjan Snippe, 29-12-2017

Content

Introduction

Over the last 100 years there has been a huge development in population growth, food production and wealth. More and more scientist, politicians, visionaries, businesses, but above all consumers are become aware of the impact of this development. As normal in these processes, everybody has an opinion which suits them best and talking about it seems to be easier than acting.

People that dare to act can have strong opinions and reasons to make a change in the way we do things. Mostly they are seen as idealists and might have difficulties to survive as the 'current' economy is based on other mechanisms. Something that doesn't work out immediately and from a rational point of view than easily been seen as a failure or low impact solution.

In food production there has been a huge drive over the last 100 years towards higher yields, efficiency and technology. It brought cheaper food, overproduction, food waste, wealth and less farmers being able to feed the world. Looking at the predicted growth of world population it looks like the path to feed all these people has been prepared.

I looks like it, as there is an increasing demand for and discussion about the way we produce our food. Beside questioning the additives that we use to produce and preserve food, there are strong debates about longer term soil quality, quality of our food and the power in the supply chain.

Being active as an organic farmer in western Europe I am facing on one side this demand and on the other side these debates more and more. So why do I grow the way I do and how sustainable is it? It was a comment made by a scientist, who has strong influence in politics and science, that woke me up: '….sustainability is producing more with less, and therefore organic farming models are by definition not sustainable and able to feed the world….' and has been the cause of this report

This report that is not a scientific research, but a journey towards common sense. Why does a scientist tells us what is right or wrong? Farmers are the specialists as far food production is concerned and consumers, of which we are all part, are the telling us what they really want. So understanding why farmers work in the way they work has been the major focus point during the Nuffield travels. It has included developing countries, over-developed countries and an example of a BRIC- country to get a better grip on the worldwide view of this and how the different parts of the world are influencing each other. Beside farmers also processors, supply chain partners and basically everybody that you can meet while travelling have become part of the search for common sense.

The reporting on this search has been divided in *setting the scene*, followed by *observations* during the research and interviews and concluding with *recommendations*.

Setting the scene

Food security and a increasing world population are trendy topics and many research has been done on it. It cannot be denied that something needs to change to deal with the issues that are coming up. A summary of the facts can be seen below.

It is clear that we have more people to feed in the near future and that an equal the access to food is an important issue. Combine this with a more instable climate, disconnected supply chain and not balanced nutrition to set the scene of the current status and the road ahead about our food.

This road ahead is not only the topic for many researchers, it is also more and more the important topic at many headquarters of retail businesses. Together with this awareness, the main question is how to transform our food system in the context of the current supply and consumption model. Early adopters and innovators are already present to showcase the possibilities and are creating more awareness. The main question that remains is how to adapt this to the main majority.

Observations

On the search for common sense farming, a travel scheme has been set out to get a wider view on the topic. Several countries have been visited and within these countries farming in the different sectors have been included. A selection of observations are being used to support the recommendations.

Developing countries

In most research, parts of Africa are seen as a high potential to help feeding the world. Strange as this continent is especially know for its lack of food. As agriculture is partly undeveloped, it is also seen a 'mirror' on good agricultural practices. As the green revolution, that had a huge impact in developed countries, passed most areas of Africa, farmers are still very reliable on creative farm models to keep fertility up and deal with extreme weather conditions at times. Mozambique is one of the poorest countries as part of Africa, but has also has a high potential as far as productivity is concerned. Who is farming there, which are the reasons why and which farming models are chosen.

Mozambique Organicos

A farm in Mozambique with mentioning organic in its name. Not organic because of wanting to supply a niche market for organic produce, but organic because it is the chosen farm model by need and vision.

As chemicals and fertilizers are rarely available and very expensive, the farmer had chosen the idea to be not dependent on this input and therefore wants to farm organic. After the fields had been cleared and brought into shape, the search for a healthy crop rotation started.

Looking at the current status, the farm is currently using chemicals and fertilizers as part of the production. Not because it is the vision, but as a need in the current status of the development. Although compost is the basis to balance the beautiful red soils, there is not enough yet to be not dependent on fertilizers. The farm is struggling to get enough crops into the crop rotation as the markets for these crops still needs to be developed. Due to high financial pressure in the current challenging conditions in Mozambique, the farm is now first focusing on cash crops to keep continuity and be able to invest in the coming years.

The farmer has identified the possibilities to work out his farm model in a way to be not dependent on chemicals and fertilizers in the future. A larger composting site in the area, to be shared with other local farmers, is on the radar. Also a piggery is set up to be able to grow N-fixating crop and use the manure as input for the farm.

Sugar Cane producer

Sugar is a real commodity and according to facts about world growth population, there is a need for expansion. The visited grower came from South Africa and saw the opportunities to use the cheap land and cheap labor to create his USP in this commodity market. The farmer can be identified as a pioneer, risk taker and business orientated entrepreneur.

At the moment of the visit, the farm was struggling. After 2 flooding the crops, buildings and equipment had been damaged. Beside that the prices of sugar were under severe pressure as much sugar cane grown in Brazil for Ethanol came on the sugar market. The grower is looking into alternatives like bananas and partnership of the processor into his farm to survive. Most important

he sees ‘keeping hard working and lowering costs’ as the solutions to survive. Something which according to him has been passed over in farming generations for many years.

Organic Banana Plantation

A foreign investment fund investing in an organic banana plantation in Mozambique as part of their investment portfolio. A clear sign that Africa as a high potential on the longer term is on the radar of larger investment funds.

The operation is managed by foreign employees with skills in running a large scale banana operation. The climate is very suitable to grow banana’s and especially because it could fill a gap in the market for organic bananas in a specific time frame. Although this area also suffered from flooding, the infrastructure is now adjusted to prevent the worst.

The farm has challenges with employees and finding the most valuable market for organic bananas. A calculated process, as first the production has to be guaranteed. Interesting aspects is that the bananas are transported to South Africa and the manure to run the organic operation is coming again from poultry sites in South Africa. Reason being a lack or manures in the area to run the plantation.

Focus point are now to connect to more valuable markets like Europe and see if there is a link to investors in the poultry industry in Mozambique to become less dependent on inputs from South Africa.

Klein Boerschoten

For some examples and learning cases, one does not need to travel far. On the poor sandy land area's in The Netherlands there is a great learning curve about farm models. Before fertilizers and chemicals came into farm models, also the farms in these area's were dependent on natural inputs.

It was mentioned that to grow 1 ha of arable crops, 7 hectares of heather was needed. Sheep would go out and bring back organic matter which could be used on the area's to grow arable crops. Since fertilizers and chemicals found their way, it caused lower product prices and therefore smaller farms could not survive. It became the poorest area and ended up keeping animals in an intensive farming method. Fed by protein feet from all over the world, it caused so much manure that manures even became a problem. Currently the soils are mainly used to grow corn for silage.

The mentioned arable farm turned into organics and is growing a very extensive range of crops: corn, grass clover and wheat. The farmer has kept , even on these easy to prepare sandy fields, the maximum eye for detail to preserve soils. Comparing the crop with the fields in the area, the result is very clear. Under the difficult and wet conditions of 2016 it was an outstanding crop without any additional inputs.

At a discussion session 'food for thought' in Amsterdam, it could be concluded that there is a lot of comparison to parts of Africa. Here they missed the green revolution and are still depending on grazing cattle on larger area's to grow crops on small proportion of land. The researcher who advised growers in Africa for many years made the statement that Africa needs a green revolution first to get a better position within the world markets for food. The difference between parts of Africa and

developed countries is so big that this first need to be solved before moving to longer term building of healthy soils.

Learning highlights developing countries

Beside a lot of respect for all entrepreneurs active in developing countries the following are the most interesting learning highlights:

- Lack of knowledge, inputs and money makes people/businesses creative in finding solutions.
- Still more use of 'old' farming knowledge to survive
- Awareness that without artificial inputs, there needs to be a natural resource to fill the nutrient gap
- Money and being able to invest are the biggest bottle neck to build a more efficient and holistic farm models
- Access to markets and connecting to these markets are limiting building a healthy crop rotation
- Many possibilities to develop, but also a risk that developed countries are beside land grabbing also grabbing indirect nutrients for the longer term

Developed countries

In developed countries, there seems to be a disconnection to some extend between farmers and consumers. Consumers do have a growing opinion about food and food production. Farmers feel they have a business to run and are proud on what they achieve within this business. That's sounds like a match, but many times the 2 groups do not share the same opinion/vision or at least do not share their motivations. Interesting as consumers are the end buyers and are therefore from a commercial point very important.

In Scandinavian countries the demand for organic is an example. Strong demand, but local farmers do not seem to pick this up. Sweden has been used in this study as a country to find some answers. Also by coincidence some examples from the UK have been added to understand the drive to choose a farming model in developed countries.

Hornudden

Driving from the south of Sweden, more up to the north, it becomes clear that most arable and vegetable production takes place in the south, where fields are flat and soils suitable for intensive crop production. The North has more extensive farms and livestock production. Staying at a small organic farm/restaurant, it became clear that this place is not going to feed the world or Sweden. But maybe more important Hornudden is giving a signal to consumers and farmers as well; true and tasty food, education and awareness. The owners became farmers by coincidence and were teachers from origin. Interesting, as it looks like many 'outsiders' in agriculture are some kind of innovators.

The farm produces a range of mainly glass house vegetables like special tomatoes, but also grows a range of outside crops like potatoes. By using the local organic farmers network they are able to put a complete assortment together for markets or their own, well known, restaurant. By being able to pass over the fun and taste of original and seasonable food, they attract a growing group of consumers.

The work is mainly done by students and travelers from all over the world. In this way Hornudden is passing on knowledge and passion about their view on food and farming. It can be clear that financially the farm has a different earning model as labor is mainly free and products are marketed direct to consumers. Far away from productive and commodity type of farms.

Interesting eye catchers was the toilet, in which the urine was separated from the rest the human sewage, and being reused after a certain process to feed the farmland. As a visitor it was very confronting, human sewage being reused to feed the plants that we eat later on. It took almost a week and strong discussions over dinner to except and understand the vision about this better. All farming models have a leakage on nutrients to human beings. This leakage needs to be compensated in some way and the ultimate solution is to recycle the nutrients in our food chain. Maybe not ready to implement everywhere, but a good point to take notice of for the future.

Carlson Farm

Combine a young straight forward farmer, a daughter who wants to improve the world and a realistic father, and you find a good example of discussions about development within agriculture. The Carlson farm is owned/runned by the son and father. They have organic pigs and growing organic crops like wheat, partly to feed the pigs. Although daughter, who is involved in development of organics and certification, might have had her influence, it looks like the move toward organic has been an economic choice. Father saw opportunities to fill a demand for organic pork and in the meantime improve the profitability of his arable crops. Although it was an economic drive that made them go this way, it now has become a clear vision of the father that this is the way forward. Not that it is always easy, but as a true farmers he sees a benefit for his land on the longer term. Interesting

enough he also explains that his son sees it a bit more straight forward. Organics is fine as long as it brings profit, but he doesn't sees it as the only option for the future. Interesting as it looks like organics is giving the farm the possibility to increase area and make profits. So the wise ripened father concludes it is the way forward and the new generation doubts it. It feels like characters play an important role in the choices that are made and not always common sense. Just wondering how the farm would develop if the daughter would have become the future farmer.

University & trade show

The general opinion of people from outside the agricultural sector, although involved, is that farmers do not like to make changes very quickly. Tradition and well known farming methods seem to be in favor instead of picking up new opportunities. There seems to be also a disconnection between farmers and retailers as far as understanding each other's context is concerned.

Retailers are looking for differentiation to compete with each other, but are in the same time very price driven. It looks that the vision of worldwide trade in food has caused that they lost connection with local production and true pricing. In case imported products are cheaper, the local products are coming on a second place. With a growing demand for organics, the farmers seem to have lost trust to enter this journey together with the retailers. It results in many imported products .

Interesting as in the same time consumers are already a step ahead of this and trying to connect more to their food. A great change for both retailers and farmers to make it happen and benefit from this.

Clearly also limits appear from a climatic point of view. In the northern countries it is not easy to grow protein crops for example. So keeping the food habits in mind that we currently have, it is not easy to go back to self dependency from a farming perspective. Time and research will be needed to find solutions.

Cedar cheese

Visiting a great cedar cheese making and dairy business in the UK, should have been the example of an integrated supply chain, creating desire. The farm has been involved in dairy and making cedar cheese for many generations. Given the current dairy market, it seemed to be a good preparation for difficult times. But also in adding value by making cheese, the business has to deal with the price competitions that come along with a commodity product. Retailers are demanding prices for the end product that does not fit with the original milk price that were used to produce the cheese. It looks like it is taking out the motivation of the farmers to keep doing this for the longer term. In the meantime the only way forward is to be very efficient instead of innovative. Again in a time were consumers are looking for quality, it feels like contradiction.

On the farm several herds where kept to produce the milk. First and mostly a very high productive herd with high yielding cows, but a lower quality milk. To guarantee a good cedar cheese a second herd is added to this to compensate the quality of the milk. Less yield, but high contents of important ingredients. To fulfill the demand for organics, also an organic herd is in place to realize this. By asking the farmer it came out that although he understands the value in the last 2 herds, he liked the first herd most: yield.

Sausages & Wales

Winning the BBC2 awards means something. It is a great award to a quality product. That is exactly what could be seen at a small scale butcher in Wales. Inheriting a farm that has been in the family for a long time, the owner decided after a career outside the agricultural industry to come back and make the difference by producing true and quality food. His sausages are being serves in the best restaurants now, although he and his partner still favor local food markets as well. So is this business going to feed the world? Mind blowing..yes. It is because they dare to 'think out of the box'. Beside making these special and local products the owners are involved in meat production to feed the world in the future. The idea is to use the quality DNA , followed by factory cultivation (biotechnology) of quality meat. In this way, they explain, we can stop unsustainable meat production and make good quality available for all people. Remarkable how they can step outside their core business and have a refreshing look at farming.

Wales as a country is opening eyes as well. Looking at the area, farming conditions, soils and climate this will never be suitable to feed the world with only vegetables. A good example that meat production at the right places plays an important role to feed the world. Exactly what the owners of the sausage farm are mentioning: keeping the right area's and conditions to preserve the right DNA, but explore new possibilities to use that DNA to 'feed the world'.

Farm shop

Beckets is the largest farm shop in the UK and according to the founder, the only farmer making real cash. A family business that followed trends in agriculture instead of keep doing what everybody is doing. After changing from dairy into poultry, it moved into a farm shop as a core business. In the meantime it has build up to a food market, restaurant, conference centre and cooking studio's. It took on opportunities that created desire. Speaking to the current owners and future generation there is a clear sign that there is a need to move on. Large retailers are understanding more and more the demand for quality and local food. It is causing a potential threat to the more expensive business model that a farm shop has. Not sure what will be next for them, but sure they pick up new opportunities to develop.

Vegetarian Butcher

Jaap Korteweg who has founded the Vegetarische Slager in Holland, has a conventional farming background and converted first his farm into organics, follow by founding a business that is offering

plant based 'meat'. The main question to him was why he tries to copy meat products into plant based meat substitutes. Interesting to understand his vision that meat consumption is putting a high pressure on worlds food consumption and resources, but also that many of us are addicted to it. His solution is simple, just copy existing meat products into the plant based alternative. Many specialist cannot taste the difference any more comparing his products with real meat products.

Good example of a farmer that steps out of his existing farming model, uses common sense to a habit that is present and offers a solution for a transition.

Learning highlights developed countries

- Characteristic s of farmer stands above common sense about what is good or has potential
- Many innovations come from people that are from 'outside' the primary agricultural sector
- Disconnection and trust within the supply chain is not helping to implement innovation and fulfill desire
- There are opportunities enough to make the difference, as long as you want to see them and pick them up
- It is all about desire to create value and closing the loop on nutrients as far as sustainability is concerned
- Understanding of production methods and farming at consumer level is key to implement 'out of the box' solutions to feed the world

BRIC countries

Brazil, Russia, India and China seems to have a booming effect in the rest of the world…as a market, but also as a supplier of raw material. Interesting to understand the dependency of the world food market on these countries. Many developed countries with a surplus production see it as opportunities to produce more and sell product in those upcoming economies. Question is if this is feeding the world or trying to learn consumers in these countries to enter the same consumer habits that we have developed in for example western Europe. When they get wealthy it seems that they all need to eat meat and drink milk like we do here.

The other aspect to take into account is the potential to produce in these countries. Protein crops are expanding heavenly in some of these countries to supply the rest of the world. Land is available and been developed in a short time into agricultural production.

Brazil seems to be high on the list to play an important role in feeding the world as it has many land available, water and sun. It also shows a differentiation of farm models due to the size of the country and different climates , as well as developments within agriculture are concerned. Although Brazil has been the main investigation, also a trip to India gave insights into the influence of BRIC countries.

GMO and soil improvement stimulators

Clearly GMO has established well in the Brazilian agriculture. Both commercial parties as well as research institutes are working hard to help farmers in Brazil to lower chemical input and find resistance against soil diseases. Although the issue about GMO is about making a non returnable change in nature, it is remarkable that for example organic farmers spray with BT and GMO growers have brought it into the genes of a plant. According to many farmers in Brazil (and Australia) it helped to reduce the impact of chemicals on their crops. Cleary in soy beans the most important GMO-resistance has been to round up. Easy for the grower and lowering costs, although it must be said that the growers calculate that the saving they make, goes back to the inventor of the resistance.

Having the image of Brazil and only GMO in mind, it is a good surprise to see a lot of research is being done by Embrapa to develop bacterial input for the soil that stimulate the fixation of nitrogen. In this way soy has been grown without N fertilizers at all.

A big concern in the production of soybeans is the increasing issues with white rust. A mono culture on soybeans has become already too risky and growers scream for other solutions like new chemicals or GMO resistance. Researchers state that it is the future issue, as there is no single solution like a GMO resistance. Becoming too reliable on these techniques, is a big threat for food security. A more healthy crop rotation is recommended as a base to prevent diseases.

Proteins and poultry

It is clear from all the research that is being done, that an important protein source to feed the world will be Brazil. The question is if this will be soybeans as a source for animal production all over the world, as a source for direct human consumption, or as an input for animal production in Brazil. Large cooperatives have invested already in huge poultry operations and slaughterhouses to convert plant proteins into chicken or pig meat. Being at the source of protein production, a good competitive advantage. Thinking about logistic costs and energy needed to ship all the soy to other parts of the world, it looks like a good way forward. Question remains if consumers trust food that comes from all over the world. Within Brazil these developments are especially taking place at the regions where land has become more expensive and growers need to find ways to add value to the products to be able to compete with cheaper production area's in Brazil like Motto Grosso.

With all the soy available it is remarkable to see the re-use of a protein source out of slaughter waste. The feathers, bones and other waste are being transferred into protein to feed animals. A very efficient way of preventing protein waste, but the questions is, if it fits with food security as it might be a risk for animal health.

Motto Grosso

Stimulated by the government huge land area's in the center of Brasil have been transformed from wild/forest land and into land for arable crops. Entrepreneurs have been taking this land into use and created beside farms also the complete infrastructure that is supporting production in these regions. Single cropping of soy, twice a year, have been a long time the main driver for growth in this region. The last few years it is changing more and more to a crop rotation with soy and corn. Main reason is

the issues with white rust and the awareness that single cropping will not be the future in retaining healthy crops.

Beside huge and impressive land area's producing protein for the rest of the world, the second earning model for the entrepreneurs has been increase of land value. The down side of this is that it looks like there is a need for developing new cheaper land again to retain this earning model. Earning models on commodity products like soy seems to be partly driven by cheap land.

Surprisingly fish ponds are showing up in this area to convert plant based protein into fish protein. It is a development which also is bringing added value to the raw material.

Dairy for the local market

Milking cows in a tropical environment seems to be a challenge. Setting up a good distribution system for milk in a country like Brazil seems to be even more difficult. The result is a very poor quality fresh milk available in stores and many local small dairy operations. The milk prices are relatively good compared to the global market for milk, due to a protection system.

Visiting an impressive dairy operation in the tropical environment of Brazil showed that drive and an innovative way of looking at the dairy market in Brazil are the ingredients to differentiate and also help to 'feed Brazil'. The dairy operation have set up their own dairy processing factory on site and is producing a high quality milk that has a longer shelf live. Bringing in a new breed has been the key to improve the protein and fat levels in the milk, as well as the taste. The cows are mainly grass fed and beside a good production model, also local people are involved to support the project and the community.

A good example of how to adapt knowledge with a local demand and not focusing on commodity markets only. Also impressive to see how in area's which were expected not to be suitable for dairy an operation like this has been formed. It is a much different model than shipping protein to Europe, milk cows over there and then export the dairy products again all over the world into a commodity market.

Soy beans in Amazon

Meeting a former agronomist in the Amazon region, running a soy bean farm is showing the drive behind a short term earning model of a commodity like soy. Main reason to be active in this region has been virgin land due to deforestation, the lower price value of this land and the harbor nearby.

The farmer has currently difficulties to survive due to low yields, mainly caused by compaction of the soils. Due to the pressure on the earning model, there is no time and alternative crops available to improve the soils. Although the farmer is questioning his future on this farm, he is sure that someone else will try again if he has to leave to farm.

There is a lot of discussion about deforestation in this region and although there are rules and controls in place, it is likely that the illegal process of deforestation is still continuing due to the attractiveness of cheap and virgin land.

The rain forest

Traveling trough Brazil has shown an impressive and diverse agricultural country. It's got land, sun and a great potential to produce a lot of food to feed the world. But to make this all happen, water is crucial…water caused by rain.

The rain forest is absorbing humidity from the sea and transporting that rain into the mainland. This air is collapsing against the higher altitudes and steered back into the production areas in brazil. The trees in the Amazon are playing a crucial role in this whole process.

It is an almost scaring idea that the de-forestation can cause a distortion of this process and with that undermining the production potential of Brazil. The search for cheaper land and short term usage of land for commodities like soy can in this way have a huge impact on the future protein production of this part of the world.

Keeping in mind the calculation models on how to feed the world and combining that with Brazil for 40% of the protein production in these models, is showing how fragile this can be if the rain forest is not protected well enough.

Learning highlights BRIC countries

- Huge potential for protein production in these area's
- As it has been developed mainly over the last 50 years and always new land has been taken into production, many farming models are based on simple/single crop farming. Issues are now showing up and are asking for a review on these farming models
- Adding value is starting to take place in these countries as well as transforming plant based proteins into protein products that are ready for consumption. There will be a shorter supply chain to export markets in the near future, skipping dairy/intensive animal farming in western Europe.
- GMO have been a helpful tool for the short term, but is not the answer to longer term issues now coming up like soil compaction/health issues or new diseases.
- The world is making itself quickly dependent on a political instable country with a high risk on short term wins instead of a sustainable approach to land use.
- The dependency on natural regulators like the rain forest should not be under estimated as part of our journey to feed the world longer term.

Recommendations

Taken on the addressed topic, it was sure on forehand that there will be not just one answer or solution. But by speaking to the farmers across the world, instead of only to scientist, and combining it with the circumstances they operate in, it has given good inside in a more common sense approach. Some of this common sense can be taken on as recommendations for everybody who is involved in food production, or better…everybody who is involved in food, including the end consumer:

- There is significant difference if you compare the existing farming model of farmer with the farming model that he/she would really love to put in place if they did not had to worry about the short term income stream on the farm. The reason why farms are more intensive and depending highly on artificial inputs is because they need the high yields of their cash crops to pay the bills. By taken this dependency away, farmers are likely to agree that a variation of crops and more rest crops are better for their soils.
- Yield, size and commodity have become a major driver of our food models, but also of the farmers DNA. It looks that most of the new approach on innovation and change in farming is coming from outsiders that enter the food chain. These outsiders are not always able to 'feed the world' but have an important 'eye opener' effect than can be follow up by others in a more efficient way.
- The world trade model, and a food supply chain that is becoming too dependent on this, is a big risk for food security and also earning models for the farmers. It is also given a false and short term view on where our food is coming from longer term. Access to relative cheap raw material from BRIC countries will change on the mid/long term and it would be good to review that dependency and look for a more local source.
- Real entrepreneurship can be found all over the world and is showing great opportunities for people that want to be involved in farming. There is a good alternative around the globe for young people that got stuck in their current farming models within a rapidly changing supply chain.
- Transparency will have a huge impact on choices that the end consumer will make. A Nuffield travel is giving some people a step ahead, but it is a matter of time that the majority can have access to the same information and choices that can be made. It is recommended to mirror your business/food system relevance with this.
- Producing 'more with less' is good, but if it is a single solution to feed the world it will be a dead end. It would be better to produce:
    - 'less for more', meaning better quality and diversity based on knowing our food and the impact our food has. Wasting less will be a easy follow up on this
    - 'invest more to waste less', meaning a better and shorter supply chain in especially developing countries…but also still in developed countries
    - 'an alternative', meaning rethink our food sources and if a more plant based diet could be helping to bring the balance back

It will not only be a better answer to food security, it will also bring a lot of joy, pride and fun back within the food supply chain, which is crucial to future generations to join this great sector!

Annex 1. End presentation @ APS2016

During the Amsterdam Produce Show 2016, the outcome of this research has been part of the seminar program. The video of this presentation can be found in the list of the following link:

https://www.amsterdamproduceshow.com/programme/aps16-programme/

Connected supply chain as key to smarter food systems

common sense farming ↔ efficiency & volume development ↔ joined category approach



Traditional, but re-invented food as key to smarter food systems

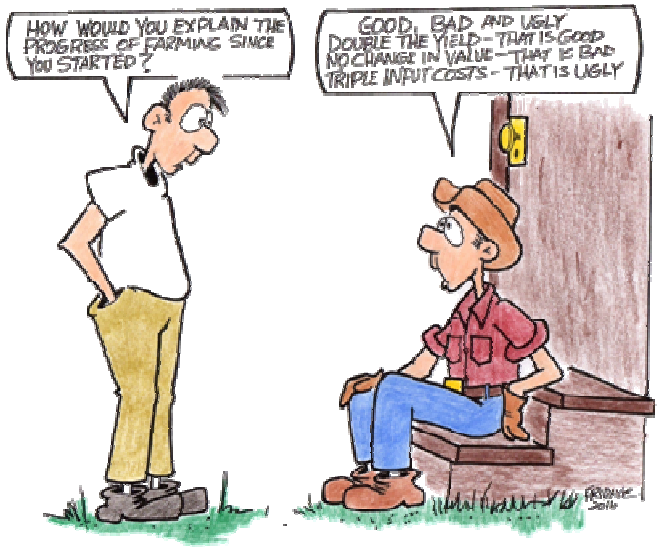
healthy & proven vegetables ↔ adding convenience ↔ tasty & valuable products



Desire and sharing true stories as key to smarter food systems

true stories ⟷ desire ⟷ inspiration





Annex 2. Travel blogs

Via the following link some blogs written during the travels can be found:

https://medium.com/@GerjanSnippe