

Placement Assignment 1

An investigation into the economic and environmental benefits
of precision fertiliser use for Riviera produce



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Section 1- Summary

The economic and environmental considerations have been highlighted in this assignment, with the benefits of the investment in technology shown throughout. It shows that the company could benefit significantly with the investment in auto shut off technology as it would bring great saving in fertiliser over the whole acreage that Riviera farm. The fact that the investment could also help in an environmental sense has also been shown, as it would help for Riviera to conform to its NVZ regulations as well as the LEAF and FWAG groups that it is registered with. This report also shows that by sticking to the current spreading regime that Riviera use should carry on regardless of the technology, this is the method of using several smaller applications as the plants need it as opposed to a smaller amount of large applications to save on time. It then concludes that it would make both economic and environmental sense to buy an auto shut off spreader.

Introduction

Riviera produce is a vegetable growing and prepacking company based in the village of Connor Downs in West Cornwall. It is a family orientated business having grown exponentially in the last 10 years to become the business it has become today, however it is still run by the managing director David Simmons. With the nature of the crops being grown, this being predominantly brassica crops, a wide rotation is needed to avoid any soil borne disease burden. This means that the company farms up to a 30 mile radius of its base on mainly rented land, which means taking into account a vast range of land types and field sizes. With a lot of the land only being rented on a one year contract it is essential that any inputs are applied accurately. With the spraying being done already with GPS mapping and auto shut off, the other major input to a business of this type is fertiliser. Fertiliser is currently applied in granular form using a double overlap mounted disc spreader, however it would seem that granular fertiliser still seem to be the only option for crops of such a leafy and sensitive nature, as most of the liquid formulations on the market could leave a crop of this nature open to scorching and rendering a lot of the plant unsaleable.

Economic Reasons

One of Riviera produce's biggest cost when growing a brassica crop is the fertiliser that is needed by the plant in order to grow. With fertiliser prices set to remain at an inflated level at around £275/ tonne for basic 34.5% N and for the more specialist blends it can cost as much as £320/tonne as shown in figure 1 (Horne. S, 2014), the seasons fertiliser bill would be vast.

Fertiliser update April 2014 (£/t delivered)			
UK 34.5%	Granular urea (46% N)	Imported AN	20.10.10
£290-300	£280-300	£270-290	£290-305 (blend)
			£305-320 (compound)
Potash (MOP)	Phosphate (DAP)	Phosphate (TDSP)	
£275-290	£380	£285-315 (blend)	

Figure 1 Fertiliser Prices Spring 2014

For this reason it would make sense to invest in higher levels of technology in order to make sure that the products are not only applied at exactly the right amount as the cropping demands but as well as this, ensuring there is no overlap in the application is paramount in order to save money.

With an average of 6 applications per one crop per year with a variety of different products to match the nutritional requirements, as shown in figure 2 on the following page. This shows that although nitrogen is needed throughout the growing season, it is not demanded in such quantities as other macro-nutrients phosphate (K) and calcium (Ca). This means that other specialist products and blends are needed for the growing crops other than the usual ammonium nitrate that is used for most other crops, one of the most commonly used products by Riviera produce is Yara Tropicote, with around 725 tonnes of this being spread throughout the growing season. This product contains 15.5% N + 19% Ca, and is specially formulated for specialist vegetable crops and is designed to reduce the scorch levels in leafy crops and its hydroscopic nature means that uptake by the plant can be a lot quicker than some of the other products on the market. (Yara, Not Dated)

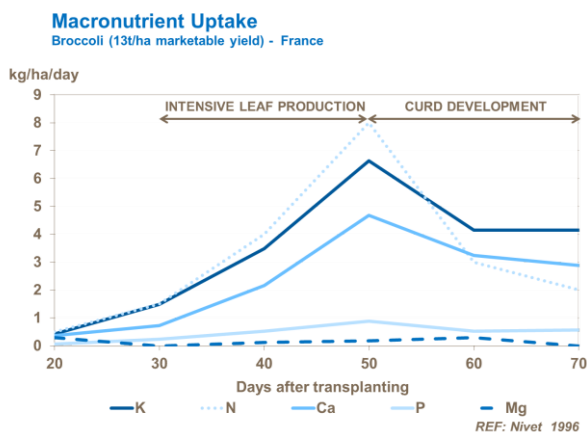


Figure 2 the nutrient uptake of a broccoli plant in its growing cycle

One way in which precision application of granular fertiliser could be achieved is by using a pneumatic spreader, this works along similar lines a sprayer, by having a boom width to cover the entirety of the spreading width. They use an air stream in order to suspend the materials and move them along plastic pipes, allowing fertiliser placement across the whole working width. They also use similar techniques as crop sprayers to be able to turn off individual section of the machine to reduce overlap in the short work, thus reducing the amount of fertiliser being over applied and therefore over the amount of land that Riviera grows on reducing the fertiliser bill dramatically (DEFRA, 2004) However the practicality of such a machine may be limited in the harsh and difficult working conditions that Riviera have to deal with, mainly due to the often increased weight of the pneumatic spreaders, and the soil damage that it could cause both before and after planting. Also with fertiliser being of hydroscopic nature it could cause spreading problems as if the atmosphere is damp which often occurs due to sea mists, it would stick in the booms causing uneven spreading or may even cause misses or scorching.

With both pneumatic and liquid application of fertiliser having flaws in vegetable production the only other alternative is disc spreading. However in a recent study done, it was found that in a perfectly square field when disc spreading fertiliser there was an overlap of approximately 5% in a 18 acre (7.3 HA) field. However taken into account the irregularity of shape of a lot of the fields being used by Riviera around another 5% more overlap could be experienced when spreading fertiliser. (Rickard. J, 2014) As well as the irregular shape of many of the

fields the average field size is around 2.8 HA meaning that in order to make up the 2000ha working area that Riviera currently crop they have to work around 700 fields each year, consequently meaning there is a high proportion of overlap when coming into the headlands or any short work. It is estimated that by using auto shut off techniques and rate reduction it could eliminate this overlap causing an average saving of 50kg/field on average. (Thomas, 2014) This spread over the 700 Fields would lead to dramatic cost savings in excess of £20,000 per annum when spread over the 5/6 applications for each crop.

With an average spreader equipped with the relevant shut off technology costing around £15,000 (Padfield. E, 2011) it would prove to be very advantageous for Riviera produce to invest in this technology as payback on their investment is likely to happen within the first 12 months of operating the machine, in terms of fertiliser savings.

Environmental reasoning

With a lot of Cornwall falling into an NVZ restricted zone which are shown by the shaded areas in figure 1 and Riviera's position being indicated by the arrow, the use of fertiliser has to be closely monitored. Especially as the company can travel as far north as Padstow which is an area not covered by an NVZ. For this reason Riviera produce could also benefit not only from saving money through the use of precision fertiliser but there are also vast environmental benefits due to both the climate and working conditions that Riviera have to deal with.



Figure 3 NVZ map of Cornwall

Cornwall as a whole receives higher than average rainfall over the last 30 years, with an average figure of around 1061mm per year, compared to one of the other major vegetable growing areas of the country Lincolnshire, which receives around 610 mm on average over the same 30 year period measured. (MET OFFICE, 2014) This means that any nitrate inputs have to be controlled carefully to ensure that the level of nitrate leaching is kept to an absolute minimum, this factor is often not helped by the extreme topography of a lot of the fields that Riviera grows on meaning that nitrate losses could be higher than usual levels. Along with this the soils that are used to grow these high value crops tend to be of the more light loams to sandy soils, these are amongst the worst soils for leaching as the CEC (Cation exchange capacity) of the soils is lower, meaning that nitrates carried

in water are able to move through the soil more freely leading to heavy losses year on year (Powell Gaines and Gaines, 1994). Coupled with this the nature of the crops grown on the soils means that the fields can often experience high levels of vehicle traffic during the winter months. This can mean that heavy compaction occurs especially on the loamier soils, meaning that surface runoff can also be a problem during the wettest of months.

With Cornwall being a peninsula and surrounded on three sides by sea, it can mean that the weather conditions can change very quickly and often bringing in heavy rain or other extreme weather conditions. This being said it is very likely that the fertiliser spreader may be caught out in bad weather, especially with the distance that is travelled by Riviera. For this reason by having a more precise way of applying fertiliser it would reduce the possible levels of loss from excess application, and along with this it would allow the operator to resume work in the same field after any weather passes through without the risk of them covering the ground that has already received its dressing.

Coupled with this each of Riviera's 700 fields are soil tested, this gives a measurement of the soil indices and what nutrients are specifically needed to match the growing requirements. From this a fertiliser plan and product is selected from the range of base fertilisers that are used, the most common of these being 6-18-36 which is used as it best meets the plant's needs. Being accurately able to spread fertiliser it means that the plant is only supplied with the right amount of nutrient needed for one crop, which becomes particularly important on rented ground which is only cropped for a single growing season. (Thomas, 2014)

Conclusion

With these points being considered it would appear that in terms of both economic reasoning and environmental, it would make sense for Riviera produce to invest in more accurate ways of applying fertiliser. With both pneumatic application as well as liquid both having major flaws both in terms of application, as well as in terms of plant growth and possibly overall uniformity it would make sense to pursue a more accurate method of disc spreading. With the current technology which is readily available and the relatively low price in comparison to the actual and potential cost savings that could be experienced in reduced fertiliser bills it would make sense to invest.

However if they choose to invest they must choose to keep on top of the technology and the updates that will come through the system in terms of software updates and more advanced mapping techniques. It is only through doing this that they will still be able to reap the benefits of the technology. It would pay dividends for the company to train more than the existing one operator. This would allow the spreader to run for longer during the busy times of year, as at present the main spreader is supplemented with the old reserve spreader. However this would no longer be used if a reserve driver was trained, ensuring that all the fertiliser is applied in an accurate manner.

However it could lead to complacency with the farm, as the farm's fertiliser strategy has always been to apply smaller doses more regularly as the plant needs it. However simply by changing the accuracy of the application it does not mean that the application strategy can change at all, with giving the plants smaller doses more frequently it will also mean that there is less wastage of fertiliser in terms of leaching, run off and volatilisation. Therefore I think that if Riviera produce were to invest in this technology the application strategy would still

have to be closely monitored. If this is done in the right manner then it would mean that a company such as Riviera would be sustainable in future years and would be able to continue to produce high quality vegetable crops that can compete on a national market.

Section 2- Sustainability

Economic- With the investment in a new fertiliser spreader the main issue regarding economic sustainability is the repayment of the technology, with auto-shutoff technology costing considerably more than standard technology. However the saving that will be experienced in terms of lower fertilisers usage will soon compensate for this, with the current price of fertiliser used as an average and the estimated product saving per field it will take around one and a half years to repay the investment. In addition to this once the machine has been purchased further investment may be needed in order to keep up to keep up with technology on board the machine. However in the wider frame of the business and the annual turnover, the investment in the new technology would not be a significant proportion, meaning it would make both good economic and logical sense to spend the extra money. With the business having grown in size substantially in the last ten years, it would seem that the financial sustainability of the business is good and should continue to be financially sustainable as they are filling a market of domestically produced winter vegetables.

Environmental- By investing heavily in new improved ways of spreading fertiliser the business and wider environment would start to see a benefit within the first few applications as well as the longer term environmental benefits. In the short term it would mean that any over application is stopped which would help to comply with the stringent NVZ regulations. As well as this it would also help to improve the natural diversity of wildlife present on their land. This particularly applies to field that Riviera as a company own themselves, this is because constant vegetable crops are grown each year and the same nutrients spread for those crops, by only putting the required amount of nutrients on these crops with would mean other species can compete therefore helping with diversity. This is supported by the companies active involvement in both environmental groups of FWAG (Farming and wildlife advisory group) and also the LEAF (linking farming and environment), with having held presentations and farm audits within the last 10 years. (Simmons, 2013) On a whole I believe that the long term sustainability of the business is not as environmentally friendly as it could be if it carries on with the same method of nutrient application and crop rotation. This is only the case however on owned land which is in a constant brassica rotation and has been for many year, however the rented land is already very sustainable as the nutrients are applied for that particular growing season, and at the end of the term a lot of green matter is incorporated giving more body and organic matter back to the land. As well as this Riviera produce as a growing group are actively trying to increase the percentage of waste that is recycled both green natural wastes as well as pack house rubbish and is enrolled on an industrial recycling scheme. Along with this research is also being done into simpler more environmentally friendly packaging for its entire product range, this work is being carried out in conjunction with the Duchy College. Riviera as a company also try to implement an IPM approach to growing a crop, with other methods often considered before chemical control. These will include things such as using cover crops in certain places to improve the soil structure and levels of organic matter rather than instinctively turning to artificial products to try and do this job. As

Social- Investing in new technology and trying different methods of work to improve both crop yields and gross margins, Riviera would be set apart as a business and would hopefully in the long run build an image of good

farming practice. For a business such as Riviera, which is such a large employer in the area public perception would be everything, as it would not only become an employer of choice, but also favourite in terms of the land rental market. With competition for land being high in Cornwall having a good public perception and having people know about a company for the right reasons would be very beneficial, and it is only through the renting of land and the scale at which Riviera operate which makes their business sustainable as if land is lost and contracts cannot be for filled with large customers then the business would become very un-sustainable. Along with this by applying fertiliser to Riviera's land in a more controlled method it would mean that there is less risk of nutrients running off or being leached meaning that the ground water would be in a better state for the community as a whole. As well as this the company's technical director has also been involved with the R+ D side of the industry, as he has been on the board at the horticultural development council since 1999. As well as this seed and variety trials are often held on the farm in order to try and constantly produce a higher yielding or less disease prone varieties to bring to the market which would in turn provide a more sustainable future for the brassica producing industry as a whole. This shows that the company and its employees have a real interest in the long term sustainability of the industry and new technology's that enter the market. As well as this Riviera produce has also held a stand at the Royal Cornwall show, which is the major industry show in the south west, this is held primarily to promote the business but also it gives the public a chance to raise any issues that it may have with the company as a whole of any small part with which they are not happy. (Simmons, 2013)

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