

Spinach Quality and Shelf Life when stored at 1°C

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Part 1 - Company Project

Introduction to Spinach at Emmett UK

In 2013, Emmett UK had 3147 customer complaints regarding the produce which was provided for Tesco (Emmett UK, 2014). These complaints covered different areas including foreign objects such as metal, glass, plastic, stone, insects and wood as well as general quality, ingredient quality and packaging faults. This project aims to examine the Emmett supply chain efficiency and productivity to help to increase customer satisfaction and business profitability. This is done by assessing shelf life and quality of spinach when stored at 1°C compared to the current temperature the spinach is being stored in the factory. Interviews and experiments have been used to collect data over the course of the project from different areas of the supply chain from farm to consumer, to gain an increased understanding of where spinach quality is most likely to be affected.

Emmett UK are a fresh produce company which specialise in leeks, kale and spinach. Over 4000 acres of farmland is used to grow spinach across the United Kingdom and in Spain (Emmett Murcia). During the peak summer season, spinach can take 28 days from sowing to harvest; however, it can take up to 85 days in colder periods. Spinach is sown several times a week to maintain constant supply and meet customer orders. There are 18 different varieties of spinach which are planted throughout the year in different areas to ensure a high quality crop, however, there are five main varieties which are used and take up 85% of the planting programme (Arkell, 2015. Pers Comm. Mr P. Arkell is the Farm Manager at Emmett UK Ltd.).

Due to increasing consumer demand of local and UK produce, Emmett UK are constantly striving to extend the British spinach season. However, when UK produce is not available, spinach is imported from European countries such as Holland and Spain. Table 1 demonstrates when the UK crop can be grown and seen in retail.

Table 1: Spinach Seasons

Product	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Spinach	Spain/ Italy				UK						Spain	

Current Supply Chain Process and Temperatures

In order to gain an understanding of the spinach supply chain cycle and how the temperature affects the spinach quality and shelf life, a flow chart was drawn from farm to customer (Figure 1). This is to help identify where in the process spinach can efficiently be stored at 1°C and areas which will be harder to store at this temperature.

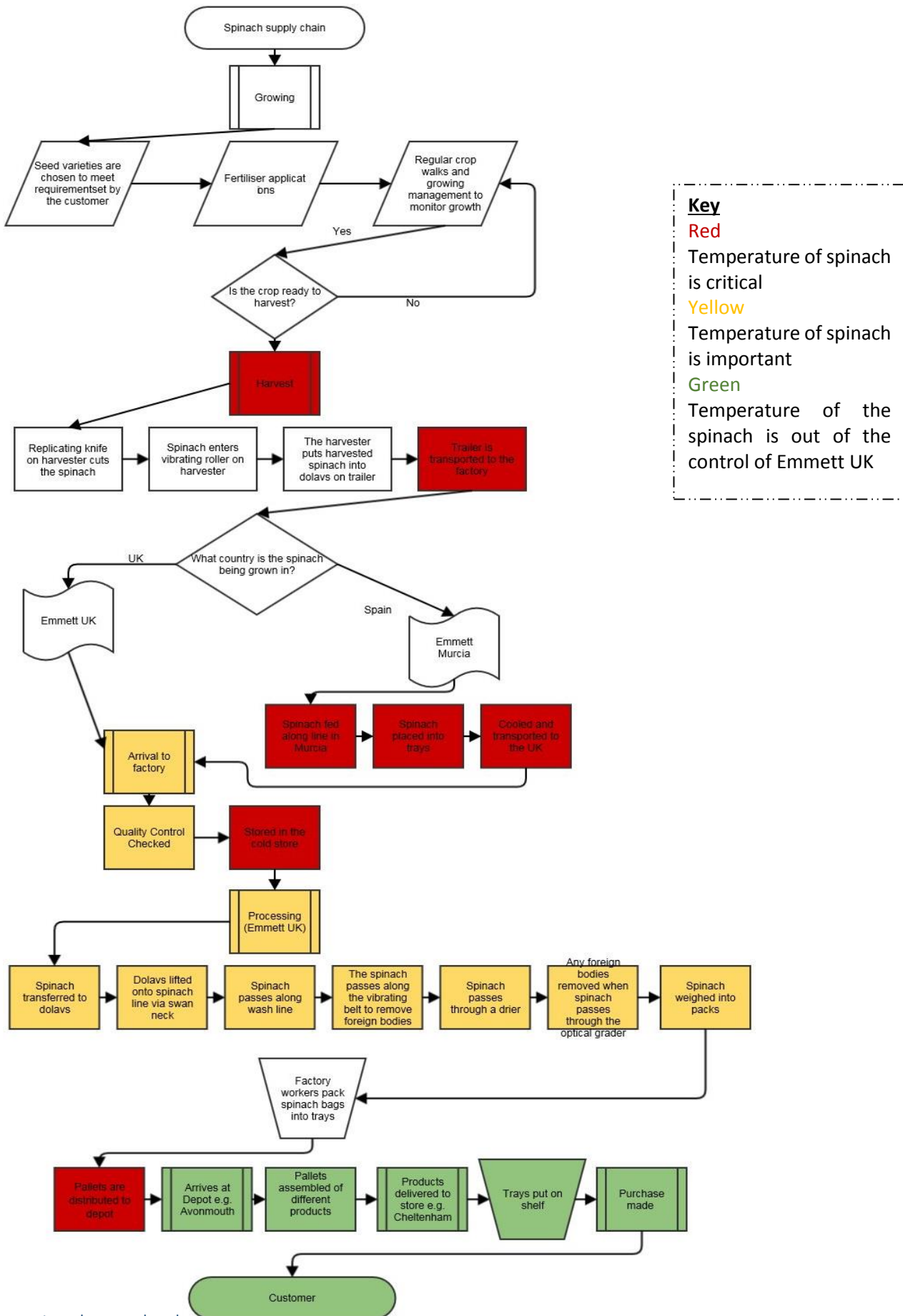


Figure 1: Spinach Supply Chain

(Source: Authors Own. 2015)

From the flowchart in Figure 1 it is clear that temperature plays an important role throughout the supply chain. The time of harvest for spinach is important for the quality and shelf life. If the crop is harvested first thing with morning dew and dampness on the ground, storage of the crop will be more difficult due to leaves being more prone to rotting (See Appendix 2). However, if the spinach is harvested in the middle of the day during the hot summer months it is more important that it is kept refrigerated and out of the heat for long periods of time as this will cause the leaves to wilt.

The temperature of the spinach when being processed at Emmett Murcia is important due to the long period of time which the leaves are spending on the lorry to be transported to the UK. If the spinach is hot when being put into trays, it will be harder for the spinach temperature to drop on the journey resulting in spinach in the middle of trays rotting. Therefore, the temperature should be as cold as possible (below 4°C) in the Emmett Murcia factory and handling of the crop should be reduced.

On entrance to the factory, if the spinach is waiting to be used it will enter the new cold store which was built in 2012. This cold store has a gas cooler to keep temperatures cool and circulate the air. The temperatures in the cold store can be easily adapted, however is set at a constant 2°C (Dawson, 2015. Pers Comm. Mr P. Dawson is the Dispatch Manger at Emmett UK Ltd.).

Throughout the washing, packaging and storage process of the green leaves in the factory in Lincolnshire, air temperature should be constantly be low. A maximum and minimum temperature were collected every 15 minutes, seven days a week for a year in both the dispatch cold store and on the spinach line. The data has been represented on the graphs in Figure 2 and Figure 3. Alarms were set at a maximum of 10°C, so if the temperature reached this, personnel were notified. From the graphs it is clear to see that the maximum factory temperatures dropped in the winter months of November, December and January. However, in July and August maximum temperatures reached over 20°C. This could have been due to the cooling systems not working properly in July and August and the warmer weather entering the factory.

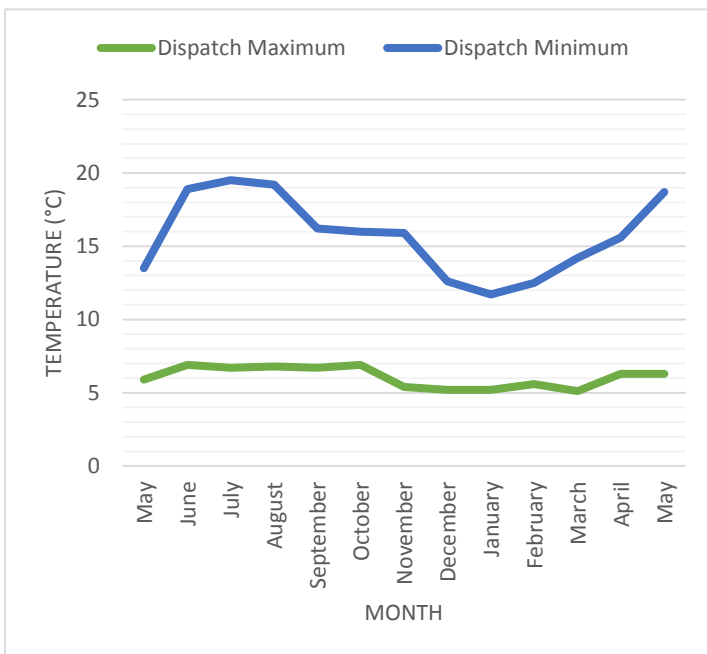


Figure 2: Monthly Temperatures in Dispatch Cold Store (Source: Authors Own, 2015)

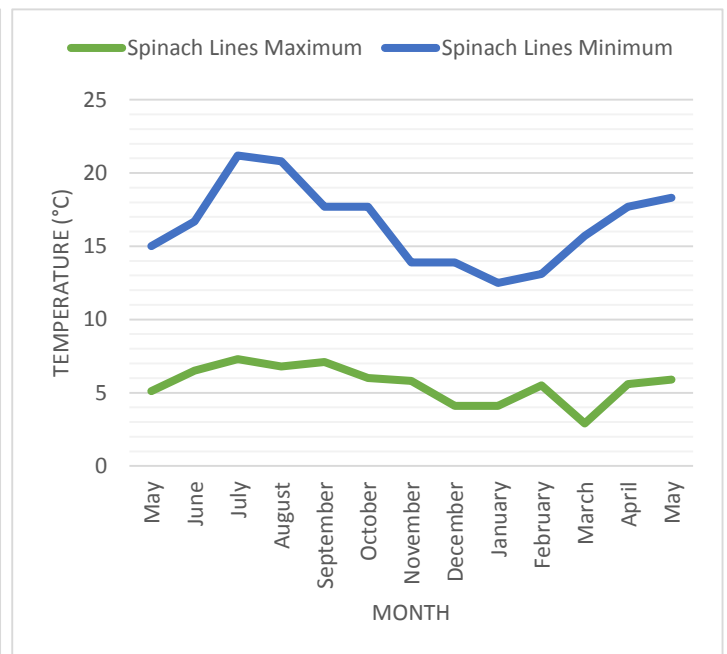


Figure 3: Monthly Temperatures on the Spinach Line (Source: Authors Own, 2015)

The spinach is stored in cold stores or refrigeration units on lorries for long periods of time meaning that if the temperature is not being handled correctly it could seriously affect quality of the spinach. The temperature can be monitored and set by the operator using the control panel (see Figure 4). The optimum temperature for spinach is 0°C. Spinach is a highly perishable product and will hold its quality for a maximum of a two week period (Ethylene Control, 2000). Therefore, it was decided to regularly test temperatures within the factory to highlight any cooler or warmer areas, to help target areas of improvement. Therefore, using a thermometer and inferred temperature probe, readings were recorded. Figure 5 shows an overview of the factory and in red are the warmer areas and in blue are the cooler areas. All temperature recordings are shown in Table 2.



Figure 4: Controller used to set the chilled lorry temperature

(Source: Authors Own, 2015)

Table 2: Spinach Temperatures recorded throughout the Factory

Room Number	Room Name	Average Temperature	Highest Temperature	Lowest Temperature
1	Spinach Loading	18.6 °C	21.4 °C	16.4 °C
2	Goods in Cold Store	14.8 °C	16.9 °C	11 °C
3	Preparation Area	15.2 °C	19.7 °C	13.7 °C
4	Dispatch Cold store	13.8 °C	9.1 °C	14.3 °C

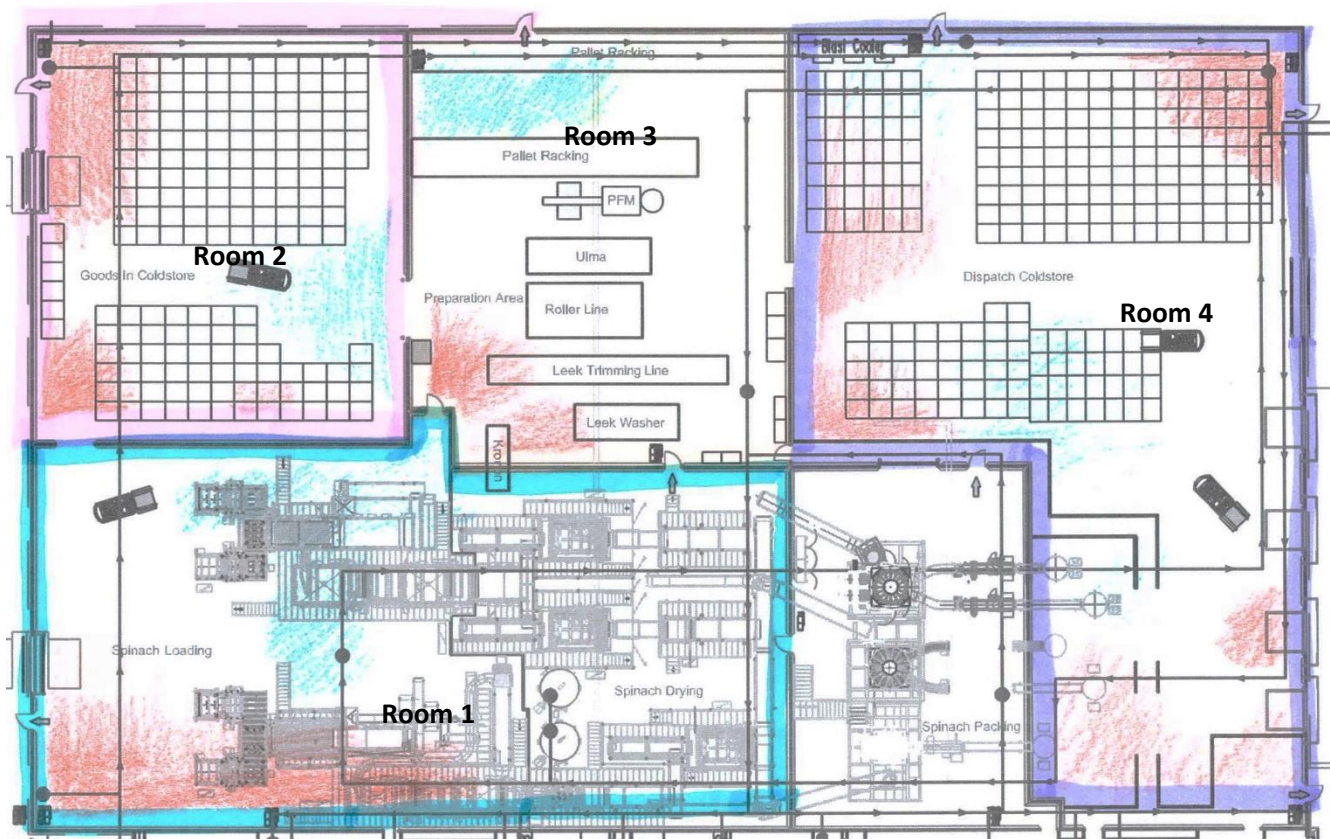


Figure 5: Overview of Factory Temperatures

(Source: Authors Own, 2015)

Once the spinach has left the factory and arrived at the retailer’s depot, there is no control over the temperature that the spinach is held at. The packaged leaves will take two days from leaving the factory in Lincolnshire to arriving to the customers and being in store. A study was conducted to see the effect that the temperature had on the deterioration of the spinach. Results showed that the packaged produce could retain quality when the temperature maintained between 1 and 4°C, however temperatures below 8°C had a significantly reduced life. Quality defects in the spinach stored at a warmer temperature included yellowing, decay and odour properties (Kou *et al.*, 2014).

Spinach temperatures were recorded in Tesco stores from across the country to assess the temperatures in which refrigeration units are storing spinach temperature. Temperatures of packs of spinach varied throughout stores with temperatures ranging from 18.8°C to -2.9°C. The spinach sampled were Emmett spinach which is 200g and 500g packs compared to Baby Spinach which is in the salad unit in store with other chilled salads such as watercress and mixed bags. This was to see if there was a difference in temperature between storage methods and to investigate if this affected the spinach quality in order to feedback to Tesco.

As you can see from Figure 6 the average temperature of each product is above 4.9°C meaning that the spinach is not being stored at a cold enough temperature to maintain spinach quality and shelf life. With some of the highest temperature readings for Emmett spinach being above 10°C this would dramatically reduce quality which could result in high store wastage and price reductions. Some of the highest temperatures were recorded in Cardiff, Swansea and Cradley Heath.

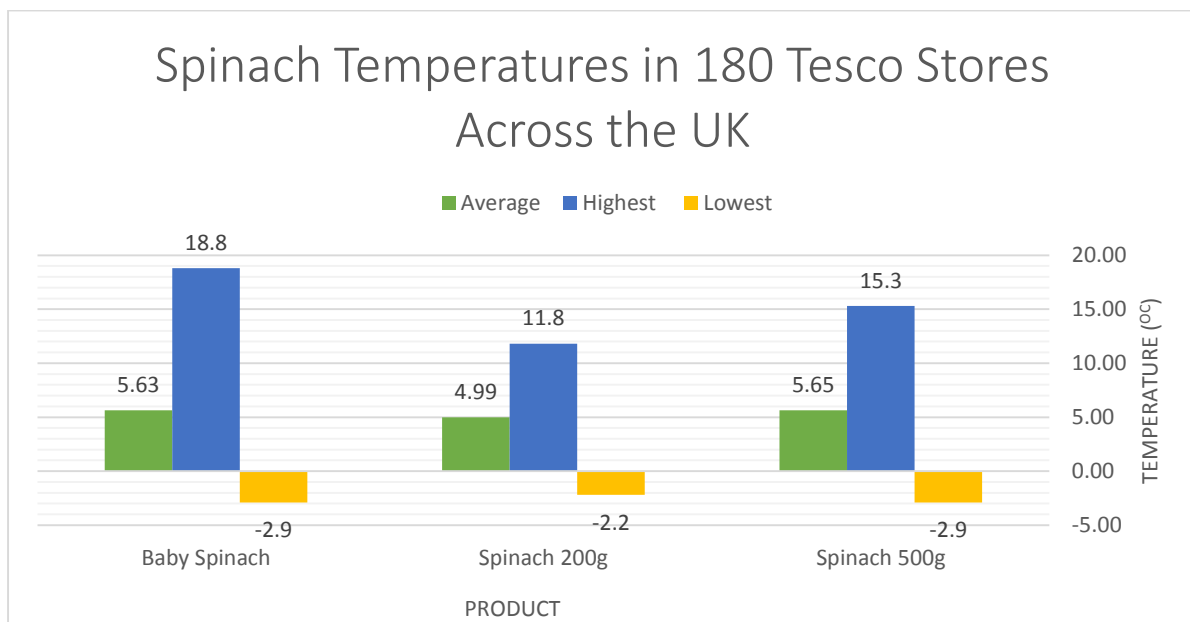


Figure 6: Spinach Temperatures in the Chillers in Tesco Stores (Source: Authors Own, 2015)

Storing Spinach at 1°C

Introduction

In April and May 2015 a research project was conducted to measure how the temperature of spinach affected the quality and shelf life of the leaves. This is to investigate and evaluate whether a change in the Emmett supply chain and technological developments could help to increase customer satisfaction as well as improve quality of the spinach and maximise shelf life. The purpose of the experiment was to see if when spinach is stored at 1°C it has an improved quality effect compared to being stored in the current temperature of the factory (average 6.5°C).

Methodology and Materials

Materials

2 x EL- USB- TC Data Loggers

2x 500g Tesco Spinach

Methodology

Coming from the same batch of spinach which has been harvested and packed on the same day, two 500g packs were taken off the end of the line and the USB data logger temperature probe is inserted into the bags. The data logger is set up to take a temperature reading every 30 seconds for 11 days. The packs were marked with sample tape to avoid the sample being thrown out or used to meet customer orders and affecting findings. The spinach quality was then assessed by observing mechanical damage, breakdown and pest and disease levels. These elements were then monitored twice a day to see if there was any substantial differences or dramatic changes between the samples over an eight day period. The spinach held at 1°C was stored in a fridge whereas, the normal temperature sample was stored in the dispatch cold store.

Results

Over the 10 day period there was no significant visual change between spinach quality when held at either 1°C or 6°C. However, from the data loggers it was clear to see trends and fluctuations in the dispatch factory temperatures with temperatures ranging between 4.5°C to 7.5°C. This shows that in the mornings the air temperature is colder than between 9pm and Midnight where temperatures commonly reach 7°C. An overview of the spinach temperatures while being stored in the factory can be seen in the graph in Figure 7.

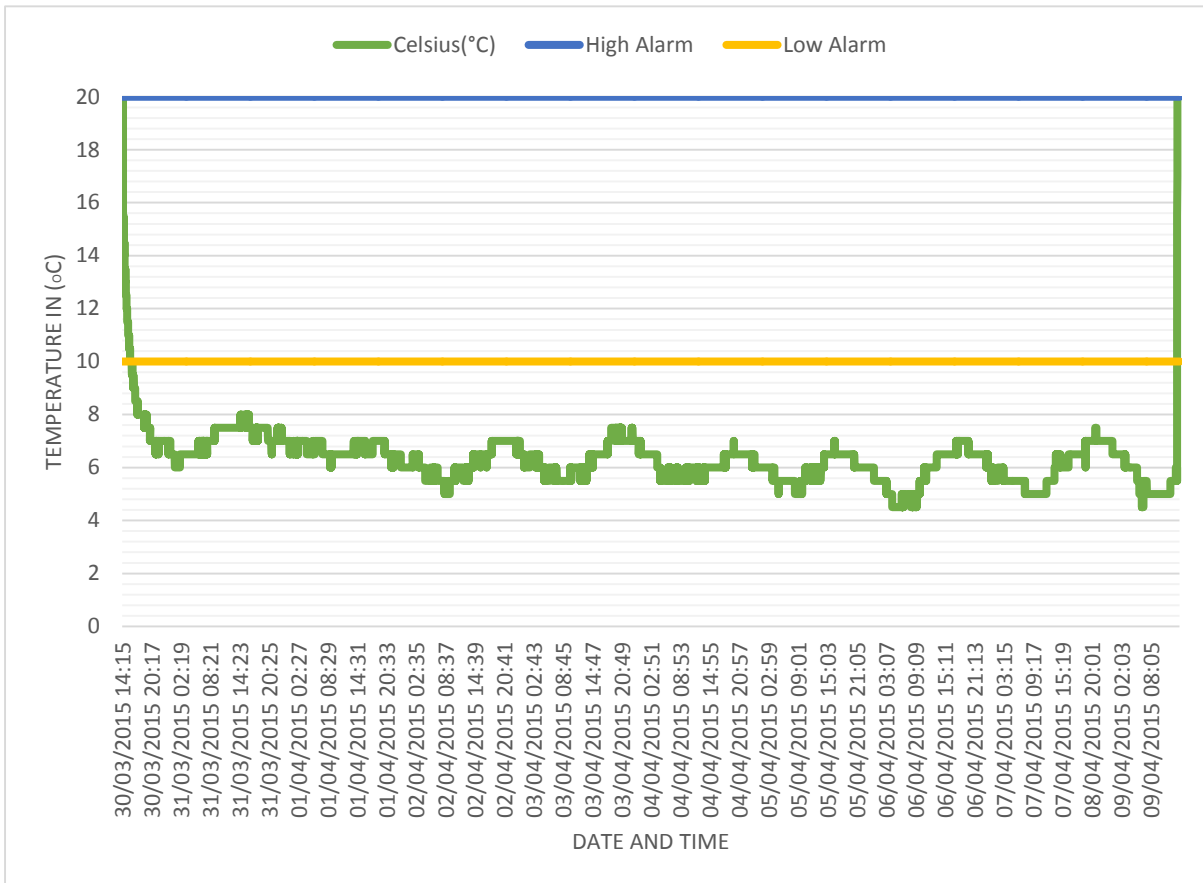


Figure 7: Temperature of Spinach Sample in the Dispatch Cold Store (Source: Authors Own, 2015)

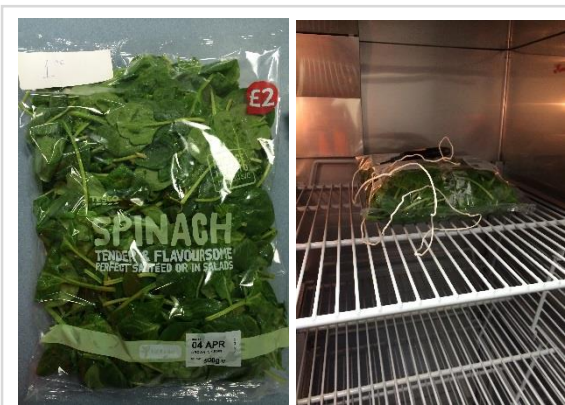


Figure 8: Spinach samples stored at 1°C

(Source: Authors Own, 2015)

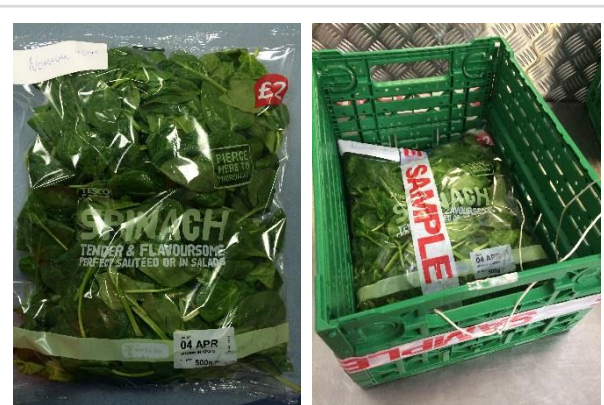


Figure 9: Spinach samples stored in Dispatch

(Source: Authors Own, 2015)

Discussion

Not only does the temperature of the environment in which the spinach is being stored need to be at a consistently low temperature through the supply chain and storage of the crop, it also needs to be understood how long it takes the packs of spinach to reach the optimum temperature when it is stored; this is so that changes can be made to packs such as perforations. As well as this, knowing the temperature which the spinach originally is can help to justify that in the factory the spinach is not consistently being kept cool enough and temperatures are too high.

	1 ^o c Spinach Sample (hrs)	Dispatch Spinach Sample (hrs)
Starting Temperature (°c)	17oc	17oc
7.5	+0.36	+4.50
7	+0.09	+6.03
6.5	+0.13	+10.57
6	+0.16	+11.58
5.5	+0.18	+ Over 48
5	+0.06	-
4.5	+0.10	-
4	+0.16	-
3.5	+0.16	-
3	+0.2	-
2.5	+1.55	-

Table 3: Time taken to reach specified temperature

(Source: Adapted from Figure 7)

With the spinach samples being stored in the dispatch cold store, results have shown that it took 4 hours and 30 minutes for the temperature to drop to 7.5°C, a further 1 hour and 13 minutes to reach 7°C and 5 hours and 8 minutes to reach 6.5°C. This is a total of 10 hours and 51 minutes to reach a temperature which is not even below 5°C. Within this time the levels of folate and carotenoid are reduced which in turn affect the nutritional content of the spinach (Science Daily, 2005). When the leaves are stored between 10°C and 20°C nutritional levels are lost at a more rapid rate than when stored below 4°C.

Although the temperature of the industrial fridge was set at 1°C, the spinach never reached this temperature meaning that the temperature of the air in the spinach environment should be set lower than the desired temperature to ensure it reaches a chilled level. Additionally, the results show that as soon as the spinach is taken out of the sample area and back into room temperature it takes just under 10 minutes to adapt to this temperature. This demonstrates that spinach is vulnerable to temperature change so should be consistently monitored to avoid temperature abuse which will affect the quality of the produce.

Limitations of the Experiment

There were several limitations within this experiment which may have affected the results. These limitations include:

- Spinach temperature was not recorded the whole way through the supply chain process; this means that in other parts of the chain the spinach temperature may have hit temperature highs which will affect spinach quality. However, due to the process which the spinach goes through in the factory in order to be packaged, it would be impossible for the temperature logger to go through this process to monitor the temperature. This is mainly due to the washing, drying and weighing process which the spinach undergoes.
- Due to only having two temperature loggers, it made monitoring the spinach quality increasingly difficult.
- On opening the fridge to assess the spinach daily, it meant that there was a large opportunity for the outside air temperature to enter the cold area meaning that inside refrigeration temperatures were lowered. This then takes time to lower again which would affect the spinach and means that the spinach is not consistently held at 1°C.

- The experiment was only carried out once and results may have varied and reliability would increase if the experiment had been repeated. As well as this, if using different sized packs of spinach for example Tesco 200g and 500g temperatures may reduce at a quicker rate.
- Due to each spinach leaf being individual in terms of size, shape and quality, two packs of spinach are difficult due to compare and contrast. As a result, results may vary which would affect the overall conclusions.

Conclusion

To conclude, the factory at Emmett UK Fosdyke is not cold enough to hold quality and spinach and shelf life of spinach successfully for the maximum shelf life period, especially through warmer periods of the year such as July and August. The lower the temperature of the spinach the better and anything above 4°C will significantly reduce the product shelf life; however, there are no findings to show that storing spinach at 1°C is better than 3°C. Over the summer months, the spinach line and dispatch temperatures can reach 20°C which is seriously going to reduce shelf life, by leaves wilting, breaking down and producing an unpleasant odour. When this spinach is sent out to supermarket stores, it may put the customer off buying the produce if they have a bad experience or even resulting in the customer purchasing spinach from competitors.

It is important to note, however, that spinach quality is affected by other factors throughout the supply chain such as the farming of the product, with elements of mechanical damage from the harvester, pest and disease damage and weather conditions during the spinach growth cycle and harvesting time. Some of these factors are external and out of the control of Emmett UK, however, could have a detrimental effect on quality and shelf life.

Recommendations

The fresh produce industry is rapidly changing and technologies advancing meaning there are a number of things which could be considered to help to improve spinach quality and shelf life. To ensure Emmett stay competitive in the industry there is a continuous amount of finance which needs to be invested into the business.

With the fast movement of the business and the large amounts of produce which are going through the factory daily, every time a door opens connecting the inside and outside of the factory so that a forklift can bring in a consistent flow of goods means that hot air is entering the factory. This affects the overall temperature of the rooms, resulting in a potential loss of freshness of produce. As a result of this, air curtains could be installed above doors or to the side to provide a barrier of air so that natural convection enables conditioned air to stay inside the building. There are a variety of air curtains available varying in price, noise, energy consumption and size.

With the use of four forklifts used 20 hours per day used within the factory, tractors and Lorries used on site and through the supply chain, vehicle exhaust fumes are being continually released near the harvested crop. Not only does this affect the environment, the ethylene produced can contribute to early crop ripening, drooping leaves and degrading produce, therefore reducing shelf life and quality. Spinach is very sensitive to the gas and can quickly become

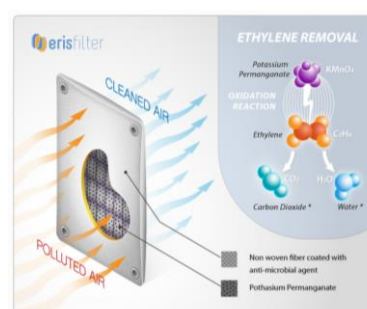


Figure 10: Ethylene filter
(Source: Eris Filter, 2014)

damaged. As a result, ethylene filters could be implemented. There are claims that Ethylene filters can cut waste by up to 29% (Eris Filter, 2014), which would help Emmett to reduce costs and be more productive and efficient. Furthermore, the filters can be implemented to have stress free-perishable transportation for longer life as well as reducing odour, airborne bacteria, mould and discolouring. Figure 10 shows an example of Ethylene Filters.

There are other methods used to remove ethylene within a commercial environment, for example ventilation with air. This method involves heavy reliance of doors opening and closing to keep fresh air ventilating through the building but is the most efficient method of eliminating ethylene in an environment. When fresh air is entering the storage, it means that the cooled ambient temperature used to refrigerate the produce is lost and money would be wasted.

With the fast movement of the business and the large amount of produce which is going through the factory daily, every time a door opens connecting the inside and outside of the factory so that a forklift can put in bring in a consistent flow of goods it means that hot air is entering the factory. The air infiltration heat gains rate is 145 litres per second (Dye, 2015. Pers Comm. Mr J. Dye is the Group Managing Director of JD Cooling). This affects the overall temperature of the rooms, resulting in a potential loss of freshness of produce. As a result of this, air curtains could be installed above doors or to the side to provide a barrier of air so that airflows natural convection enables conditioned air to stay inside the building. There are a variety of air curtains available varying in price, noise, energy consumption and size.

Ultra violet light has also been proven to remove ethylene in the environment as well as working to cool temperatures in stores and factories. When applied to both sides of the spinach leaf, the radiation from the lighting can help to reduce microbial growth, increase shelf life and can also work to prevent growth of pathogens such as *Listeria monocytogenes* and *Salmonella enterica* (Fresh Plaza, 2012) and the bacteria affecting food spoilage, *Pseudomonas marginalis* (Turtoi, 2013).

To reduce the temperature of the cold stores throughout the factory, new gas cooling systems could be installed. JD Cooling provide standing floor evaporators which are manufactured with galvanised steel and casework coils made out of copper tubes and aluminium fins which would help to circulate the air around the factory (Dye, 2015. Pers Comm. Mr J. Dye is the Group Managing Director of JD Cooling). With the size of the area in despatch, it would be recommended to have four floor standing evaporators. Each evaporator comes with an air cooled condensing unit which controls the coolers with electric defrosting heaters to prevent ice build, helping to keep the technology efficiently working. This is a large investment for the business, however it would dramatically help to increase quality and shelf life by keeping the spinach cold. This helps to keep the customer happy, resulting in repeat purchases and lowering the risks of an EPW which could cost the company millions of pounds.

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Part 2 – Sustainability

Sustainability is defined as “the process of conserving an ecological balance by avoiding depletion of natural resources” (Oxford Dictionaries, 2015). Emmett UK are a business which focus in three main fresh produce commodities; leeks, kale and spinach. The company are specialists in what they do within the supply chain from farm to fork and through having only three main lines it means that expertise can be focused on these crops helping to improve efficiency and profitability by leading the market through innovation, reducing purchasing costs thus helping to ensure competitive prices. This is linked to one of the Emmett values “*deliver excellent quality at the lowest cost*” (Emmett UK, 2015).

With the increase in awareness of environmental factors throughout the supply chain and ongoing pressure from the customer to ensure a high reputation, Emmett have gone through changes throughout the supply chain to improve sustainability. Irrigation on the farm has been reviewed and to reduce the water footprint for the spinach crop and going forward, sprinklers are going to be used instead of booms. The benefit of this is that efficiency of application will be improved due to an even and consistent application, it is easier to measure the water which has been applied to the crop meaning that excess water is not used and the optimum level of water required for the crop is used to increase yields (Civil Engineers Forum, 2015). There is also less interference with the irrigation applicator with the crop meaning that crop damage such as bruising and mechanical damage is prevented.

Across two of their farms in Shropshire and Deeside, Emmett UK have planted eight hectares of headlands which are full of wild flowers to help to attract birds and game cover as well as pollinating insects such as bees (Syngenta, 2013). This will help to restore and sustain the environment which is being farmed and the biodiversity around this. One of the Farming principles which Emmett have set is “*Minimise our impacts on the environment, our neighbours and the public*” (Emmett UK, 2015).

Once a month the Health and Safety committee meet to discuss near-miss incidents and hazards which have happened over the period and potential ways to prevent them from happening in the future. Different exercises are conducted to help improve the health and safety within the business. An example of this includes each factory employee going into an area which they are not familiar with to identify any hazards or potential near misses.

Emmett UK is owned by CSB holdings which has other businesses such as The Really Welsh Trading Company and Emmett Murcia. These businesses work together to ensure a year round supply of produce to the retailers, helping to improve relationships as well as spreading risk of the crop so that if there are external factors which affect the growing, harvesting or processing of the crop they can have greater control. Although, it could be argued that this is not environmentally friendly as it increases food miles and creates greenhouse gas emissions; however, it enables the community to have a choice of produce on the supermarket shelves as well as avoiding importing from countries further afield. Furthermore, due to having three businesses it means that Emmett are supporting the community through employing over 600 people including agency staff. These employees are from all over Europe and include different nationalities such as English, Lithuanian, Polish, Spanish and Romanian. Additionally, the Really Welsh Trading Company are sponsors of the Glamorgan Cricket Team which is showing support to the local culture and sports teams.

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Appendices

Appendix 1

Interview

Interviewee: Erika Jankauskaite

Role within the business: Quality Control

1. **What is the shelf life of:**

Leeks	} See weekly notes
Kale	
Spinach	

2. **What are the main causes of poor quality products?**
 - If the crop is wet or damp on harvest or packing.
 - If the crop has been in the cold store on hold due to orders from customers not being as expected or excess crop has been harvested.
 - Machinery
 - A fault in machinery
 - Employee error e.g. the farm worker who drives the spinach harvester, if the blade has lifted above the stem of the leaf mechanical damage is caused.
 - Varieties of crop
 - Planted in the correct places
 - Planted at the right times of year in the correct season
 - Crop rotations
 - Poor crop management and use of pesticides and insecticides.
 - High orders to meet and occasionally quality is sacrificed.
 - Weather

3. **What is the optimum storage time and temperature for products?**

If products are being stored for long periods of time, the new cold store is the best place to store produce as it is colder than the goods in cold store. Temperatures should be as low as 2-3^oc.

4. **How do we ensure maximum freshness?**

Factory temperature current procedures

Dispatch Procedures - A Despatch Operative will check the temperature settings of the refrigeration unit for distribution. Any Lorries delivering or collecting produce must have a running temperature as per the requirements of the product (usually 3^oc).

5. **What percentage of a crop is harvested and sent through the factory**

Depends what is coming in, time of year, where it is from, what crop it is- spinach weighs less. In general, aim is at least 90%.

6. **Is shelf life affected by whether the product is packaged or not?**

Yes, packed has a longer shelf life. For example, Tesco loose leeks have a 4 day shelf life, whereas packed leeks have a 6 day shelf life.

7. **Is there anything which you think could be done to increase quality/ shelf life?**

Freshness/ seasonality of produce. Ensuring that the right products are being grown in the right places and harvesting and communication with the factory is efficient to ensure that when stock is required the crop is harvested as close to the date to maximise shelf life.

We buy in cabbage from a supplier to create the cabbage and leek mix. However, the cabbage needs some focus as the supplier used to send pre washed, cut cabbage, however now the supplier sends whole head, unwashed produce as it increases shelf life.

Appendix 2

Interview

Interviewee: Nick Reynolds

Role within the business: Farms Director

1. What is the average time spent for the crop to be harvested and then arrive to the factory?

Depends on the product:

Leeks/ kale/ cavolo nero- (average) - Harvested using rigs. As the products are hand harvested, it is a lot slower than mechanical harvesting (spinach) so takes longer to fill up a trailer. A cold refrigerated trailer is parked up in field, so once trailer on the back of the rig is full, produce gets moved to refrigerated trailer. Once this gets filled up, it is transported to the factory and is then packed and distributed.

Spinach is quicker to harvest. It comes off of the harvester and straight into trailer, which fills up quickly. The average time is 30 minutes from harvest to factory depending how far away the field is from the factory.

2. Where does irrigation water come from? What happens to waste factory water?

Factory waste water goes into the lagoons next to the factory. The irrigation water source is from the reservoirs. We only apply the amount of water which is needed for the crop to ensure maximum efficiency and to prevent wastage.

3. What are the main pests which are cause of concern?

Leeks – Thrip

Spinach – Aphids and Caterpillars

Kale – Whitefly, aphids and pigeons

4. How do you manage these pests? What control methods are used?

Pesticides- must be away of MRLs. Tesco/ Waitrose set levels and pesticides which can be used and amounts.

5. What happens to any crop residues?

Reworked into soil

6. What breaks do field workers get?

One hour break every day. 2 ½ hour shifts with 30 minute breaks.

7. Is there a preferred time of day to harvest?

Spinach requires dry leaves, so once the morning dew has gone. But if the weather is very hot, it is best to harvest first thing early in the morning to prevent leaves wilting, reducing quality and shelf life. Harvesting when leaf is wet can result in quality problems and reduced shelf life.

8. What is the most recent change in production in on the farms which has been introduced?

Piece rate system on the leek rigs to aim to increase productivity. If the quality of leeks is poor due to workers cutting more leeks per limit, same rig workers have to rework the leeks in their own time, this gives a balance between quality and time. Leeks cut per minute rose from 3-5 leeks per minute.

STUDENT PERFORMANCE FEEDBACK FORM – VISIT ONE

The visiting tutor and line manager should review the student's performance, normally with the student present, within the first three to four months and towards the end of the placement period.

The student's name, email, telephone, address, placement portfolio and other information are subject to review by the college for quality assurance purposes.

Employers should annotate or edit the descriptions to best reflect their evaluation of the student in the context of the given role.

Student name: *Sophie Bell* Employer: *Emmett U* Date of feedback: *16/12/14*

Please tick the box that best describes the student's performance

Acceptance of instructions / understanding new jobs.	Does not listen to instructions or seems incapable of understanding them.	Is prepared to listen but finds it difficult to grasp what is required.	Understands instructions well and can manage the job successfully with some further help.	Capable of understanding what is required and carrying out the task with minimal supervision.	Very quick to absorb instructions and gets the job right first time.
Organisation of work.	Is disorganised and has to have work planned out regularly.	Planning of work is weak but attempts are made.	Usually understands importance of different tasks.	Has a clear view of tasks to be done.	Prioritises work without assistance, usually correctly.
Quality of work.	Work is of consistently low quality.	Rarely is work of high quality.	Quality of work is variable.	Work is frequently of high quality.	Work is of the highest quality.
Relationship and communication with others.	Has considerable difficulty in communicating with others, prefers to work alone.	Prepared to work with others but lacks the confidence to be a successful team member.	Communicates well with most people, useful team member.	Communicates well with management and staff, a strong team member.	Excellent communicator, inspires and improves the team performance.
Interest in the business.	Shows no interest in any aspect of the business.	Asks a few questions when prompted but not concerned about things outside his / her own work.	Asks sufficient questions necessary for the written work.	Asks good, relevant questions, keen to know about the whole business and to contribute to day to day decisions.	Takes a detailed interest in the whole business, asks searching questions and makes a contribution to decision-making and problem solving.

PTO

Timekeeping.	Very unreliable.	Makes an effort but timekeeping should be better.	Makes every effort and usually reliable	Very reliable.	Always on time or early.
Attitude and willingness to work hard.	Reluctant to work, lacks enthusiasm.	Does what is required but without much enthusiasm.	Usually shows enthusiasm, has a good steady approach to routine work.	Nearly always enthusiastic and prepared to work hard as and when required.	Has maintained a high level of enthusiasm throughout the placement and always works hard.
Initiative and confidence.	Serious lack of confidence in his/her own abilities, no initiative.	Needs a good deal of direction, lack of confidence which often impairs performance.	Capable of working unsupervised on a variety of well-practised tasks.	Can be left to use initiative and cope with nearly all situations.	Has the confidence and ability to approach any new tasks and cope with them well.
Rate of work.	Very slow at all/most tasks (delete where applicable)	Achieves an acceptable work rate after much repetition.	Usually capable of an acceptable work rate after a limited amount of experience.	Is soon able to achieve a very good work rate.	Capable of excellent work rates with all tasks.
Thoroughness.	Does not bother to carry out the simplest tasks thoroughly.	Can perform simple tasks thoroughly but is not consistent.	Usually thorough with most tasks but will sometimes avoid unfamiliar aspects of a job.	Achieves high standards over a wide range of jobs with few mistakes.	Takes great pride and is very reliable in all tasks.
Level of technical knowledge.	Non-existent	Very poor – needs constant reference to other sources of information.	Able to work without first of all having to explain background to the job.	High, but still has gaps in expected level of knowledge.	Very high – technical knowledge exceeds expectations.

Action required by whom and by when: Please keep doing more of the same! Well Done.

Company Project: comment on progress, quality of work and the value to the company on the completed project:
Initial Ideas: Seward, Renovation Project / Review.

Employer signature: _____ Visiting Tutor Signature: _____ Student Signature: _____ Date: 16/12/14

Scheduled date of next review: _____
Ideally, students will have a review, using this form as a basis, every 3 months

STUDENT PERFORMANCE FEEDBACK FORM – VISIT TWO
 The visiting tutor and line manager should review the student's performance, normally with the student present, within the first three to four months and towards the end of the placement period.

The student should retain completed forms in their placement portfolio and visiting tutors are encouraged to retain a copy for their own records.

Employers should annotate or edit the descriptions to best reflect their evaluation of the student in the context of the given role.

Student name: Sophie Bull Employer: Emmett UK Date of feedback: 9/6/15

Please tick the box that best describes the student's performance

Acceptance of instructions / understanding new jobs.	Does not listen to instructions or seems incapable of understanding them.	Is prepared to listen but finds it difficult to grasp what is required.	Understands instructions well and can manage the job successfully with some further help.	Capable of understanding what is required and carrying out the task with minimal supervision.	Very quick to absorb instructions and gets the job right first time.
Organisation of work.	Is disorganised and has to have work planned out regularly.	Planning of work is weak but attempts are made.	Usually understands importance of different tasks.	Has a clear view of tasks to be done.	Prioritises work without assistance, usually correctly.
Quality of work.	Work is of consistently low quality.	Rarely is work of high quality.	Quality of work is variable.	Work is frequently of high quality.	Work is of the highest quality.
Relationship and communication with others.	Has considerable difficulty in communicating with other, prefers to work alone.	Prepared to work with others but lacks the confidence to be a successful team member.	Communicates well with most people, useful team member.	Communicates well with management and staff, a strong team member.	Excellent communicator, inspires and improves the team performance.
Interest in the business.	Shows no interest in any aspect of the business.	Asks a few questions when prompted but not concerned about things outside his / her own work.	Asks sufficient questions necessary for the written work.	Asks good, relevant questions; keen to know about the whole business and to contribute to day to day decisions.	Takes a detailed interest in the whole business, asks searching questions and makes a contribution to decision-making and problem solving.

PTO

Timekeeping.	Very unreliable.	Makes an effort but timekeeping should be better.	Makes every effort and usually reliable	Very reliable.	Always on time or early.
Attitude and willingness to work hard.	Reluctant to work, lacks enthusiasm.	Does what is required but without much enthusiasm.	Usually shows enthusiasm, has a good steady approach to routine work.	Nearly always enthusiastic and prepared to work hard as and when required.	Has maintained a high level of enthusiasm throughout the placement and always works hard.
Initiative and confidence.	Serious lack of confidence in his/her own abilities, no initiative.	Needs a good deal of direction, lack of confidence which often impairs performance.	Capable of working unsupervised on a variety of well-practised tasks.	Can be left to use initiative and cope with nearly all situations.	Has the confidence and ability to approach any new tasks and cope with them well.
Rate of work.	Very slow at all/most tasks (delete where applicable)	Achieves an acceptable work rate after much repetition.	Usually capable of an acceptable work rate after a limited amount of experience.	Is soon able to achieve a very good work rate.	Capable of excellent work rates with all tasks.
Thoroughness.	Does not bother to carry out the simplest tasks thoroughly.	Can perform simple tasks thoroughly but is not consistent.	Usually thorough with most tasks but will sometimes avoid unfamiliar aspects of a job.	Achieves high standards over a wide range of jobs with few mistakes.	Takes great pride and is very reliable in all tasks.
Level of technical knowledge.	Non-existent	Very poor – needs constant reference to other sources of information.	Able to work without first of all having to explain background to the job.	High, but still has gaps in expected level of knowledge.	Very high – technical knowledge exceeds expectations.

Action required by whom and by when :

Company Project comment on progress, quality of work and the value to the company on the completed project:

Employer signature: **Visiting tutor signature:** **Student signature:** **Date:** 9/6/15