Project title: Lean production in soft fruit: a case study

Project number: SF 89

Project leader: Neil Fedden, EEF South

Report: Final report, September 2007

Previous report: None

Key staff: Neil Fedden, Project Leader

Location of project: Manor Farm, Oldbury, Kent

Project coordinator: Mr Andrew Chesson

Date project commenced: 1 June 2007

Date project completed (or expected completion date): 31 July 2007

Key words: Lean production, soft fruit

Whilst reports issued under the auspices of the HDC are prepared from the best available information, neither the authors nor the HDC can accept any responsibility for inaccuracy or liability for loss, damage or injury from the application of any concept or procedure discussed.

The contents of this publication are strictly private to HDC members. No part of this publication may be presented, copied or reproduced in any form or by any means without prior written permission of the Horticultural Development Council.
The results and conclusions in this report are based on an investigation conducted over a one-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.
AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

Mr Neil Feddon
Head of Operations
EEF South

Signature ............................................................ Date .......................................................
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background</td>
<td>1</td>
</tr>
<tr>
<td>The Problem</td>
<td>2</td>
</tr>
<tr>
<td>The Analysis</td>
<td>2</td>
</tr>
<tr>
<td>Summary of break down of harvest activities expressed as a percentage of time</td>
<td>3</td>
</tr>
<tr>
<td>Solution</td>
<td>3</td>
</tr>
<tr>
<td>Trial</td>
<td>4</td>
</tr>
<tr>
<td>Action</td>
<td>5</td>
</tr>
<tr>
<td>Savings</td>
<td>5</td>
</tr>
<tr>
<td>Quotations from company representatives</td>
<td>7</td>
</tr>
<tr>
<td>Interim Visit</td>
<td>7</td>
</tr>
</tbody>
</table>
Applying Lean to a Commercial Strawberry Farm

A Case Study Undertaken at Manor Farm, Kent

Neil Fedden, Head of Operations, Ebis

HDC Project SF 89

Background

The steady rise in labour costs coupled to static prices and returns, is currently the biggest threat to the profitability of the soft fruit industry. In recent years, HDC has funded a number of projects to find ways of reducing labour costs. In strawberries, Project SF 71 developed a champion picker model to increase the picking speed of slow pickers in line with faster pickers. It also recommended best practice in harvest efficiency.

Given the success of a technique known as ‘Lean’, which has worked extremely well in other sectors of the horticulture industry, the HDC soft fruit panel thought it prudent to commission a project which applied ‘Lean’ principles to a typical strawberry farm.

‘Lean’ is a system that was first used in the Japanese automotive industry back in the 1950’s and is largely attributed to the success of Toyota. The technique uses the ‘talent’ that is latent within the organisation to identify and eliminate wasteful activities within the business processes. It is often termed as ‘learning to see’. In doing so it removes the hassle factor from the individual’s job as well as improving productivity and reducing lead-times. Staff are trained to challenge their normal ways of working in order to achieve continual improvement.

By using the technique in many ornamental plant production businesses in recent years, significant cost savings have been made, so a case study was instigated at Manor Farm in Kent to assess the savings that could be made in the strawberry industry.

Manor Farm has been a Commercial Strawberry Farm for the last x years. With over x hectares of land they produce nearly 200 tonnes of fruit for sale through the supermarket chains. Andrew Chesson is the owner/manager and during the peak production months employs up to 85 people within the operation with the vast majority being employed on seasonal contracts. Price competition means that the organisation needs to constantly improve in order to remain competitive.

In undertaking this case study, the problem facing the business was identified and members of staff from within the business were used to analyse how the problem could be improved and
resolved. Solutions were identified and implemented in the business through an action plan. Savings that were achieved as a result were quantified.

The Problem

In recent years, it has become increasingly difficult to recruit staff with the correct skills that are able to pick at the required output rates. With staff being paid on ‘piece rate’, slow pickers’ wages have to be topped up to reach the minimum wage level. At Manor Farm in 2007, fifteen people fell into this category of slow pickers. It was identified that increasing the productivity of the 35 pickers identified as medium speed pickers by 15%, would negate the need for the slowest pickers to be employed. This would allow the management team to be more selective during the recruitment process rather being forced to recruit anyone purely to achieve the desired picking capacity at the expense of productivity.

The vast majority of staff employed within the organisation work within the picking department and so this process became the focus a 4-day improvement workshop, which aimed to achieve the targeted 15% improvement in productivity. Productivity consultancy firm Ebis were employed to undertake the case study and lead the workshop and remainder of the process.

The Analysis

Six members of staff were chosen to participate in the improvement workshop that worked in departments from the whole business including picking, packing, runners and management. This enabled all points of view to be established and more importantly to gain a real understanding of the key issues within the business.

The 4-day improvement workshop took place in June 2007. The first day was used to teach staff the theory and application of the lean tools and techniques. Day 2 involved the staff analysing the process in order to identify the wasteful activities and in turn identify ways of eliminating them.

On Day 3 the improvement team designed and carried out a trial to verify the improved process and quantify the expected savings. From this they identified the final solution that would be implemented.

In the instance of Manor Farm, the team also visited the packing department to ensure that they had enough capacity to cope with the increased output from the improved picking process.
Day 4 allowed the team to draw-up their future plan of action and calculate the expected savings. Solutions are ranked by priority of the size and speed of return on investment. The vast majority of solutions are ‘no’ or ‘low’ cost ones which is typical within Lean.

Having established the picking area as the target process, it was decided to use ‘Activity Sampling’ as a means of establishing the wasteful practices. This involved the observation of 12 pickers that were identified from the list of 35 medium speed pickers. The improvement team observed two operators each and recorded their actions every 10 seconds. After 1 hour the team collated the results which were expressed as percentages of the total time. The summary can be found below:

Summary of break down of harvest activities expressed as a percentage of time

<table>
<thead>
<tr>
<th>Activity</th>
<th>% of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picking fruit</td>
<td>69.5%</td>
</tr>
<tr>
<td>Walking to collect trays</td>
<td>12.5%</td>
</tr>
<tr>
<td>Setting out trays</td>
<td>5.5%</td>
</tr>
<tr>
<td>Resting</td>
<td>5.1%</td>
</tr>
<tr>
<td>Talking – Social</td>
<td>4.3%</td>
</tr>
<tr>
<td>Talking – Query</td>
<td>2.0%</td>
</tr>
<tr>
<td>Toilet</td>
<td>0.0%</td>
</tr>
<tr>
<td>Other</td>
<td>1.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

The improvement team concluded that 18% (‘Walk’ 12.5% plus ‘Trays’ 5.5%) of the pickers time was lost in walking to get empty trays and lay out punnets. By eliminating these wasteful activities when the picker was not picking fruit, it would be possible to achieve the required 15% productivity improvement.

The team also established that at any one time, pickers were not 100% clear of the amount of fruit they had picked and hence how much money they were earning. As a result, they would be less motivated than if they clearly understood the amount they were currently earning.

The team used a technique know as the ‘5 Why’s’ for establishing the cause of the problem and then developing the permanent solution. The technique is very simple and involves the staff
asking the question why something has occurred 5 times until the problem cannot be dissected any further. By tackling the cause rather than the symptom, the chances of re-occurrence are greatly reduced.

Solution

Having observed the process and reviewed the analysis, the improvement team then initiated solutions to these identified wastes. It was decided that having more runners in the picking teams would service the quicker pickers with the trays and punnets that were required to keep them picking.

A mock-up of a white board was employed to mark the hourly target rates for pickers. Against this, the runners marked up the actual picking rate achieved. This is a very visual way of ensuring that the pickers fully understand and are motivated by the amount they have earned the previous hour.

There was concern that increasing the capacity of the pickers would increase throughput in the pack-house, with a build-up of stock which could not be packed quickly enough. By process mapping the flow of fruit through the pack-house, the team established that a runner employed serving the fruit and removing the empty trays from the packing line would eliminate this problem. One of the improvement team suggested that this line feeder could also be responsible for placing the empty punnets into the tray so as to save even more time for the pickers. This would also reduce the number of trips made by drivers to move packaging.

The team also identified that space could be created on the packing line for a fourth packing station which would enable them to cope with the extra fruit picked if required.

The team established that drivers could increase the number of full trays transported from 60 to 70 trays per trip which would further reduce the number of trips per day by 6.

This is the whole essence of Lean, to train staff so that they can identify opportunities for improvement and have the confidence to implement the changes. The concept of the small improvements being implemented on an almost weekly basis is known as continuous improvement.

Trial

A trial was set-up, using two groups of 8 pickers chosen from the 35 medium speed pickers, with the aim of achieving a 15% improvement in productivity. The two groups were identified as the ‘blue’ and ‘orange’ group. The solutions were implemented in the ‘orange’ group including the visual measures board and the runner, supplying them with trays and punnets. The ‘blue’
group acted as a control group whereby their performance was monitored but no improvements were made to the way they worked.

The ‘blue’ group acted to monitor the ‘Hawthorne Effect’ whereby performance improvements are achieved simply because a group are being observed rather than through a real tangible and sustainable improvement.

The pickers chosen normally achieved an average of 3.5 trays per hour, so a new target of 4 per hour was set for the group.

The results of the two hour trial are illustrated below:

<table>
<thead>
<tr>
<th>Results of Trial</th>
<th>8:20 – 9:20</th>
<th>9.20 – 10.20</th>
<th>Blue Group</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>Target</td>
<td>Achieved</td>
<td>Target</td>
<td>Achieved</td>
</tr>
<tr>
<td>Inesa</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Iryna</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Nata</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Sevinch</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Carolina</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Narek</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Iveta</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Pavel</td>
<td>4</td>
<td>3</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

The results signify that in two hours, the team of 8 picked 10 trays on average over this time period, compared to a normal of 7 and 8.1 in the control ‘blue’ group.

This equates to a 42.9% productivity improvement over the normal and 23.5% over the control group, which is a more realistic and sustainable measure.

This observed improvement was encouraging in comparison to the targeted 15% and was enough to convince the team to continue with a longer trial.

In the automotive industry, where lean originated, it was common to put in place temporary engineering solutions in order to trial the improvements and gain a rough idea of whether it would work. More importantly this helps the team develop the confidence required to see the improvement through. They often used to build trial workstations out of cardboard in order to develop their ideas and this became known as ‘Cardboard Engineering’!

Action
The improvement team spent day 4 working on the action plan required to achieve the savings. A brief summary of the action points are listed below;

- Run trial in the pack house with the line feeder in place, putting the empty punnets in the tray.
- Put down anti-fatigue matting in the warehouse and also make the entrance door easier to open (at the moment some staff need help in opening this door).
- Increase the number of trays on a pallet from 60 to 70.
- Run an extended trial with the runner system in place for the pickers.
- Introduce visual hourly monitors.
- Introduce a 3-hour rule whereby if a minimum pick rate is not achieved within this time period the associated staff are asked to leave the field.
- Introduce a fourth packing station in the pack house.
- Hold improvement meetings every two weeks.
- Re-design the packing stations so that they are more ergonomically friendly.

**Savings**

These have been grouped into those that are tangible and those that are not.

**Tangible savings**

1. 15% efficiency saving (conservative estimate on observed improvement of 23.5%)

   75 people - saves 15 but 4 extra runners needed - net saving of 11 people

   On average have to make up their wages by £5 = £55 / day x 1.3 employee contribution = £71.5 = £429 / week

   - £429 x 9 weeks (peak period) = £3,861
2. Less people in campsite at £150/week = £900

3. Putting 70 crates on a pallet during busy periods

   Saves 6 trips per day for the drivers which saves £120/week in drivers costs based on a labour cost of approximately £4 per trip

   9 weeks of busy period = 9 x £120 = £1,080

4. Reduced O/T in packhouse

   3 people x 6 days/week x £3 x 5 weeks = £270

5. Extra capacity (15% across 75 people - loss of 11 people) = 5,400 - 4,224 = 1,196 hours extra capacity

   - 1196 x 4 trays = 4,800 trays/day

   = 15 tonnes extra capacity = £20,000 net profit

Total Value of Savings

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picking productivity savings</td>
<td>£3,861</td>
</tr>
<tr>
<td>Reduced campsite costs</td>
<td>£900</td>
</tr>
<tr>
<td>Reduced transportation costs</td>
<td>£1,080</td>
</tr>
<tr>
<td>Reduction in O/T cost in packhouse</td>
<td>£270</td>
</tr>
<tr>
<td>Reduction in lost fruit through extra capacity</td>
<td>£20,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£26,111</strong></td>
</tr>
</tbody>
</table>

Intangible savings

- Better work life balance
- Less stress on supervisors
- Less administration
- Less time lost picking, dealing with waste fruit
• Reduction in management time in managing the slower pickers

• Reduction in the carbon footprint by reducing the amount of transportation

In summary

The largest saving came from the increased productivity, creating capacity during the busy periods enabling the amount of fruit lost due to over ripening to be reduced by 15 tonnes.

By reducing the amount of wasteful activities within the process, improves the ability of a business to react to fluctuations in demand profiles. The term lean and agile are often used when describing the optimum process.

Quotations from company representatives

‘This course has provided a framework for us to overhaul everything from specific operations to the whole business. An excellent set of tools, especially the ‘5 Whys.’

— Andrew Chesson (Owner/Manager)

‘opened my mind to and gave me the courage to do what became obvious.’

— Ross Smith (Assistant Manager)

‘I have found the last 4 days a very interesting and eye opening experience. We are now looking at things/procedures from a different angle and we can definitely improve how we run the business.’

— Petr Hejda (Packhouse Supervisor)

‘I work on Manor Farm as a supervisor for 1 year and so all the information that I need I have got from the programme. I am very happy I can be on this training programme.’

— Alice Szyndlar (Field Supervisor/Checker)

‘I think this is good for any company to make experiments and further improvements. All the people in the group wanted to help and make a practical difference.’

— Svezoslav Karamfilov (Runner)

‘I found it a very interesting experiment. It helps a great deal in opening your eyes to changes that can be made and improve the systems that are in place.’
Interim Visit

In preparation of this report, Neil Fedden, head of operations at Ebis, visited Manor Farm on 15th August 2007 to observe the improvements to date and understand what improvements the business was going to implement next.

The biggest improvement has come from the placement of the empty punnets into the trays within the packhouse and the introduction of the line feeder. This has seen at least a 25% increased capacity in the packhouse with output rising from 100 to 125 trays per hour. It is likely that this increase in capacity will negate the need for the fourth packer during peak periods. On average, the packhouse now finishes its daily quota 1 hour earlier than previously, allowing the staff to go and support the pickers.

It also enables them to take on sales opportunities which come in late in the day which has increasingly been the case in 2007 with the adverse weather conditions in certain parts of the country.

It also reduces the number of tractor trips by 1 per day in taking down the empty punnets and also recovering the waste cardboard from the field, which is not contained in the packhouse close to the recycling bin.

The tractor drivers are also now more inclined to drop the trays with empty punnets closer to the pickers themselves which has reduced the amount of distance travelled by the pickers. The pickers no longer need to worry about sorting out the empty punnets as this is now done for them. It is estimated that these improvements save each packer 5 minutes in every 60 minutes which equates to an 8% productivity improvement out of the required 15%.

The Field Supervisor is impressed by how much easier it is now to pick with the improved process.

At the time of the visit, output was starting to drop off and it was decided not to introduce the runner system and hourly visual monitors until output started to rise again. This is in-line with the estimation of the savings which were calculated over the 9 week busy period.

What is most encouraging is the continued improvement achieved from the subsequent 3 suggested meetings. These focused on how to improve field layout to make it easier to supply the pickers and the extra room at the edges of the field required to cater for the tractor turning.

The next improvement meeting will focus on how to improve runner cutting.
The team will monitor the picking rates over the busy periods and compare these to last year’s figures as a means of establishing a sustainable improvement.