PROCESS MANAGEMENT FOR FARM STAFF

Effective and efficient operations management for farm staff

Kay I. Carson*

*Streamline Farm Management, Cheshire, England. Tel 44 1829 260599.

kaycarson@streamlinefarmmanagement.com

SUMMARY

Manufacturing industries, from auto to aerospace to pharmaceuticals, have for decades employed a management system known as “lean management” to improve production efficiency. The term “lean” refers to lack of excess “fat” or waste in production operations. In this management system waste is defined as any staff activity or cost which does not result in creating value for the business in the short or longer term – either increasing output which can be sold or improving its quality which will increase its market value – and changing production processes to eliminate it.

Can the principles of lean management be applied to dairy farm operations; and can their application increase profitability and employee engagement in the business? Can industrial production management work for the management of cows, which are not machines, and the management of employees who can be seen as a cost and not as the creators of value on dairy farms? On the basis of research carried out on commercial dairy farms in England, we believe that the answer to all these questions is “yes” but that it requires a new management culture in both farm managers and employees.

This chapter describes how the implementation of lean principles in dairy farm management can increase effectiveness and efficiency in dairy operations. Six years after the start of the three-year research project on which this chapter’s conclusions are based, the business owners and managers involved still identify the lean management systems put in place in 2010 and 2011, alongside their technical performance, as the key to their sustained profitability.

The success of dairy lean management is founded on two pillars: technical knowledge of all dairy production processes and their performance, and staff engagement with the dairy business’ targets for operational profit - the difference between the revenue obtained from the

sale of milk and calves and all operating costs, herd replacement costs, a charge for rent, machinery and equipment depreciation and the cost of finance. The targets for operational profit are set by the senior management or owners but they are translated into operational targets by the dairy operations team for all processes, including forage production, herd health, fertility, feed conversion ratios and milk and calves output. Lean staff teams are responsible for the delivery of these targets and they do so by operating in a culture of daily monitoring of progress towards targets and individual accountability to the team and to management. Finally, lean staff teams are trained and coached by the business' leadership team to learn from their mistakes and apply new knowledge as their part in a continuously improving business.

INTRODUCTION TO DAIRY LEAN MANAGEMENT

This chapter describes the characteristics of an operations management system for dairy farms developed between 2010 and 2013 on eight dairy farms in Cheshire, north-west England. This system is based on lean management principles and it sought to achieve three objectives:

(1) *To improve the farms' effectiveness in the delivery of production targets* – effectiveness is the successful execution of an annual production plan: the planned series of well-defined technical processes necessary for milk production delivered to a defined standard. The plan determined the target volume, quality and composition of milk to be produced and the annual profile of that production, chosen to maximize its market value.

(2) *To improve the farms' efficiency in delivering production targets*. The operations management of a dairy system is *efficient* if it is not possible to produce milk of the

target quality, composition and profile at a lower unit cost. The lowest unit cost achievable changes over time and across different dairy production systems, yet management needs to identify a target unit cost of production for planning purposes which together with market prices for the farms' dairy output will determine the business' dairy operational profit target. Without a target unit cost of production it is not possible to identify the production process targets that will meet the operational profit target. In this project each farm aimed to improve its own efficiency performance relative to the previous year – efficiency performance was measured as the difference between income from milk and calves and all operating costs incurred in their production, herd replacement costs, a charge for rent, machinery and equipment depreciation and the cost of finance divided by the total litres of milk produced.

(3) *To achieve (1) and (2) while maintaining fixed assets, including land, so that the productive capacity of the dairy unit would not be degraded during production*. This last objective is a very basic definition of sustainability: a dairy system is sustainable when the assets involved in milk production, both physical and human (such as land, farm infrastructure, machinery and the herd and the staff team) have the same, or improved, productive capacity at the end of the production period as they had at the beginning. In other words, we did not want to trade short term efficiency gains for future productive capacity.

The background to the English experience on implementing lean management principles on dairy farms was the need for multi-unit dairy businesses to achieve consistent high levels of technical performance across all units at the least possible management cost. It was, in fact, a wholesale milk buyer who pointed its farm suppliers to lean management to achieve and maintain high levels of technical performance across units.[2] The reason these principles were

attractive to the farm business owner was that they offered the prospect of building up management capacity in his unit managers so that his management role would be limited to strategic planning, operational oversight and continuous improvement across units. Up until that point, the operations management job consisted of reacting to urgent and avoidable problems that came up every day, rather than proactively leading the staff team in achieving daily goals and identifying process improvements to target in the future. It is important to emphasize that the change in the owners' time use was enabled by a change in the behaviour and focus of activity in farm managers. The latter change required the development of those managers in the use of lean management methods so that they could be effective in their changing roles. Six years after the start of the pilot program, this business is still run along the lines established then, still pursuing lean improvements and in very challenging market conditions, still returning profits

The five management principles that encapsulate lean thinking are well-known and the literature on their application across manufacturing and service industries is vast: see Liker (2004), Mann (2010) and Womack and Jones (2003) amongst many others. When these principles are applied they have been shown to increase business profits across industries. The five lean principles along with brief explanations applying them the dairy business are as follows:

(1) *The value created through any process is defined by what the customer values and is therefore willing to pay for*. In dairy production, there are the two products that make it to a paying consumer, these are milk and calves. The value in calves is realised either in cash when they are sold as calves, or if they are retained as replacement or additional heifers for the dairy operation, in increased milk and calves production in the future. It is important, however, to distinguish between income and value added. To illustrate this point consider cull cows. The sale of cull cows generates income,

but since for every cull cow a more expensive replacement needs to be found in order to maintain the productive capacity of the herd, it follows that a cull cow is a net cost. On a lean-managed farm, cows are culled as part of a coherent replacement policy that maintains the productive potential of the herd. When a cow is culled as a result of failures in animal health management or other management failure before she fulfilled her lifetime production potential, lean thinking does not allow managers to regard its income as value. A lean-managed farm pursues value, not always short term income.

However, farms on which dairy production takes place can also produce environmental goods for which sometimes, especially in developed countries, they are paid for by governments – in which case governments are the customer. The production of environmental goods is also a process, but not part of the dairy process. When these two conflict it is the role of business managers to decide which process will be prioritized according to the business' goals in terms of environmental stewardship. As asset managers, farm owners will also be aware of changes in the market valuation of his assets, in particular land; these changes may have fiscal implications which will affect farm income, but they are not part of the dairy process of milk and calves production – although they may well play a part in determining the operational profit required of the dairy operation.

(2) *The series of activities that lead to value creation in each production process must be specified*. In dairy systems the relevant processes are milking, calving, calf rearing, nutrition and feeding, fertility, animal health management, feed and forage production, storage and management, maintenance of plant and equipment, maintenance of fixed farm infrastructure and soil and water management. Each of these processes needs to be defined in terms of tasks, input requirements, and output and quality targets that will achieve the business targets.

(3) *The operation of production processes needs to be planned and executed in such a way that a production flow is established avoiding the creation of waste*. In this context waste is defined as any activity or cost which does not contribute to the production of milk and calves, in the current or future production cycles. The creation of flow involves the synchronization of processes and the elimination of process mistakes through the use of standardized procedures to satisfy milk buyer's demands in terms of milk volume, quality and composition and calves' demand whether for market or for the dairy operation itself. A simple example is the need to create an even flow of feed and forage to the herd if the milk flow is to be uninterrupted.

(4) *Once production flow has been established, it is controlled so that it responds to customer demand, only producing what the customer is willing and able to pay for*. In other words, production systems need to be designed to meet market demand in terms of quality and price in order to avoid the creation of waste, or production that fails to return a profit.

(5) *The dairy business' management team is responsible for creating and supporting a culture of continuous improvement in the farm team*. Only a change is culture can ensure that the first four principles are applied every day, every week, every month, and every year by every member of the production team.

In order to identify waste in production processes, lean practitioners have identified eight sources of waste common to most production processes. Below are examples to illustrate the nature of waste on a dairy farm.

1. *Unnecessary transportation or movement of inputs or output* – Feed or other inputs in storage which need to be moved more than once in the production cycle before they reach the herd.

2. *Unnecessary holding of inventories of inputs or output* – Bulk buying of inputs which may not be used before their sell-by date, such as medicines.

3. *Unnecessary motions by staff in carrying out processes* – Untidy farm yards and workshops that lead to losses in staff time while tools are looked for. Inefficient movements during the milking routine can add considerable time to the process, not only costing more in staff hours but extending the period during which the cows are on their feet.

4. *Waiting* – Staff waiting for machinery to be repaired when timely maintenance can prevent breakdowns. Another example would be cows waiting to be fed when they could be producing milk.

5. *Overproduction of intermediate inputs or output* – In some systems, overfeeding cows can occur so that their weight increases but milk production does not. Similarly, it is not uncommon to produce forage over and above the herd's requirements. When the excess is sold, then that does not constitute waste, but if it is stored it will lose its value in storage and turn into waste.

6. *Over processing* or using inappropriate techniques which do not add value to final output - for example, feeding nutritional supplements without evidence of increased milk production or improved cow health to support fertility and milk production.

7. *Defects* – in dairying these are breakdowns in animal health or milk quality and composition which does not meet contract requirements.

8. *Underutilization* – The maintenance of redundant buildings is wasteful as is owning or leasing more mechanical power than is necessary to meet the dairy herd's needs. However, the largest waste of the all is not engaging staff in eliminating waste from the production process.

In addition to lean principles and the importance of waste identification in production systems, lean practitioners – most notably its pioneers, the Toyota Motor Corporation – have also developed a set of tools to enable operations teams to identify and access increases in value and reductions in waste, in other words, to increase total process productivity. These tools are also known as continuous improvement methods. Today, the use of lean tools is widespread in manufacturing industry and even the delivery of services. These tools include 5S, for workplace organization (Sort, Straighten, Shine, Standardize, Sustain); process mapping, for understanding the tasks and resources involved in carrying out a process to a defined standard and within a particular period of time; value stream mapping, for understanding how value is created through a given process; and root cause analysis, for identifying the true causes of a given process failure, beyond its symptoms, amongst others. Later in this chapter, in the section on the practical application of dairy lean management, we will describe the use of some of these tools for dairy farming.

Lean management tools play an effective part in improving dairy efficiency only if they are put in the hands of the workforce. This means that it is necessary to train and coach staff in their use so that they can identify where and how process waste is being generated and find process improvements which eliminate it. Moreover, given that lean-trained staff have an increased role, they need to be actively supported by the leadership team in carrying it out. This model of staff development empowers employees to act for the benefit of the farm business and improves day-to-day decision making by staff at all levels.

We found that it takes at least three years for this process to take root on a dairy farm. This is mainly because the dairy production cycle is an annual one, whereas in manufacturing industry there may be any number of production cycles on a single day and process improvements can be implemented quickly. Because it takes this length of time to establish lean habits on a dairy farm, it is key that the farm leadership supports the staff throughout to

prevent any valuable employee leaving the farm. In the English project the business owners committed themselves to support the staff teams for as long as it took to put the necessary systems in place. No employees left the businesses as a result of the lean implementation projects.

In the first year of lean implementation on dairy farms the entire farm team embarks on a period of examination of production processes through the monitoring of quantitative measures of performance. This leads to the discovery of underperformance relative to what the team know to be achievable by them, a symptom of waste, which is challenging for any team. Lean control systems are put in place in the first year and this too can be challenging when decision making was at the entire discretion of the operator or the farm manager beforehand. Lean control systems gather process performance data and require the work force to review it at short intervals to ensure performance is held to plan throughout the production year.

The second year of lean implementation is the most rewarding, inasmuch as process improvements identified in the first year are achieved; the leadership team usually remains focused and some measure of external consultancy support is still on hand.

The third year of lean implementation is the year of consolidation, when changes in farm culture and work practices should be recognizably lean with minimum external support. Once the transformation is achieved, the continuous minimization of process waste reduces costs and the maximization of value increases income, resulting in an increase in potential business profits through productivity improvements.

So, what can go wrong? The evidence in case studies on lean transformations across industries, and the evidence of the research on dairy farms quoted here, proves that lean implementation projects fail when senior management use them as a short-term cost cutting

tactic to be pushed through the business. These projects can identify easy gains to be achieved through waste reduction in the first year, but they often fail to create the management system that will sustain that gain in the future, or recognise the need to support the staff in continually improving process performance after the project's end. The result is staff disengagement and management disappointment.

Lean transformations succeed when lean thinking becomes embedded in staff culture. This happens as staff become confident that continuous improvement methods improve their own decision-making skills, as well as supporting the delivery of team targets and the needs of the business. However, it is important to highlight that staff cannot fully engage with the business in the absence of a strong and fair system of staff performance management, compensation and benefits. These are key areas in business management which were addressed in the earlier chapters: "Compensation, bonuses and benefits" by F. Soriano and "Setting goals and using performance feedback effectively" by J. Estrada in this section. The failure of senior management to deliver on these area has the very real potential to derail any productivity gains achieved through operational improvements.

THE PRACTICAL APPLICATION OF DAIRY LEAN MANAGEMENT

Lean management principles offer dairy farming what it offers all other production systems: a clear framework of analysis to identify productivity gains in dairy production systems and a structured management system for farm staff to deliver those gains and sustain them over time. There are two steps to identifying productivity gains: (1) for each dairy process the operations team needs to quantify the value and the waste created through it; (2) the operations team needs to identify the process improvements which would result in greater value creation or the elimination of the waste that was identified. However, knowing that

improvements can be made is not enough to make them happen. The management system that can deliver these productivity gains consists of three parts to be overseen and supported by the senior management team: (1) the setting of technical targets by the operations team that reflect the process improvements identified; (2) the development of standard operating procedures which ensure technical targets are met and waste is not created; (3) the establishment of continuous process monitoring and reviewing management routines. The rest of this section will describe each of these steps with examples drawn from the experience on English farms.

The Identification of Value across Farm Processes and how it can be maximized

Production processes are effective when they meet the targets of quantity, quality and time that together define the value created by that process. Process effectiveness, therefore, is achieved by planning the production year by process and, crucially, by setting realistic targets which can be achieved on-farm and then implementing that plan.

So far we have referred to value in the dairy system as milk and calves; any activity or input which does not result in the production of milk and calves we have labelled as waste. However, the reality of a dairy system is that there is a series of intermediate processes which ultimately leads to the production of milk and calves, and therefore value and waste has to be identified for each of the intermediate process. For example, in the intermediate process of forage production, value is in the energy produced, which the herd will eventually convert into milk, with or without supplementary feeding. Management of the forage production process, therefore, identifies the customer as the dairy herd and value in forage energy. To illustrate this it is helpful to visualize the series of processes which operations staff manage on any dairy farm in Figure 1.

Figure 1 - A Summary of Dairy Processes Necessary for Milk Production

Nutrition, feeding and fertility management are, of course, the subject of primary concern on dairy enterprises. However, dairy managers cannot afford to prioritise one process over another if they are seeking excellence – all processes need to be managed simultaneously. Returning to the forage example: it is clear from Figure 1, that it is impossible to achieve technically excellent feed performance, for example, unless forage of the right quality and in the right quantity is grown or procured, and stored to minimize its waste. Similarly, that cannot be achieved unless soil management ensures the soil is capable of producing forages of the right quality, and that crop management and harvesting processes do not generate waste that compromise that quality.

A useful tool for identifying value in lean management is process mapping. A process map identifies the steps or tasks which are required to achieve process goals and value targets. Figure 2 shows a simple process map for the milking process. Common key production indicators (KPI) for the daily milking process would be total litres of milk placed in the tank, time taken to milk the herd and the quality targets of low bacterial and somatic cell counts, no cow injuries and no staff injuries. However, these targets could not be achieved if other processes were not delivering on their targets: if the herd health management system was not delivering a healthy herd capable of producing the required milk volume, the feeding management did not provide the herd with the nutrition necessary to sustain the required yield, the management of the herd's accommodation did not minimize the risk of environmental infections and the maintenance of the milking parlour did not ensure that the milk would be collected in a hygienic manner, without compromising udder health, then the milking process would not deliver on its targets either. In short, the milk process KPIs do not stand alone, but from planning to daily task management, they are tied to the KPIs for all the other processes related to it. It is only when all processes are meeting their targets that value creation in the dairy system is maximized. It follows that a production plan designed to guide

lean dairy operations in the achievement of technical targets needs to specify the list and timing of tasks necessary to meet production targets across *all* processes across the year. Monthly, weekly and daily targets for each process, as appropriate, are needed to enable farm teams to meet them, enable managers to monitor performance across all processes and take corrective action when production targets are compromised. These targets are set by the operations team with senior management support and guidance; we will return to the process of target setting after discussing the identification of waste – the second step in the identification of productivity gains.

The Identification of Waste in Dairy Processes and how it is driven out of the System

An effective process can be made more efficient if waste is being generated and one or more process improvements can eliminate it. The removal of waste will reduce the unit costs or production and, all things being equal, this will increase operating profit.

Operational farm teams hold the key to process improvements. They are in the best position to know how productivity is lost from production processes on a daily basis. However, the identification of underperformance can cause defensiveness in dairy teams instead of generating a sense of opportunity to improve profits. Even farm owners and managers can too easily fall into the trap of micro managing teams when underperformance is identified, instead of engaging the staff in finding solutions instead of culprits. Where this is the case, management is in danger of creating the largest waste in any process which is to underutilize the human capacity to question its own practices and improve on them. To enable staff in operations teams to be part of the improvement process, they need to be trained in identifying waste and setting clear performance targets, and they need to be supported to deliver on agreed plans.

Waste can be identified in a variety of ways, but the simplest is to regularly benchmark technical performance indicators against other dairy farms operating the same production system, or against the farm's own past performance. It is of little use for this purpose to use financial benchmarks as they give no indication of process performance. In order to benchmark effectively it may be necessary for the farm to review its collection and management of performance data as it is vital that the data is accurate and timely. Whether through benchmarking or the other methods discussed below, without high quality performance data it is not possible to identify value or waste in reliable manner.

Through benchmarking, operation teams are trying to a) discover whether process performance has been shown to be better than that observed on-farm, b) to find how the better performance was achieved and c) to emulate the process. It follows, therefore, that the choice of benchmark must supply enough technical detail to make sure that the areas of waste can be identified at process level. It is also important that the comparison is fair, that is to say, that the comparison is like-for-like given that different dairy systems will operate at different key production indicators for individual processes. A system of production can be defined by its scale, given by the herd size, the calving pattern, the intensity in its use of grazing and whether it is organic or not; comparisons should be made between farms operating similar systems. .

Benchmarking, however, only identifies underperformance which is a symptom of process waste. To identify waste itself a detailed quantitative description of the performance of the relevant production processes will reveal how waste is generated and its magnitude. The physical observation of processes at work on the farm will also reveal where waste is generated, whether through waiting times for people or livestock, inefficient movement of staff, livestock or inputs, or ineffective non-standardized work. The physical observation of

processes in real time may need an outside pair of eyes, perhaps a consultant's support. However, on larger farms, this is the role of management.

Once waste is identified, the improvement activity to drive it out of the process can be started. In all cases, the improvement activity starts with the team reviewing how the process in question is currently conducted on-farm in a facilitated meeting. The farm manager can facilitate the meeting, but so can other members of staff who have been coached in fulfilling that role. The team lays out the precise series of tasks which are carried out in the operation of the process to be improved, in what order and with what frequency. This description is presented as a flow chart and is known as a process map. Figure 2 shows an example of a simple process map for milking a housed herd.

Sometimes, the clarity provided by the process map is enough to point the team to easy gains. On one of the pilot English farms, a quick look at the milking process in this way led the team to identify two hours of waiting waste, after the first milking of the day, during which the herd did not have access to enough feed because the feeding team did not start work until then. This situation arose because the milking team and the feeding team did not have structured review times to co-ordinate their activities. Both teams relied on the farm manager to plan daily activities and give orders, and the manager assumed that the two operations were "close enough". Lack of communication led to this loss in herd productivity and the waste generated was invisible to the team.

Once the tasks that actually take place are identified, the team will check process documentation to see whether standard procedures for each task have been adhered to. On farms where improvement activities are new, it is common to find that most of the problems of underperformance arise because not all the staff are adhering to best practice protocols - that is to say, protocols which are proven to result in consistently high technical performance:

effective and efficient. If protocols do not exist for any of the processes in question then the first improvement activity is to standardize the tasks involved to best practice. On the other hand, when waste is found to be generated while following an existing protocol, an improved protocol needs to be developed and tested until its effectiveness and efficiency is proved. This is done by the farm team supported by the team leader – note that the improvements come from within the team and external support is only requested when the team needs technical advice.

In some cases inefficiency has its roots upstream of the production process under scrutiny. It is important to resist the temptation to produce a short term patch when this is the case. This approach only generates new sources of waste. Instead the root causes of the breakdown need to be identified and dealt with in order to increase process efficiency, rather than move the problem to another stage of production. Root cause analysis is a structured approach to problem solving and it is particularly helpful when dealing with interconnected systems, such as dairy farms. It is not unusual for problems on-farm to be addressed using instinct and previous experience, as on-farm performance data can be of very poor quality. The importance of good quality process performance data for the identification of waste cannot be overstated as it is necessary to implement and sustain any improvement activity. Root-cause analysis uses the understanding provided by process mapping and the operational team's experience of that process to identify the causes of underperformance and not its symptoms. Root cause analysis starts with a description of the problem, the measurement of its impact on production and an understanding of the sequence of events or actions which have given rise to it. Once the problem is set out in that way the operational team seeks solutions – i.e. changes to the process that generated the waste so that it can be eliminated. It is possible that alternative solutions need to be tested before the problem is resolved; however, this analytical

approach to problem-solving builds up the team's knowledge and skills thereby increasing labor productivity.

The improvement process is iterative. The search for productivity improvements, small or large, is continuous as operators monitor process performance and, with management, work to understand variations that can point to sources of waste. Improvements that can be tested and implemented in the short term, can be implemented when operational efficiency is not compromised; larger projects may need more planning and involve support from outside the operations team. Continuous improvement activities ensure that the dairy system maintains and improves its technical efficiency over time thus protecting the farm's competitiveness.

Getting It Done

So far, we have described how to define value and plan it into a dairy production system through the setting of process targets, and how to find waste and ***plan*** it out of the system through planned process improvements. However, a plan is only as good as its execution. How does lean support the execution of these plans? It does so through an operations management system which rests on engaging the operations team in setting production and quality targets for dairy processes, strict process performance monitoring, and the use of mainly visual communication tools for staff. Monitoring tools can also be electronic, on phones or tablets, but when not every team member has access or sight of the data, then back up manual visual tools ensure that communication breakdowns are minimized.

Staff Engagement in Setting Process Targets. Engaging production teams in the detailed setting of technical performance targets in the manner described above is a way of aligning the individual work goals of the workforce with those of the farm business. However, teams cannot participate in target setting without having a thorough knowledge of the processes they will be operating. A simple way of achieving this knowledge is through

the use of process maps, a basic thinking tool illustrated in Figure 2. These flow charts are excellent communication tools, even for multi-language teams, as the simple terms describing tasks can be easily translated and key performance indicators are numerical in the vast majority of cases. A well-constructed process map not only allows staff teams to be clear about the tasks that must be completed to achieve process goals, but it also shows staff members how their individual contribution plays a part in creating value in the dairy enterprise.

The second element in staff engagement is clarity in terms of standardized procedures. Whereas process maps show the series of tasks necessary to achieve process goals, standardized procedures specify how tasks are to be carried out to minimize the risk of creating waste in their execution. The earlier discussion on eliminating waste from processes described how standardized procedures are used on lean-managed farms to ensure high levels of performance are maintained across the farm team. Standardized procedures or protocols define what processes need to achieve in terms of output, quality, timing, and, crucially, the precise steps through which this is to be achieved. Protocols should also include a health and safety risk assessment for the tasks involved. Once agreed, protocols need to be visible to all staff, preferably posted where the process takes place. Farm teams are more likely to adhere to agreed protocols when they have been part of their development, they have been trained in them and know that team leaders will prioritize adherence to protocols when assessing staff performance.

The third necessary element for staff engagement is access to simple process information for operating staff at all times. Information flows on a farm are key to ensuring that all members of the team are clear in respect of what needs to be achieved each day. Teams need to know what tasks have been planned for the day for each process and they must be able to record when tasks are completed simply and easily. It is important that these records are visible to

the whole team and to the team leader for monitoring. Much of this information is managed through parlour and herd management software and these systems can be very effective at planning farm activity. However, summary information from this software is rarely shared with staff in real time. For example, fertility teams usually work with a list of cows due for insemination on any given day. However, if the team can see the running cumulative number of inseminations for that week, they are more likely to focus on identifying cows ready for insemination in order to meet the weekly target. The incentive must be for the team to achieve its target. Simple white boards listing key performance indicators have been proved to be effective in keeping teams focussed on process performance.

Process Performance Monitoring. Achieving staff engagement in adhering to process protocols does not, however, guarantee that processes will perform as expected every time, or that the team, over time, will not develop work habits that undermine their initial adherence to process protocols. Team leaders and farm managers have a crucial role to play in continuously monitoring to check that processes perform as planned and that staff adhere to protocols at all times, or raise any problems that they have identified as soon as possible. This is achieved primarily through what John Mann has called team leader's standard work in Mann (2010).

Team leaders are responsible for daily dairy performance on a daily basis. Team leader's standard work, as its name implies, is the set of standardized monitoring and review tasks required to ensure that processes meet their targets. The tasks fall into four groups: daily, weekly, monthly reviews and continuous improvement activities.

1. Daily work. The team leader is required to physically observe, or "walk" each process, as it takes place on a daily basis. During these walks he checks that staff are recording progress towards targets on visual displays and that the progress is as

planned; that any problems that may have been encountered by the team are addressed appropriately and that potential process improvements identified by the team are added to the information boards to be discussed at the weekly review meetings for action. Not only can the team leader assess the status of each process through process walks, but he can also observe staff as they work, ensuring that protocols are being adhered to and support staff as required.

2. Weekly work. The team leader is responsible for running weekly performance reviews of the entire dairy system with the farm team, during which each process is reviewed in a 30-minute meeting. The agenda is set and the discussion is restricted to process performance against planned key performance indicators for each dairy process. Past performance is noted and the focus of activity for the coming week is agreed, including any follow up action on process improvements. This is also an opportunity for team members to raise concerns with the team leader if they were not addressed during daily process walks.
3. Monthly work. Monthly performance reviews take the place of the weekly meeting once a month and follow the same format as weekly reviews but cost performance is added to the agenda. Monthly reviews are chaired by the farm manager, if he is different from the team leader – on farms of under 500 cows they may be one and the same. At these meetings the farm manager encourages the team to look ahead at dairy performance in the coming month and, in particular, at potential risks that could impact on production and mitigating strategies. The sharing of cost performance by farm managers with operational teams is not commonplace, however, it is one of the most powerful ways of engaging the team in the achievement of business targets after production planning: it demonstrates trust by the managers for his team.

Continuous Improvement Activit*ies.* It is a key responsibility of team leaders to encourage staff to look for process improvements as they carry out their daily activities. Teams have to be trained in identifying waste and value in the processes they manage, but once this is done, they are able to bring forward suggestions for improvement. It is important that team leaders respond to staff when this happens by providing them with the support and resources required to test potential improvements before they are standardized and adopted. Without standardization, improvements are unlikely to be sustained, as human nature is to revert to old habits. It is up to team leaders to nurture a culture of excellence, learning and process discipline, even if some of the staff suggestions do not result in immediate improvements.

CONCLUSIONS, IMPLICATIONS AND THE FUTURE

Dairy production is well served by scientific and technological innovation, yet around the world, farm teams have not always managed to adopt these innovations to maximum productive use. This is because the processes into which these innovations are introduced are not as effective or efficient as they could be. Even at current levels of technology there are considerable productivity gains that can be achieved on-farm when staff are trained and managed to operate with a focus on eliminating process waste and maximizing value creation continuously. The experience of English dairy farms in applying lean management principles to dairy staff management shows that it is possible to achieve such change, albeit in a minimum of three years. Lean management is not a short term fix to chronic technical underperformance and high production costs, but a strategic policy to enable dairy operation teams to learn to identify, implement and sustain productivity improvements. As dairy operations around the world face the challenge of climate change and commodity market volatility, it is vital that farm teams are able to change and adapt processes to maintain high

levels of total productivity in sustainable systems of production. Lean management principles provide useful lessons in achieving this goal.

NOTES

[1] Reducing unit costs by failing to maintain and service machinery and equipment involved in production appropriately, or not training staff, will reduce costs but will result in degrading the productive capacity of assets. In this case, the reduction in unit costs is not a measure of increased efficiency, but the erosion of the productive value of business assets.

[2] The company's lean transformation was financially supported by European Union Funds under the Livestock North West Dairy Monitor Farm Programme and by DairyCo, a farmer-funded organisation supporting dairy R&D and the dissemination of dairy market information to levy payers. The author conducted all the research for the project and led its implementation on-farm. An executive summary of this work can be found in file:///C:/Users/SFML/Downloads/411113__executive_summary_pilots_1_and_2_oct14_v3.pdf.

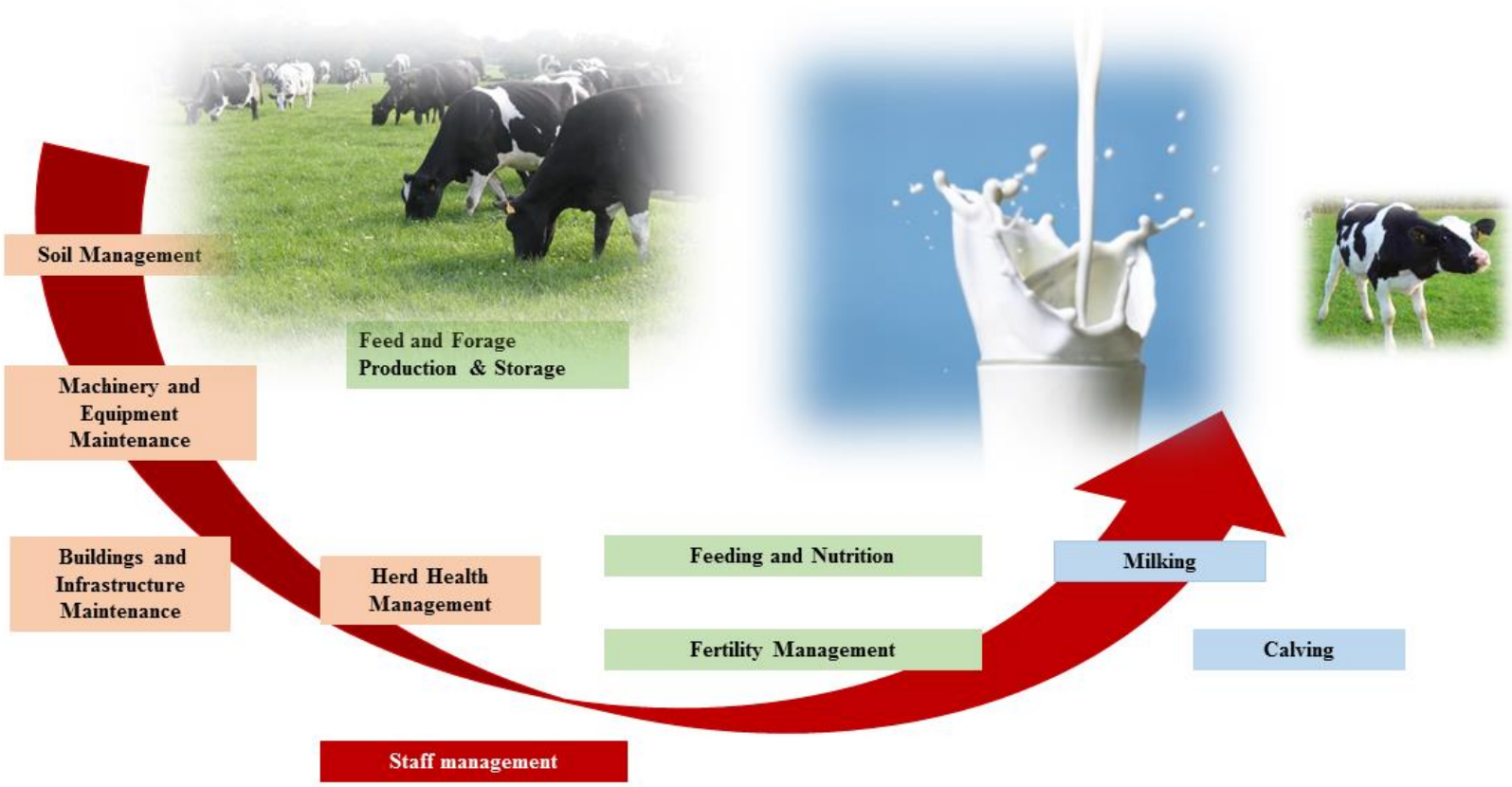
[3] In order to manage costs a dairy farm needs to have good management accounts. Financial accounts are not meant to guide operational decisions as their primary function is to manage financial flows, which may be driven by the needs of the dairy enterprise or not, depending on the business and the structure of tax incentives.

REFERENCES

Carson, K. I. 2014. Long Term Case Studies in Dairy Lean Management. RADA Final Report to DairyCo, AHDB, Stoneleigh, Kenilworth, Warwickshire, CV8 2TL.

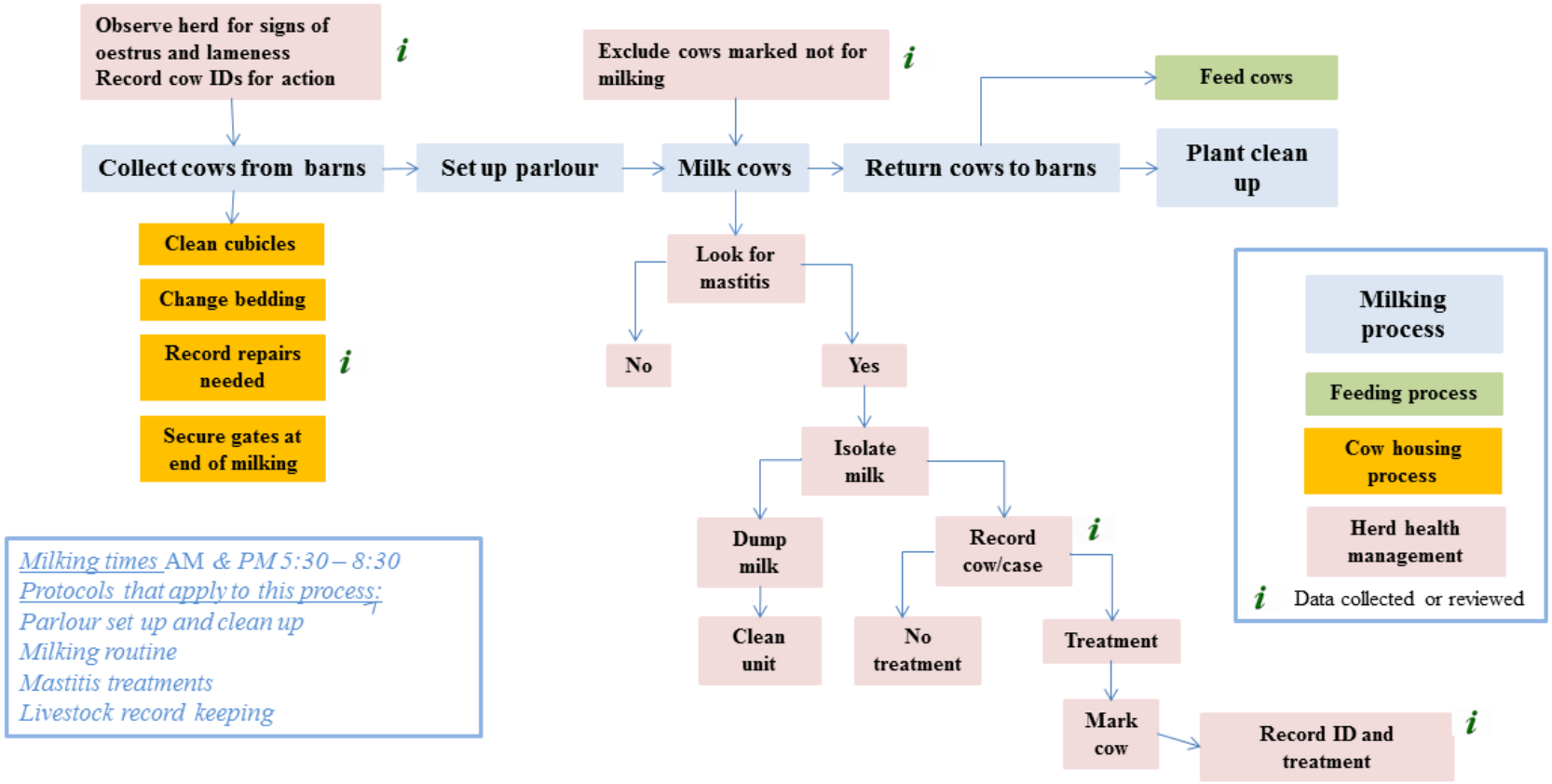
Liker, J. K. 2004. The Toyota Way. McGraw-Hill, NY, USA.

552 Mann, D. 2010. Creating a Lean Culture. 2nd ed. CRC Press, Taylor Francis Group, Florida,
553 USA.
554 Womack, J. P., and Jones, D. T.2003. Lean Thinking. 2nd ed. Simon & Schuster, London,
555 UK.



Carson Figure 1

Figure 1 - A Simple Process Map for Milk and Calves Production



Carson - Figure 2

Figure 2 - The milking process and its links with herd health & fertility, feeding and cow housing