Title: Carmo Dairy Standard Operating Procedures

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INTRODUCTION

Inconsistency in employee performance within any system of the dairy will affect overall performance in producing a high quality product. One factor that may lead to this poor performance is the dairy operation’s lack of Standard Operating Procedures (SOPs). A key aspect in maintaining consistent, first-rate performance within an operation, SOPs are important no matter what size or how many employees the dairy consists of. Along with SOPs, proper employee training is beneficial in maintaining a well-organized and safe business operation day by day. When a dairy operation is operated without these routine protocol measurements, one can observe a number of issues that lead to the unorganized and/or perhaps poor performance of the operation.

These issues can consist of poor or no training, poor management, and/or undirected employees due to poor communication between both the management and employees or amongst the employees themselves. As a source for establishing routine protocol measurements, SOPs are expected from the operation’s head management for the employees to have access and reference to at anytime. Another crucial role that SOPs can play in is that of employee safety when handling livestock and equipment. The management can be liable for accidents when employees are injured on-site due to the fact there are no protocols and/or improper training of all necessary systems of the operation. When SOPs are set and an accident occurs, more likely than not, the
management will not be at fault because the accident was most probably caused by the employee not accurately abiding by the given protocol.

So in order to resolve/prevent any of these events from occurring, the management can take some, if not all of the following solutions: Setting SOPs for each operation system or job, having professional trainers come in to train new employees, set up biweekly meetings for performance feedback, performance evaluations, and operation updates.

The project will determine the SOPs necessary for the dairy farm operation and will be implemented upon approval of management.
Standard Operating Procedures on Dairy Farms

*What are SOPs?* Standard Operating Procedures (SOPs) are a set of established procedures that are carried out in a given operation. In this case, dairy farms that have this system will have an SOP for each system of the operation itself. These may include the milking, calf raising, and feeding systems. For example, in feeding:

Step one: Take a walk around check of equipment used in feeding operation to look for any hazards.

Step 2: Check fluid levels and tire pressure of equipment.

Step 3: Before putting vehicle in motion, make sure proper safety equipment are being utilized (Seatbelts)

Step 4: etc…

*Importance of SOPs.* SOPs are very important in achieving a successful business operation. They play three critical roles in dairy farm operations: They provide instructions that guide the employee’s job, they are standards by which managers can train and evaluate employees, and they are considered an access point where advisors can suggest changes and improvements to the dairy’s production processes (3). Dairy
producers also benefit from SOPs in that they can improve overall performance and motivation of the employee. Using SOPs and insisting that they be followed can help keep the employees safe and may also provide legal protection to the management if an injury or accident were to occur. They are also useful to help protect the environment when manure, chemical, or waste are being handled. Emplacing these protocols can encourage evaluation of work on a regular basis and allow for continuous improvement of current procedures.

*Organizing SOPs.* Organization of the effort that will be used in developing the protocols will make the process much smoother. The following five steps conducted by David Grusenmeyer (1) will assist in the organizing efforts.

1. Identify the key areas of concern for your operation where SOPs might be useful. For example, feeding, animal moving and handling, manure handling, equipment cleaning and sanitation, vaccination, bedding, biosecurity, animal health, new animal arrival, etc.

2. Using the list from step one, identify the top one or two priority areas for attention. In which areas are more controls desired or required? In which areas will economic returns or impact on the operation be greatest? Which areas are likely to yield some good successes early in the process so you can build momentum and excitement for the effort?
3. Focusing on the selected top priority areas from step two, identify all the processes, functions or operations that occur within each of these areas.

4. Group together and combine or subdivide further (which ever makes sense for the operation) all the important processes, functions or operations within each area. Then prioritize them for SOP development.

5. Identify the best individual to lead the development effort for each SOP and assign a development team of employees, managers, agribusiness representatives, consultants and anyone else who can bring relevant expertise to the effort.

*Development.* The following steps from the Penn State Dairy Alliance (2) describe a method that will create excellent procedures that can be utilized when developing a SOP.

1. **Plan for Results**

Plan with the business goal in mind. The goal of a milking SOP is not to ensure that everyone milks the same way. The goal is to quickly and efficiently harvest high-quality milk and eliminate the spread of mastitis organisms. Standard operating procedures work best when they are designed to achieve specific results. Decide what business goals will be achieved through better management with SOPs and how those goals will be measured. For example, in the parlor, you might measure the pounds of milk harvested per milker per hour and the rate of new mastitis infections
per month. These measures would indicate how efficiently cows are milked and how effective the procedures are at preventing the spread of mastitis. This information can then be used to adjust procedures and provide feedback to workers about their performance. Many benchmarks exist in the industry to help measure quality and efficiency in specific areas.

2. First Draft

Select a format for the procedure. Formats include: Simple steps, Hierarchical steps, Linear flow chart, Annotated pictures, and the Branching flow chart. Here are a few examples:

![Simple steps example](image)

Figure 1. Simple steps example
Figure 2. Hierarchical steps example

Figure 3. Graphic system example
Clarity Farms Parlor SOP #5, Cows With Abnormal Milk
Effective Date: February 27, 2001
Developed by Parker Staff

Abnormal milk detected.

Perform CMT test for mastitis on all four quarters.

Is mastitis present? Yes Collect sterile samples from affected quarters, label, and store in refrigerator.

No Does milk appear bloody or watery?

Yes Milk cow according to procedure, but divert milk into waste milk pail.

No

Is udder swollen? Yes Inject 1 cc Oxytocin to the front shoulder.

No

On milker report, record date, time, cow ID, affected quarter(s), and severity.

Key

START/END

ACTION

DECISION

> 103°

YES

RECORD

Milk cow according to normal milking procedure and release as usual.

Figure 4. Flow chart system example
Before the chosen format is used, one should first make a detailed list of the steps in the order that they are performed. A simple way to get started is to observe someone performing the process as it now exists and write down everything that they do. This list is now a draft of the procedure. If the procedure needs to appear as a flowchart, start with the most reasonable beginning point. Draw the decisions that a worker will need to make and the actions that follow each decision. Don’t try to be perfect with the first draft, because it is very likely that many revisions will be necessary.

3. Internal Review

Provide each worker who performs the procedure with a copy of the draft SOP. Ask them to review and suggest changes that are easier to understand, more accurate, or will improve performance. Assure the workers that their input is important and will be used. People are much more likely to accept and use the SOP if they feel a sense of ownership in it. Workers will feel ownership and commitment to an SOP if they believe that management used, or at least fairly considered, their ideas during development. The chance of success is reduced when workers feel that management is imposing SOPs without regard to worker input.

Another excellent reason to involve the workers is that they are likely to have good ideas. Highly successful managers actively engage their work teams in a continual quest to become more efficient, increase cost effectiveness, and improve quality.
4. External Review

Dairy managers increasingly rely on the advice of trusted advisers outside their own organization. The SOP writing process is an excellent way to tap the expertise of technical advisers such as the veterinarian, nutritionist, or extension agent. They can give the management advice that draws on their scientific knowledge and broad experience with other dairy businesses. Provide advisors with a copy of the SOP draft. Management should ask them to suggest any changes that will make it clearer and more effective. Dairy managers often see dramatic performance improvements after their technical advisers help them with SOPs. In many cases, the procedure writing process takes communication with advisers to much more productive levels than ever before. Revise the procedure as necessary to incorporate input from technical advisers.

5. Testing

For procedures to be effective, they must be performed in the workplace. There is only one way to be absolutely certain that a procedure is well written and yields expected results. Have someone test the procedure by performing each step exactly as it is described while the procedure writer watches. Have a person not familiar with the work follow the procedure. Any steps that cause confusion or hesitation for the test worker should be revised.
6. Post

Make a final draft of the procedure and post it in the appropriate locations. The workplace is one essential location. A master SOP file should be kept in a central location so workers can review little-used SOPs when necessary. Another possibility is to include SOPs with employee handbook materials. In each case, it is essential to keep SOPs up to date. Preferably, the workplace copy of the procedure should be printed in text large enough for workers to review while completing their work. Many copy centers have the ability to make enlargements. In addition, it may be helpful to laminate the workplace copy so that it will hold up under difficult conditions.

7. Train

The last step in the SOP writing process is often the most neglected. Train or retrain everyone as necessary to follow the procedure exactly. Even with very detailed steps, it is necessary to train all workers. Otherwise, individuals will interpret the meaning of procedures in different ways, leading to inconsistency in work routines and performance. When training workers, share the reasons why procedures must be performed correctly, not just what to do or how to do it. People are much more likely to follow procedures exactly when they understand why they are important. In addition, sharing “why” demonstrates that the worker is valued and his or her success is important. It also helps develop the worker’s job knowledge and enhances his or her ability to contribute to future procedure improvements. An effective SOP training
program first will make the worker aware of what training activities will take place and what the trainer will be able to do when training is complete. The trainer will explain and demonstrate both why and how each step in the SOP is performed and then give the learner a chance to practice. The trainer will provide positive feedback as the learner masters parts of the procedure and patiently revisits those parts that need improvement.

_Monitoring._ The pursuit of well established SOPs continues well after they are first written through the monitoring system. This system will measure the results of a process and inform the management of whether all the employees are accurately and consistently following the protocol and if it is designed appropriately to accomplish the desired results. Feedback from the manager to the employees can assist them in adjusting their behaviors to perform better either individually or in a group. Six principles are recommended in providing proper performance feedback (3).

1. **Specific.** Feedback should be specifically related to recognizable elements of performance or particular incidents that can be easily understood by both the employee and supervisor. Whenever possible, feedback should include objective information.
2. **Relevant.** Feedback should focus on behaviors or attitudes that have a direct impact on performance. Issues or opinions unrelated to performance have no place in job feedback.

3. **Credible.** Feedback should come from a trusted source that has a developed relationship with the employee. The source of feedback needs to be in a position to observe employee performance. In other words, a milking supervisor who never visits employees milking on the night shift cannot credibly provide them with feedback.

4. **Frequent.** Feedback needs to be frequent enough to provide direction that helps employees to shape their performance. Supervisors should observe employees as they perform their work. Less experienced employees need feedback more frequently, but even experienced people need to hear it often enough to stay motivated and to feel valued.

5. **Timely.** Feedback needs to occur close enough in time to performance that it has meaning. Feedback about a critical incident in particular needs to come close to immediately after the incident takes place. Otherwise, the meaning and importance of the incident for learning begins to decline rapidly.

6. **Linked to a Source of Help.** Feedback should not end with the employee wondering what to do next. Negative feedback especially, should always conclude with a series of positive steps that the employee can take toward improvement. The help should include some specific recommendations about how to better perform the procedure.
Materials and Methods

The literature review discussed all the essential elements necessary in organizing, developing, and monitoring standard operating procedures. The Carmo Dairy operation was examined and raw data including current operating procedures was collected. After reviewing the raw data, the procedures were put into detailed lists according to what order they were done. Then they were organized into the simple steps format that are displayed in this section. The SOPs are divided by each system of the operation including: Milking, Feeding, and Maintenance. Within each of these systems, subsections are created to focus on specific procedures within each main system. For the Milking system subsections include parlor set-up, milking procedures, and parlor tear-down. Within the Feed system, the subsections incorporate calf management and adult/heifer cow feeding. The Maintenance system subsections consist of welding management, field tractor and implement management, and manure management.
Carmo Dairy Parlor SOP #1, Parlor Set Up

Effective Date: Nov. 1, 2009

Developed by Management and Milking Crew

Preparation begins at approximately 12:30 AM/PM

1. Turn milk receiver line valve to on position (See Figure 5).

2. Break down machines from wash (See Figure 6).

3. Check the milk tank for cleanliness.

4. Change pipeline from circulatory wash (Figure 7) to tank entrance mode (Figure 8)
5. Replace milk filter (See Figures 9 and 10)
6. Turn plate cooler handle down to allow water entrance into cooler (Figure 11).

Figure 11. Plate Cooler w/ green handle

7. Turn Cooling System controls to Cool/Agitate (Figure 12).

Figure 12. Cooling system controls
8. Turn Pulsator control unit (Figure 13) from Wash to Milk position (Figure 14).

   a. Pulsator motors will turn on automatically

![Figure 13. Pulsator controls](image1) ![Figure 14. Pulsator Milk/Wash control](image2)

9. Move handle above vacuum reservoir to “Milk Mode” (Figures 15, 16).

   a. Allows ball inside to protect vacuum line in case of overflow.

![Figure 15. Vacuum handle (Wash mode)](image3) ![Figure 16. Vacuum handle (Milk mode)](image4)
10. Clamp milk line hose located next to vacuum pump (Figure 17).

![Milk line hose](image17)

Figure 17. Milk line hose

11. Turn holding pen sprinkler valves to “ON” position (Figure 18).

![Sprinkler valve](image18)

Figure 18. Sprinkler valve
12. Fill up foot baths and apply proper amounts of foot treatment material according to supplier (Figure 19).

![Figure 19. Foot bath](image)

13. Retrieve cows from following pens, in order: 1, 2, 4, 3 (Fresh cows), and hospital.

Begin milking at approximately 1 AM/PM
Carmo Dairy Parlor SOP #2, Basic Milking Procedure

Effective Date: Nov. 1, 2009

Developed by Management and Milking Crew

Begin at approximately 1 AM/PM

(If radio is used, keep at appropriate sound level.)

1. Put on blue latex gloves.

2. Retrieve pen 1 cows and herd them into the sprinkler/wash pen.

3. While cows are in holding pen, turn on sprinklers (See Figure 20) to allow udders to be cleaned.
   
   a. Check for any broken, damaged, or dysfunctional sprinklers and notify management when possible.

   b. Once sprinkler wash is complete, bring the cows into the parlor.
4. Predip all four teats with iodine from blue iodine gun of each cow on same side (Figure 21).

5. Strip and check for any irregularities or abnormal milk.

   a. Abnormal milk will appear bloody, watery, and may have flakes or clots.
b. If any, only milk uninfected quarters and remove cow for treatment, if necessary.

6. Wipe the teats dry with paper towels (Several located above along pipelines).

7. Attach milking unit to cows and make proper adjustment.

8. Once all machines are attached to cows on one side, repeat steps 4-7 with the remaining cows on the one side.

9. When all units have detached automatically from one side, postdip with blue iodine gun.

10. Release cows and bring in the next set of cows to be milked.

11. When there are only enough cows to fill up about two more sides, then one of the two milkers will begin to retrieve cows from the next pen.

12. When all milking cows have been milked, bring in the hospital cows.

   a. Hospital cows’ milk cannot enter the milk tank, since they have abnormal milk and may have antibiotics in their system.

   b. Milk cows and make sure the milk lines to the tank are disconnected.

   c. This milk can be retrieved and used for feeding calves.

13. After hospital milking and treatment, begin parlor clean-up procedures.
Carmo Dairy Parlor SOP #3, Parlor Clean up

Effective Date: Nov. 1, 2009

Developed by Management and Milking Crew

Begin once milking and hospital treatment is complete.

1. Wash down milk units, foot baths, floors, and walls with high pressure hose (red).

2. Set units up in washing position.

3. Replace empty paper towel boxes.

4. Dispose of trash into nearby dumpster.

5. Check iodine levels in barrel and replace if low.

6. Record milk weight and temperature in fold out records table.

7. Prepare for system wash.
   a. Move handle above vacuum reservoir to “wash” mode
   b. Turn pulsator controls from “Milk” to “Wash” mode.
   c. Remove dirty filter and dispose of it.
   d. Return pipeline back from tank input to circulatory wash.
e. Turn on “wash”.

8. Once the milk hauler has picked up the milk, then the tank can be set up for wash.
   (This should be done at least one hour prior to next milking.)

   a. Replace acid and sanitizer containers while wearing gloves and protective eye wear.

   b. Turn tank wash to “ON” position.
Carmo Dairy Feeding SOP #1, Calf Management

Effective Date: Nov. 1, 2009

Developed by Management and Feed Crew

Begin every morning at 6 AM and afternoons following Cow feeding (Approx. 3 PM)

Employee is responsible for Calf and Cow feeding.

1. Empty and wash out all miniature water and feed buckets (Figure 22).

   (Take visual inspection of each calf for any illnesses.)

   Figure 22. Calf buckets

2. Extract milk from the parlor into 5 gallon bucket and use to fill calf bottles.

3. Mix in any nutrient powder/ liquid, if necessary.

4. Bottle feed all of the younger calves.
5. Place the milk in the mini water buckets for the remaining calves.

6. Fill up mini feed buckets with grain mix.

   (Halfway for younger calves)

7. Wash out remaining milk and fill mini water buckets with water.

8. Use hose to wash out all urine and fecal matter towards rear (north) end of barn towards the opening leading to the lagoon pit.

   (Outside older calves/ young heifers)

9. For the morning shift: Give alfalfa feed to the older calves outside.

For the afternoon shift: Walk along the manger of the older calves and gradually pour grain from 5 gallon bucket over their TMR.

10. In winter, keep calf barn doors closed at night and during harsh weather conditions.
Employee is responsible for Calf and Cow feeding.

1. Push up feed at 11 AM.

2. At 1 PM, scrape feed refusals to end of bunk with small loader/scaper tractor (Figures 23, 24).

3. Scoop the feed refusals and distribute them to the wild cattle feed bunk.

4. Check fluid levels and tire pressure of both the feed truck and feed loader tractor prior to use (Figures 25, 26).
5. Leave truck in park position with augers in “ON” / “Mixing” position.

6. When loading ration, check feeder notebook for amount of ingredients to mix.

7. Record lbs from scale (Figure 27) in feeder notebook.
8. After truck has been loaded, shut down the tractor and enter the feed truck.

9. While truck is in park, mix feed for about 5 minutes.

10. Distribute feed evenly along feedbunk.

11. After all cows have been provided for:

   a. Park tractor in reserved parking in feed barn

   b. Return feed truck to main yard and park in appropriate location (Figure 28).

![Figure 28. Feed barn/ Tractor parking](image)

12. Continue on with second daily calf feeding (Feeding SOP 1).
13. Once the afternoon calf feeding is complete (approx. 4 PM), enter inner freestall/alfalfa storage barn and provide hay in the local inner feed bunks.

   a. Be Careful. Use a ladder when necessary.
Carmo Dairy Maintenance SOP #1, Welding Management

Effective Date: Nov. 1, 2009

Developed by Management and Maintenance Crew

Prior to operating welding equipment, the employee must have completed required training and have authorization to operate the equipment. (Provided by management)

1. Appropriate attire is required.
   a. Wear protective eye wear (Figure 29).
   b. Wear appropriate protective gloves (Figure 30).
   c. All other clothing must cover limbs and feet.

Figure 29. Welding mask   Figure 30. Welding gloves
2. When transporting welding equipment, check that all the tools are present and put away in the right location (Figure 31).

![Figure 31. Welder](image)

3. Make sure the electrical controls, and the Gas and Oxygen (O2) tanks are shut off before transportation.

4. Only operate equipment using suggested practices obtained from training.

5. Before returning the equipment to storage, make sure all equipment is turned off and tanks are off.

6. Return all equipment to designated location in storage barn.
Prior to operating field tractors and any related equipment, the employee must have completed required training and have authorization to operate the equipment.

(Provided by management)

1. Check tire conditions and fluid levels prior to operation.
   a. Do not operate if tires are in poor condition. Notify management to call local tire company.
   b. If fluids are low, refill to adequate levels before operating.

2. Check condition of implements prior to use.
   a. If anything is broken, damaged, or malfunctioning, notify management immediately.

3. When about to undergo heavy loads, slowly lower implement into soil and increase idle. Do not run tractor in fast gear under a heavy load.
3. Before parking tractor, allow engine to idle for a minimum of 15 seconds and make sure all pressure from hydraulics attached to implements are released.

5. Refer to field management schedule to determine when and what field operations will occur.
Carmo Dairy Maintenance

SOP #3, Manure Management

Effective Date: Nov. 1, 2009

Developed by Management and Maintenance Crew

1. At 6 AM, turn on manure separator.

2. In the freestall barns, rake manure from beds into lanes.

3. Turn on flood valves to clean lanes and disperse manure into lagoon.

4. On Fridays at 4 PM, collect manure from separator platform and transport it to manure pile (Figure 32).

![Figure 32. Manure compost heap](image)

5. On the 15th of every month, refill the freestall beds with dry manure.
RESULTS AND DISCUSSION

Implementing Standard Operating Procedures

Now that the Standard Operating Procedures for Carmo Dairy have been written, they are still not 100% complete. Through biweekly meetings, the SOPs and employees can be evaluated and adjustments or new material can be added to the SOPs in order to stay current and as up to date as possible with all of the farm operations. A binder including all of these SOPs has been created as a prototype SOP manual for the management to review. Whatever they would like to change or take out of the procedures will be discussed. Once they are pleased with the adjustments, if any, then these procedures can be placed in their proper locations throughout the farm. They will be laminated and placed in a location that will be visible to the employees. Bilingual versions of the SOPs will be necessary since the majority of the employees are Spanish speaking and cannot read/ speak English very well. Once the biweekly meetings commence, the employees and managers can discuss their views and/or issues of the newly implemented SOPs. If there is debate over certain details within the procedures, then management can make a decision there or take it into consideration and announce a decision at the next meeting. These SOPs can be implemented into training manuals once those are created. Once these are set in, then one can examine the increased performance of the employees and that their jobs are completed in a clean, safe, and timely manner. With the increased performance, cows will be managed properly increasing their comfortability, reducing their stress,
increasing production. The increased productivity will help the work shifts run smoother, increasing production, therefore increasing profit for the owner.
CONCLUSION

The absence of SOPs is one possible factor that may lead to inconsistency in employees’ performance and productivity within all systems of the dairy operation. Excellent SOPs are essential in maintaining the consistency and performance in an operation, regardless of the size of the operation or how many employees there are. These procedures are a source for establishing routine protocol measurements expected from the operation’s head management for the employees to have access and reference to at anytime. Much improvement can be observed from operations that do not have this protocol technique. These issues can consist of poor or no training, poor management, and/or undirected employees due to poor communication between both the management and employees or amongst the employees themselves. Another crucial role that SOPs can play in is that of employee safety when handling livestock and equipment. The management can be liable for accidents when employees are injured on-site due to the fact there are no protocols and/or improper training of all necessary systems of the operation. When SOPs are set and an accident occurs, then more likely than not, the management will not be at fault because the accident was most likely caused by the employee not accurately abiding by the given protocol.

So in order to resolve/prevent any of these events from occurring, the management can take in some, if not all of the following solutions: Setting SOPs for each operation system or job, have professional trainers come in to train new employees,
set up biweekly meetings for performance feedback, performance evaluations, and operation updates. Now that a rough draft version of SOPs has been created for this operation, one can slowly observe the improved performance of the workers as well as the cows through their productivity numbers. The SOPs are a continual process and amendments and can be made to create a more clear and precise set of protocol measurements to ensure that the business is running at the best of its abilities.
REFERENCES

