Dairy Farm Business

STANDARD OPERATING PROCEDURES:
A Writing Guide

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COLLEGE OF AGRICULTURAL SCIENCES
AGRICULTURAL RESEARCH AND
COOPERATIVE EXTENSION

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INTRODUCTION: DRIVING TOWARD THE SAME GOALS

A successful dairy farm business needs committed workers who complete work procedures consistently and accurately. It also requires all involved to contribute their experience, knowledge, and ideas to constant improvement for the future. This publication describes how dairy businesses can use standard operating procedures to get everyone driving toward outstanding performance and success.

Most people naturally want to do a good job. Successful managers recognize this fact and seek to channel workers' efforts in ways that will benefit the business. Well-written standard operating procedures (SOPs) provide direction, improve communication, reduce training time, and improve work consistency. The SOP development process is an excellent way for managers, workers, and technical advisers to cooperate for everyone's benefit. A very positive sense of teamwork arises when these parties work together toward common goals.

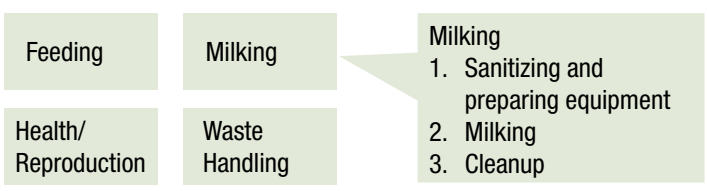
Standard operating procedures used in combination with planned training and regular performance feedback lead to an effective and motivated workforce. Dairy managers and advisers benefit from consistent work performance and predictable results. Workers benefit from increased confidence and a clear sense of achievement.

DEFINING SYSTEMS, PROCEDURES, AND STEPS

Producing a high-quality product at a profit depends on the consistent operation of all systems within the dairy. The basic **systems** shared by all dairy farm businesses are a milk harvesting system, an animal feeding system, and a waste management system (see Figure 1). Dairy farm success depends on how well these systems work together to produce large volumes of high-quality milk to sell.

Management systems are made up of work **procedures.** For example, on most farms, milking consists of more than just cleaning and stimulating cows and attaching milking units to them. Before milking can begin, someone must prepare the milking equipment system, usually by sanitizing and changing the configuration from wash mode to milking mode. After all cows are milked, someone must change the equipment back to wash mode and clean the system. Each of these three activities—sanitizing and preparing to milk, milking, and cleanup—are examples of procedures that when put together make up the milking management system.

FIGURE 1. SYSTEMS AND PROCEDURES.



Finally, **steps** are the smaller actions that when put together form a procedure. Figure 2 is a basic standard operating procedure for prepping cows, attaching milking units, and post-dipping in a double-12 parlor. Notice that the procedure is made up of a series of small steps. The small steps are where variation among different workers takes place if procedures are not standardized. Managers can use standard operating procedures to help ensure everyone performs each procedure the same way every time.

FORMATS FOR STANDARD OPERATING PROCEDURES

When writing standard operating procedures, managers can choose a number of different ways to organize and format them. Your goal is to create a document that is easy for the reader to understand and helpful for the work at hand.

Two factors determine what type of SOP to use (Figure 3). First, how many decisions will the user need to make during the procedure? Second, how many steps and substeps are in the procedure? Routine procedures that are short and require few decisions can be written using the **simple steps** format. Long procedures consisting of more than ten steps, with few decisions, should be written in **hierarchical steps** format or in a **graphic format**. Procedures that require many decisions should be written in the form of a **flowchart**.

FIGURE 2. SAMPLE "SIMPLE STEPS" OPERATING PROCEDURE FORMAT.

Clarity Farms Parlor SOP #1, Basic Milking Procedure
Effective Date: Oct. 1, 1999
Developed by Parlor Staff

1. Dry-wipe dirt and debris from the first cow's udder.
2. Predip all four teats with the green dip cup.
3. Strip two squirts of milk from each teat and observe for abnormal milk. If any abnormal milk is found, refer to Parlor SOP #2, "Dealing With Cows Showing Abnormal Milk."
4. Repeat steps 1, 2, and 3 with the second and third cows on the same side.
5. Return to the first cow and thoroughly wipe with a clean towel.
6. Attach unit to first cow and adjust.
7. Repeat steps 5 and 6 with the second and third cows in the side.
8. Begin at step 1 with the fourth cow on the side and repeat procedure with each group of 3 cows until all 12 units are attached.
9. When all units have detached, postdip all cows and release.

Simple Steps

Generally, a milking procedure is very repetitive and requires few decisions. In this case, a simple set of steps like those in Figure 2 is sufficient. The SOP in Figure 2 does not contain much detail. A thorough training program would be necessary to make sure that new milkers understand how to perform each step in the procedure. Unfortunately, this low level of detail still leaves a lot of room for milkers to interpret the procedure. This SOP could work in a situation where only a few people milk.

Hierarchical Steps

A dairy striving for very consistent work should use a more detailed and precise format for most SOPs. The hierarchical steps format (see Figure 4) allows the use of easy-to-read steps for experienced users while including more detailed substeps as well. Experienced users may only refer to the substeps when they need to, while beginners will use the detailed substeps to help them learn the procedure.

Graphic Procedures

When writing procedures for very long activities, managers should consider using a graphic format. The graphic format breaks long processes into shorter subprocesses that consist of only a few steps. Workers can learn several short subprocesses more easily that one long procedure. Figure 5 illustrates the graphic procedure format.

Another possibility for the graphic format is to use photographs and diagrams to illustrate the procedure. Many producers and most of their advisers have access to computers with powerful graphic capabilities. Digital cameras are now relatively inexpensive and simple to operate. Use these tools to design creative SOPs that combine helpful pictures with explanatory text. Pictures truly are worth a thousand words, and they are helpful regardless of the literacy level or native language of a worker.

FIGURE 3. STANDARD OPERATING PROCEDURE FORMAT CHOICES AND CRITERIA.

Many decisions?	*More than 10 steps?*	*Best SOP format*
No	No	Simple Steps
No	Yes	Hierarchical or Graphic
Yes	No	Flowchart
Yes	Yes	Flowchart

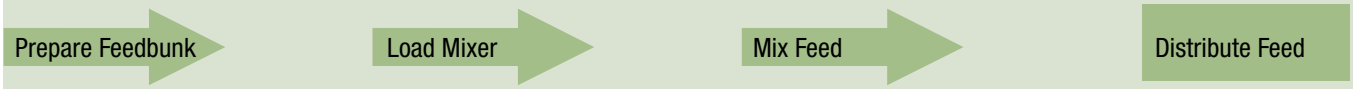
FIGURE 4. SAMPLE "HIERARCHICAL STEPS" OPERATING PROCEDURE FORMAT.

Clarity Farms Parlor SOP #1, Basic Milking Procedure
Effective Date: Feb. 1, 2000
Developed by Parlor Staff

1. Wipe dirt and debris from the first cow's udder.
   a. Use your gloved hand to remove dry dirt and bedding.
   b. Use a clean paper towel to dry the teats and udder if they are wet.
2. Predip all four teats with the green dip cup.
   a. Squeeze dip up from bottom reservoir so that teat chamber is 3/4 full.
3. Strip two squirts of milk from each teat and observe for abnormal milk.
   a. Squirt milk onto black surface of strip cup.
   b. Abnormal milk may appear watery, bloody, or have clots or flakes.
   c. If any abnormal milk is found, refer to Parlor SOP #2, "Dealing With Cows Showing Abnormal Milk."
4. Repeat steps 1, 2, and 3 with the second and third cows on the same side.
5. Return to the first cow and thoroughly wipe with a clean towel.
   a. Completely clean teats from base of udder to end of teat.
   b. Pay special attention to the tip of the teat where the opening is located.
   c. Use more than one towel if necessary.
6. Attach unit to first cow and adjust.
   a. Press green button on control panel to activate milking unit.
   b. Attach teat cups while allowing as little air as possible to escape.
   c. Adjust automatic take-off arm and hoses so milking unit hangs level from front to back.
7. Repeat steps 5 and 6 with the second and third cows in the side.
8. Begin at step 1 with the fourth cow on the side and repeat procedure with each group of three cows until all 12 units are attached.
9. When all units have detached, postdip all cows with the blue dip cup and release.
   a. Squeeze dip up from bottom reservoir so that teat chamber is 3/4 full.

FIGURE 5. SAMPLE GRAPHIC OPERATING PROCEDURE FORMAT.

Clarity Farms Feeding SOP #1, Feeding the Lactating Cows
Effective Date: October 7, 2000
Developed by Feeding Crew



1. Sweep feed refusals to end of feed bunk.
2. Scoop feed refusals into TMR mixer.
3. Record weight of feed refusals in feeder notebook.
4. Distribute feed refusals in bunk at steer pen.

1. Check feeder notebook for amount of ingredients to mix.
2. Add protein concentrate from bin #1. Record lbs added in feeder notebook.
3. Add ground corn from bin #2. Record lbs added in feeder notebook.
4. Add corn silage from bunker #1. Record lbs added in feeder notebook.
5. Add haylage from bunker #2. Record lbs added in feeder notebook.

1. Mix feed for exactly five minutes.
2. Do not move tractor while mixer is running.
3. Record total amount of feed in mixer in feeder notebook.

1. Distribute feed evenly along entire length of feedbunk.
2. Record time in feeder notebook.
3. Return tractor and mixer to equipment shed.

Flowcharts

Notice that Step 3 in Figure 4 refers to another SOP, called "Cows With Abnormal Milk." This SOP is likely to require many decisions to determine what is wrong with the milk, if a sample should be taken, whether the cow should be treated, etc. Procedures that require many decisions should be presented as a flowchart.

Flowcharts are simply a graphic way to present the logical steps in a decision-making process. While normal milking procedures are quite straightforward and repetitive, deciding what to do about a cow with abnormal milk certainly is not. Many different factors such as mastitis or an injury may cause the abnormal milk. The appropriate response to each situation may be dramatically different. A flowchart provides an easy-to-follow mechanism for walking a worker through a series of logical decisions and the steps that should be taken as a result.

Figure 6 is a flowchart depicting how milkers should deal with cows showing abnormal milk. Note that the procedure begins in the top left-hand corner and proceeds generally to the right and downward, depending on which decisions are made. You should use the generally accepted symbols for flowcharts, which are as follows:

START/END A flattened oval represents a starting or ending point.

ACTION A rectangle indicates the worker should perform an action of some sort.

Unlabeled arrows between other symbols indicate the direction of flow.

DECISION Diamonds are the accepted symbol for a decision point. They must have two or more arrows leading away from them toward alternatives.

YES Decision arrows lead away from a diamond and toward an appropriate action or

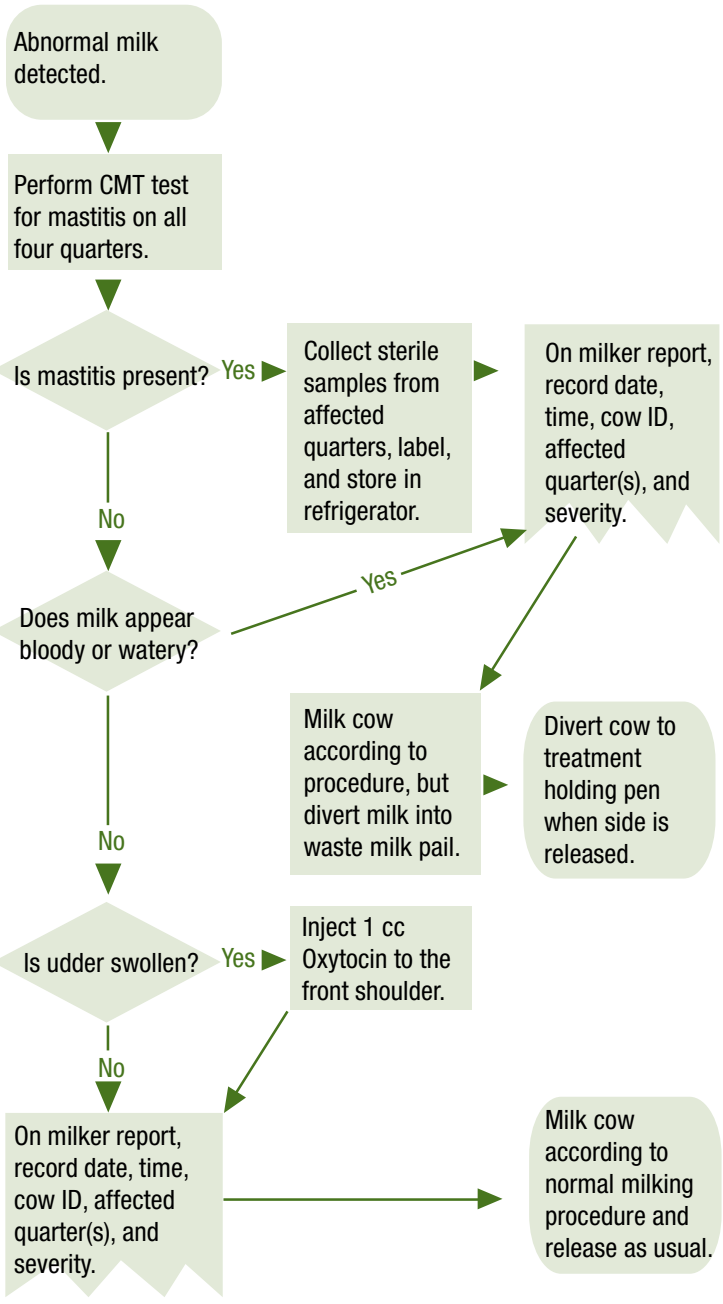
> 103° follow-up decision. At least two alternatives must lead from each decision diamond. Many times they will be yes and no, but they also could involve three or more choices. For example, after taking a temperature, you might have several options to follow, depending on the results.

RECORD A rectangle with a ragged bottom edge indicates that a record or notation should be written down. You might use this in an SOP to record how much cows were fed, or to note when a job is completed.

Regardless of the SOP format that you choose to use, there are a few elements of information that should be included

FIGURE 6. SAMPLE FLOW CHART OPERATING PROCEDURE FORMAT.

Clarity Farms Parlor SOP #5, Cows With Abnormal Milk
Effective Date: February 27, 2001
Developed by Parlor Staff



with every SOP. These include a clear and descriptive title; the name of the author or person responsible for the SOP; and the date on which the SOP or revision becomes effective. Businesses that use many SOPs should adopt a logical numbering scheme for filing and to keep track of revisions. In addition, some SOPs should include lists of materials or tools needed to complete the job. All SOPs that involve hazardous working conditions should include a list of safety precautions.

DEVELOPING AND IMPLEMENTING THE SOP: PEOPLE SUPPORT WHAT THEY HELP CREATE

The SOP development process is critical to successful implementation of SOPs. It should be an inclusive process that considers the input of everyone with an interest in the procedure's success. Managers who write procedures without input from workers or technical advisers run the risk of upsetting workers and producing a poorly written SOP. Managers who enlist the talents of workers and technical advisers will increase buy-in and produce better SOPs. Most importantly, they will take advantage of an important opportunity to foster teamwork among workers, managers, and advisers. Human nature dictates that people support what they help create.

The following seven steps describe a method that will produce excellent procedures and generate maximum buy-in from the workforce. All of the steps are important.

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. You then can use this information 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. Ask your advisers for help identifying benchmarks that will help you improve your business. In some cases, you might need to come up with measures on your own that will help track progress over time.

2. First Draft

Select a format for the procedure. If you choose to use simple steps, hierarchical steps, or the graphic format, first make a detailed list of the steps in the order that they are done. 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 you will need to make many revisions.

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 your technical advisers such as the veterinarian, nutritionist, or extension agent. They can give you advice that draws on their scientific knowledge and broad experience with other dairy businesses.

Provide your advisors with a copy of the SOP draft. 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 your technical advisers.

5. Testing

For procedures to be effective, they must perform in the workplace. There is only one way to be absolutely certain that a procedure is well written and performs as expected. 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 you care about the worker and his or her success. 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.

EFFECTIVE WRITING

Standard Operating Procedures are instructions that should be understandable to everyone who uses them. Writers should always try to write procedures as simply as possible while communicating well. A complete discussion of grammar and writing is beyond the scope of this paper. For more information, refer to the book *Procedure Writing: Principles and Practices* by Douglas Wieringa (see "References").

Write steps as short sentences. Long sentences are harder to understand and tend to include more than one step. Several short sentences usually are easier to understand. Note the following examples:

Long: Use your gloved hand to wipe dry dirt and debris from the first cow's udder, or dry with a clean paper towel if the udder is wet.

Short: Wipe dirt and debris from the first cow's udder.

a. Use your gloved hand to remove dry dirt and bedding.

b. Use a clean paper towel to dry the teats and udder if they are wet.

Note that the short sentences in the example above are organized in the hierarchical format. Both examples convey the same meaning, but the long sentence is much more difficult to understand. In this example, we have one step to complete, but two different ways of completing it, depending on the condition of the cow's udder. It is very awkward to convey all this information in one sentence.

Write steps in SOPs as imperative sentences. Imperative sentences are in the form of a command and are easy to understand. They usually begin with an action verb. Consider the following examples from an SOP for feeding cows:

Unclear: The weight of feed refusals should be recorded in the feeder notebook.

Clear: Record the weight of feed refusals in the feeder notebook.

In this example, the manager wants to know how much feed the cows refuse to eat so she can accurately determine dry matter intake. The clear example directs the person doing the feeding to record this information. The unclear example is subject to interpretation—does it mean that the feeder should record this information, or just that someone should?

Communicate well in as few words as possible. Mark Twain once said he didn't have time to write a short story, so he wrote a long one instead. Writers tend to use long sentences and paragraphs because it is easier than thinking of the exact, most meaningful words. Procedure writers must use short, direct sentences so readers can quickly understand and memorize the steps in the procedure. Consider the following examples from an SOP for feeding calves:

Rambling: Make sure that you clean out all of the old grain from the calf pails before you put new grain in them.

Concise: Empty all old grain from calf pails before feeding new grain.

The two sentences communicate the same idea, but the concise sentence is more direct and easier to understand. The reward for clear and concise writing is better understanding by readers.

Use acronyms and abbreviations sparingly. For example, "The cow developed an LDA after exhibiting reduced DMI brought on by BVD or IBR. She had not yet received supplemental bST." Many people involved in dairy management will recognize all of the acronyms in these sentences, but many others will not. Use acronyms only when they are commonly understood, not just to shorten your writing. For example, most people understand the meaning of the abbreviation "BVD" more quickly than if they read "bovine viral diarrhea." On the other hand, most will stumble on the acronym DMI, but even those with only a passing interest in nutrition will recognize the words "dry matter intake."

Example: Adjust ATO arm and hoses so that milking unit hangs level from front to back.

In this example, "ATO" stands for automatic take-off. There is no advantage to using "ATO" in place of the actual words. The writer would help most milkers to understand by avoiding this uncommon acronym.

LEVEL OF DETAIL

The level of detail to include in standard operating procedures is one of the most difficult decisions to make. Procedures definitely should include all steps that are essential and that should be performed the same way by all workers. Omitting any of these essential steps may lead to confusion for the reader or performance variation among different workers. On the other hand, procedures should not be so detailed that they are cumbersome and impractical for everyday use.

Highly detailed procedures cannot take the place of training. Recognizing this, procedure writers should not attempt to answer all possible questions that a worker might have. SOPs should complement and serve as a basis for introductory training. Excessive detail also is likely to cause resentment from experienced workers. They might feel that management is using the SOP to micromanage every aspect of their work performance.

Procedure writers must ensure that they include enough detail to eliminate significant variation among workers. In Figure 2, Step 2 says to "Predip all four teats with the green dip cup." Experience shows that dipping means different things to different people. Some workers will start with a minimal amount of dip in the cup so that only the tip of the teat is covered. Others will first fill the cup full so a great deal of dip is wasted when the cow is dipped. In Figure 4, a substep, "Squeeze dip up from bottom reservoir so that teat chamber is 3/4 full" follows the main predip step. This additional level of detail helps ensure that each teat is sufficiently covered while minimizing dip wastage.

Be aware that a weakness of the flowchart format is that the level of detail must be low. Attempting to use an excessive number of detailed steps leads to a very long, messy, and hard-to-follow flowchart. Flowcharts are best used to provide an overview of a procedure, while paying special attention to logical decisions. Actions within a flowchart that require detailed steps should refer to another SOP. For example, in Figure 6, an action block calls for the worker to take a sterile sample of milk. The steps needed to complete this action should be covered in another SOP and through training. Some writers overcome this weakness of flowcharts by using a hybrid of simple steps in combination with the flowchart. In the hybrid, several steps may be included inside or next to the appropriate flowchart shape.

CONCLUSION

Standard operating procedures are powerful tools for seizing control of work procedures. They define the subtle details that make the difference between success and failure in today's dairy economy. In addition, well-written SOPs act as effective communication tools that contribute to worker understanding and job satisfaction.

The SOP development process, while demanding, can provide significant performance improvements. When properly and fully carried out, the development process brings workers, managers, and advisers together in a collaborative way. As a result, everyone focuses their abilities on doing the best job possible with the farm's resources.

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