

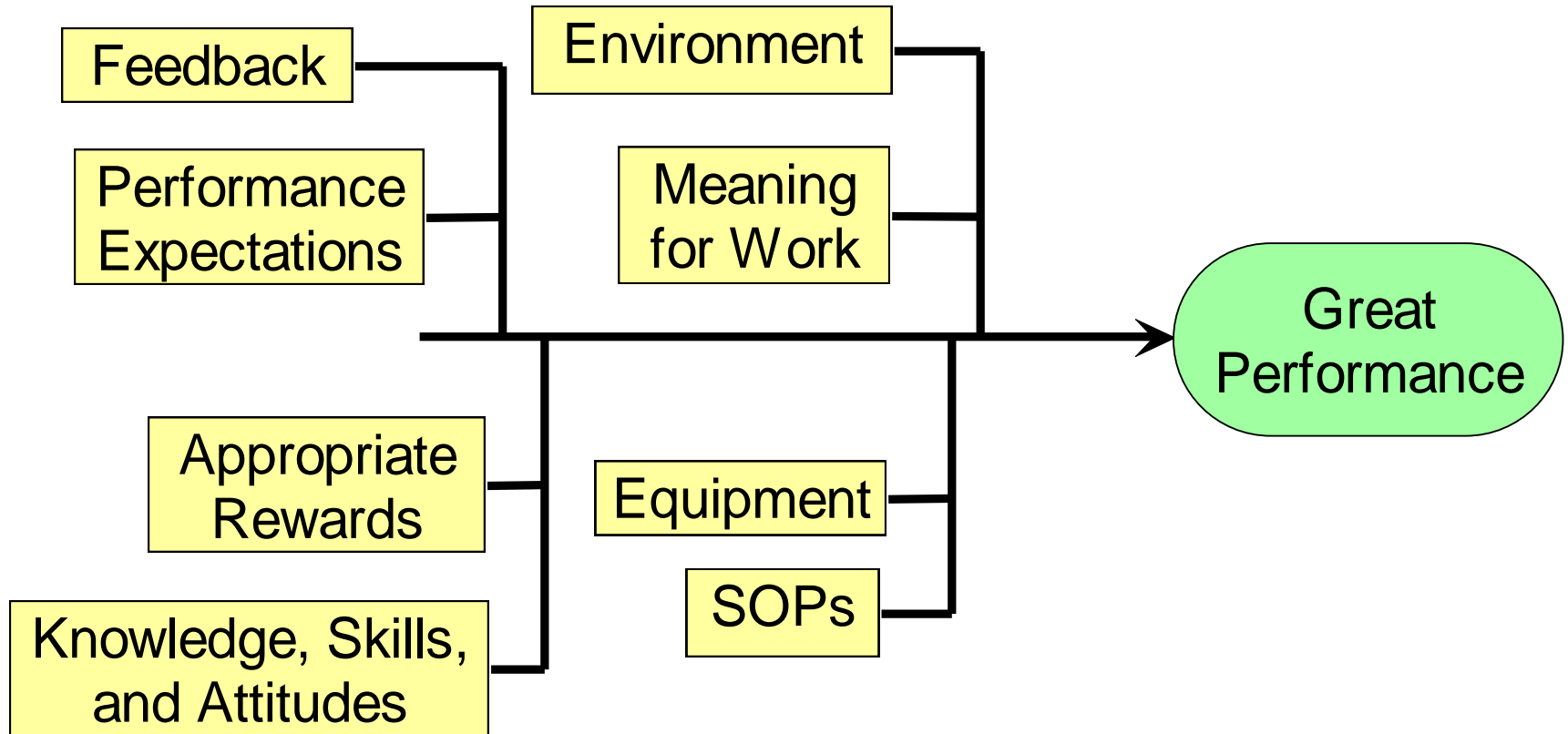


The “Systems” Approach to Dairy Process Management

Richard Stup
Penn State Dairy Alliance
(814) 652-6430
RichStup@psu.edu



Performance Factors



Learning Objectives

- Define the two types of variation and how management systems may be used to control special cause variation.
 - Identify parts of a management system
 - Develop a monitoring scheme that measures performance (worker and procedure)
 - Explain why feedback is necessary
 - Develop a plan to generate buy-in from the dairy's workers, managers, and advisors.
-

Part One

Systems, Procedures, Steps, and
Variation



Old-fashioned Chocolate Cake

Prep Time: 20 min.

Start to Finish: 2 Hrs. 50 min.

- 3/4 cup (1-1/2 sticks) butter or margarine, softened
- 1-2/3 cups sugar
- 3 eggs
- 1 teaspoon vanilla extract
- 2 cups all-purpose flour
- 2/3 cup HERSHEY'S Cocoa
- 1-1/4 teaspoons baking soda
- 1 teaspoon salt
- 1/4 teaspoon baking powder
- 1-1/3 cups water
- 1/2 cup finely crushed hard peppermint candy (optional)

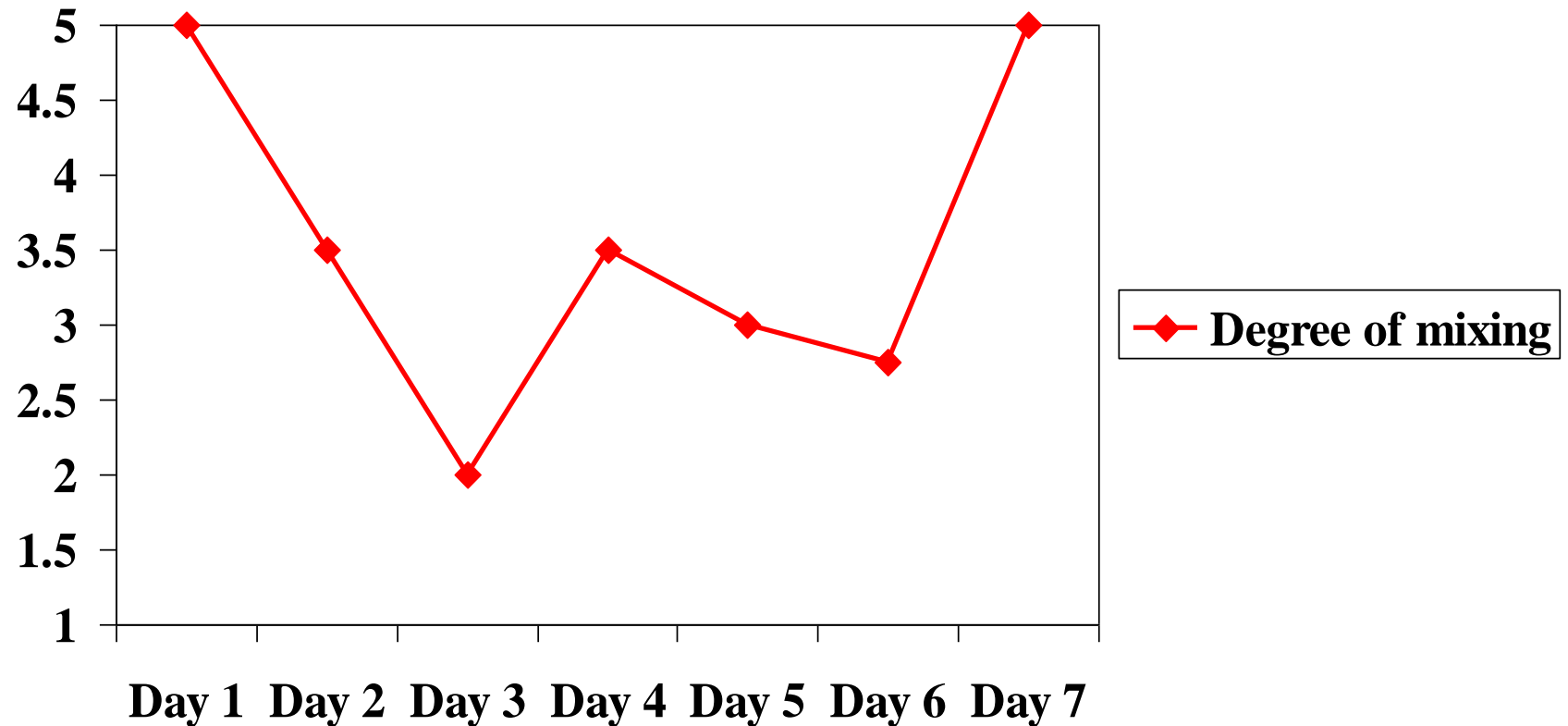
1. Heat oven to 350°F. Grease and flour two 9-inch round baking pans or one 13x9x2-inch baking pan.
2. In large mixer bowl, combine butter, sugar, eggs and vanilla; beat on high speed of electric mixer 3 minutes. Stir together flour, cocoa, baking soda, salt and baking powder; add alternately with water to butter mixture, beating until blended. Add candy, if desired. Pour batter into prepared pans.
3. Bake 30 to 35 minutes or until wooden pick inserted in center comes out clean. Cool 10 minutes; remove from pans to wire racks. Cool completely. Frost as desired. 10-12 servings.

How can written SOP's improve a system?

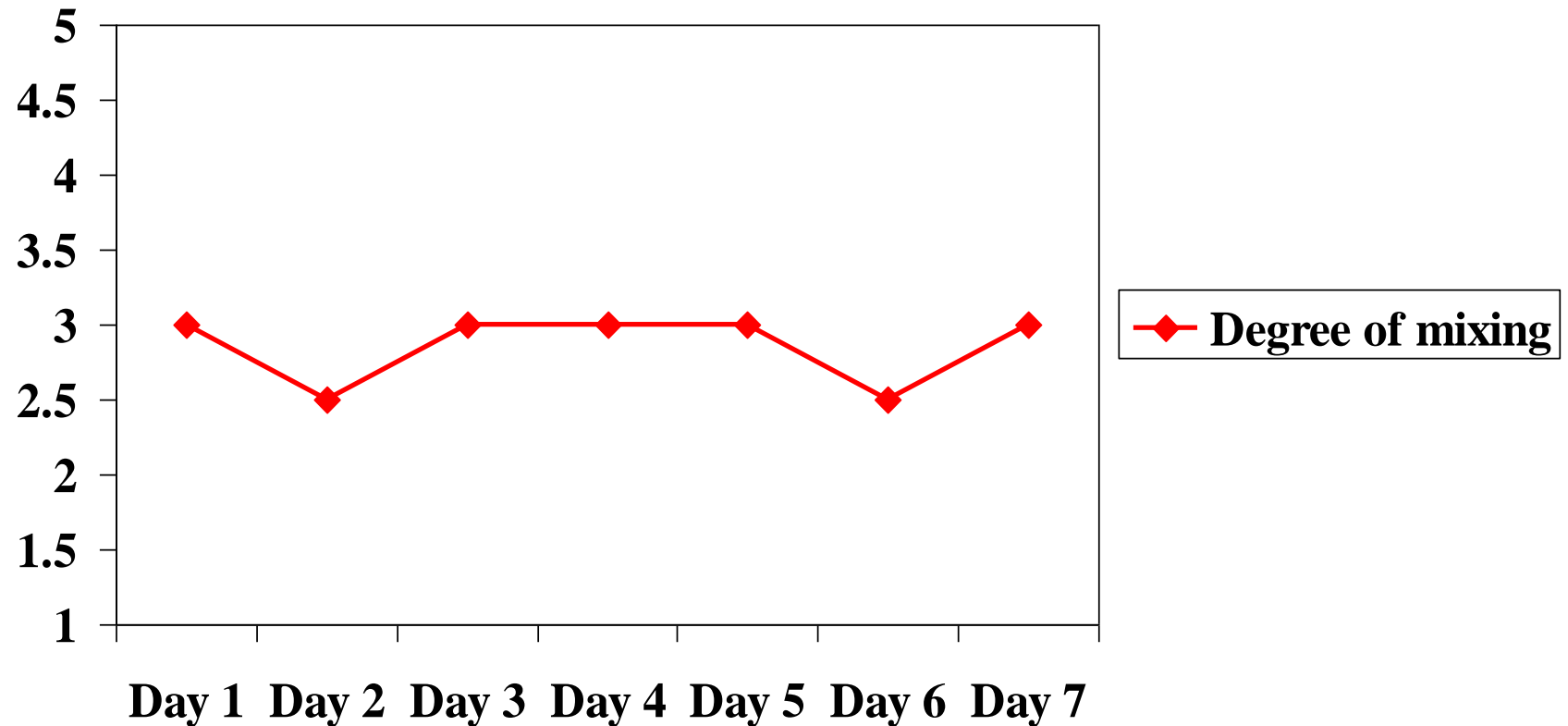
1. Control variation
 2. Act as objective standard for feedback and evaluation
 3. Promote safety
 4. Improve training
 5. Improve communication among farm staff and advisors
 6. Serve as a focal point for improvement
-

So what is the big problem
with variation?

High Variation



Lower Variation



Common Cause Variation

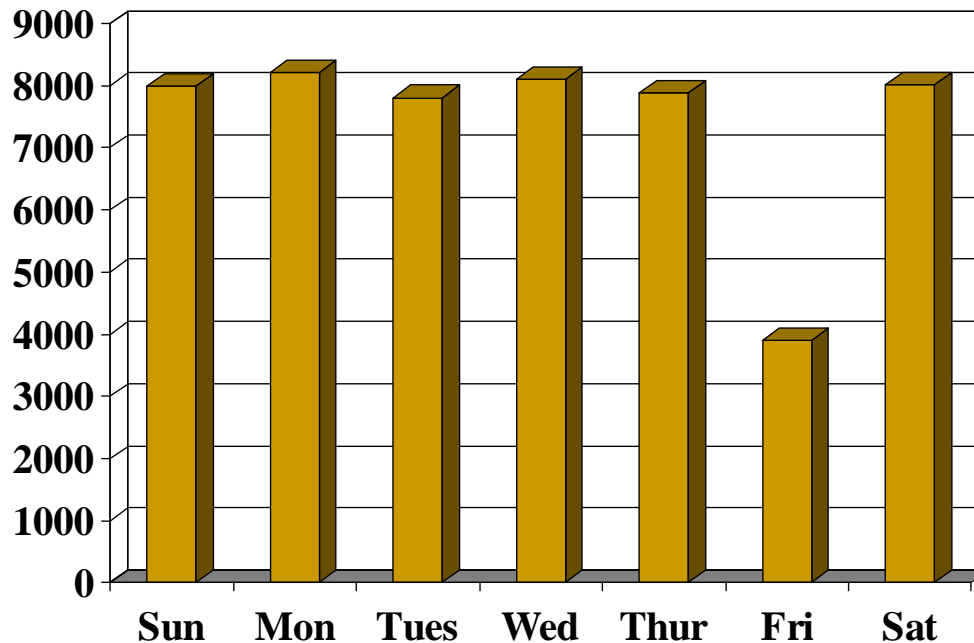
- Common cause variation is the result of the myriad imperceptible changes that occur in the everyday operation of a process (Farnum, 1994).
 - Common causes of variation produce points on a control chart that over a long period all fall inside the control limits. Common causes of variation stay the same day to day, lot to lot (Deming, 2000).
-

Special Cause Variation

- Special cause variation is variation for which one can find definite causes. Ordinarily special cause variation will fall further from the mean than common causes.
 - A special cause of variation is something special. Not part of the system of common causes. It is detected by a point that falls outside the control limits (Deming, 2000).
-

Variation Example

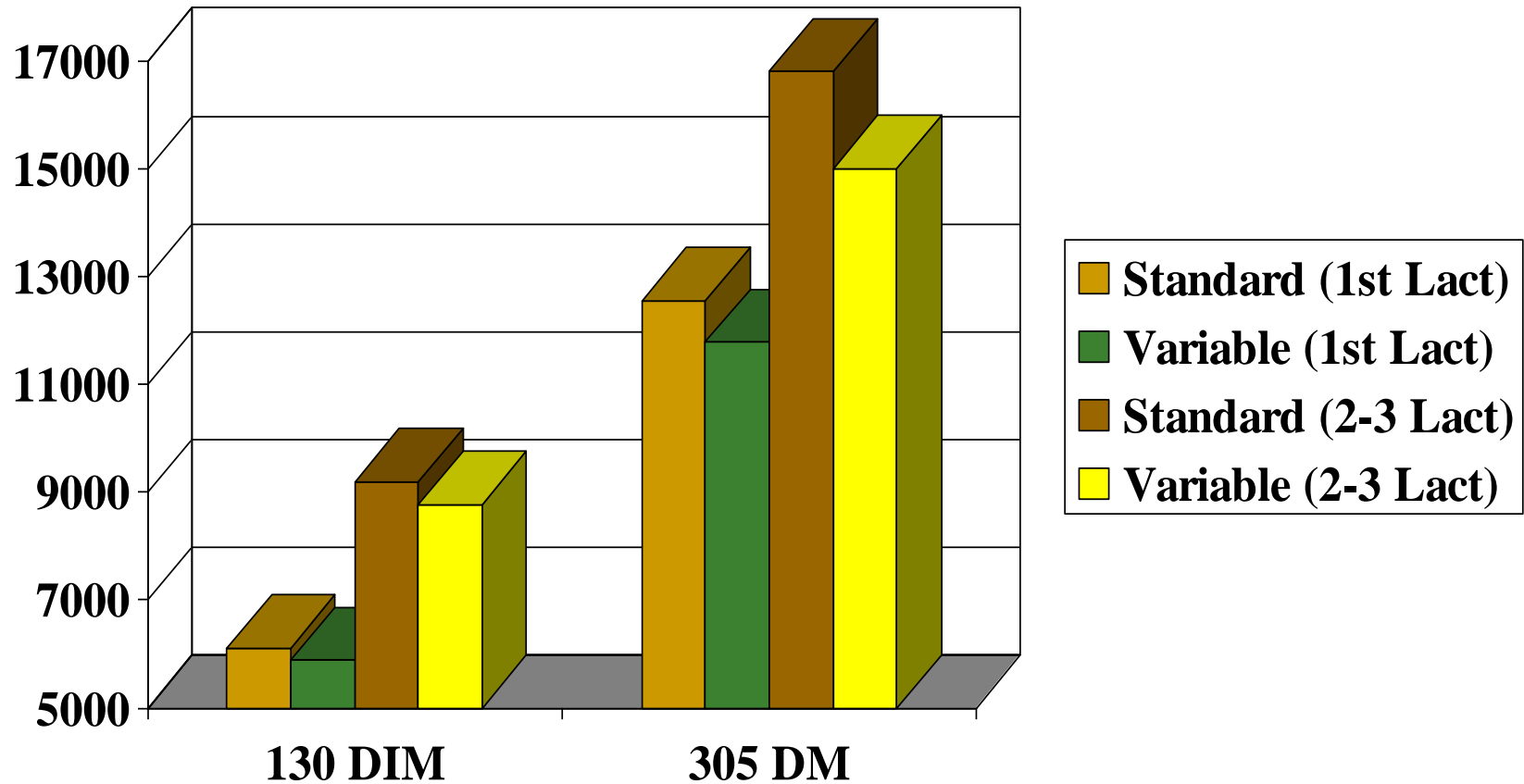
In the graph below we see bulk tank weights tracked every day for a week in a 100 cow herd that is averaging about 80lbs per cow. On most days, the tank weight is consistent. On Friday, the AM milking had to be dumped because of contamination with antibiotics. The slight variation on most days is generated by common causes such as weather and natural variation by the cow. The Friday variation was generated by a special cause known as human error.



Dealing With Variation

- *Mistake 1*: To react to an outcome as if it came from a special cause, when actually it came from common causes of variation
 - *Mistake 2*: To treat an outcome as if it came from common causes of variation, when actually it came from a special cause.
-

Increased Yield from Standardized Milking Routine*



* Rasmussen, 1990. J. Dairy Science

Value of Increased Milk Yield

| | |
|------------------------------|---------|
| Average increased milk yield | 811 lbs |
| X Milk price/lb | \$.12 |
| Value of increased milk | \$97.32 |
| X 100 cows | \$9732 |

Part 2

SOP Formats and Writing

SOP Formats

- Simple Steps
 - Hierarchical Steps
 - Graphic
 - Enhanced Graphic
 - Flowcharts
 - Flowchart/Stepwise Hybrid
-

Simple Steps

1. Wipe dirt and debris from the first cow's udder.
2. Pre-dip all 4 teats with the green dip cup.
3. Strip 2 squirts of milk from each teat and observe for 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 the first cow and adjust.

(Continues)

Simple Steps

Strengths

- Easy to write
- Easy to follow
- Logical flow

Weaknesses

- Lack of detail
 - Tends to get long if detail is included
 - Keeps all steps at same level
 - Does not handle decisions well
-

Hierarchical SOP

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 4 teats with the green dip cup.
 - a) Squeeze dip up from bottom reservoir so that teat chamber is 3/4 full.
3. Strip 2 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."

Hierarchical Steps

Strengths

- Easy to write
- Easy to follow
- Logical flow
- Handles details very well
- Allows different levels of steps

Weaknesses

- Does not handle decisions well
-

Prepare Feedbunk

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.

Load Mixer

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.

Mix Feed

1. Mix feed for exactly 5 minutes.
2. Do not move tractor while mixer is running.
3. Record total amount of feed in mixer in feeder notebook.

Distribute Feed

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

Graphic
Format

Graphic Format

Strengths

- Easy to write
- Easy to follow
- Logical flow
- Handles long procedures well

Weaknesses

- Does not handle decisions well
-

Photo-Graphic Format



Dip



1. Dip teats with dipping tool. Make sure that every teat is entirely covered with dip.

Strip



2. Strip 3 squirts of milk from each teat.
 - ❑ Observe for clotting, flakes, or any other unusual appearance.

Dry



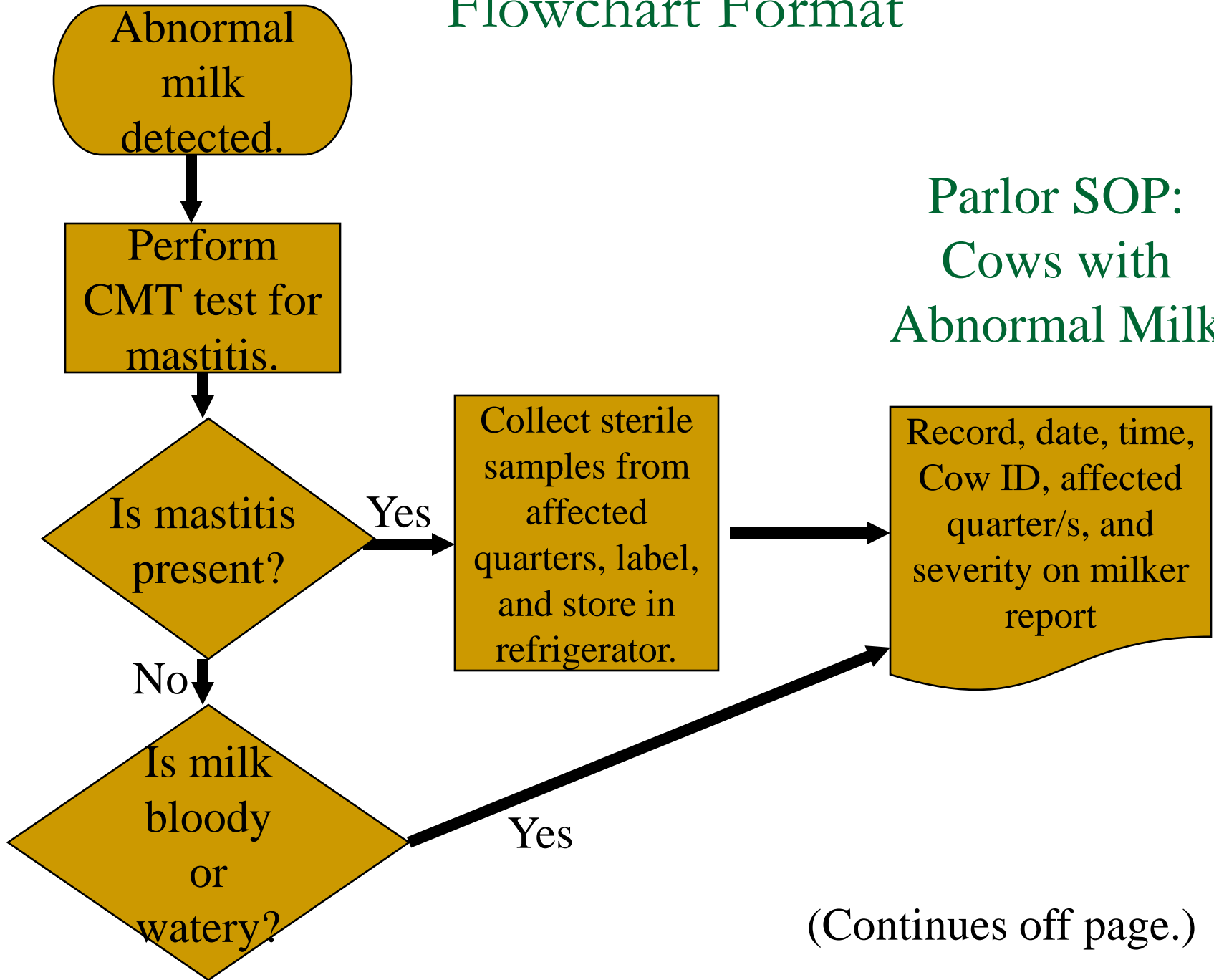
3. Clean and dry all teats using a clean paper towel for each cow.
 - Be sure to remove all dirt, especially around the end of the teat.

Apply



4. Attach milking unit and adjust.

Flowchart Format



Parlor SOP: Cows with Abnormal Milk

(Continues off page.)

Flowchart

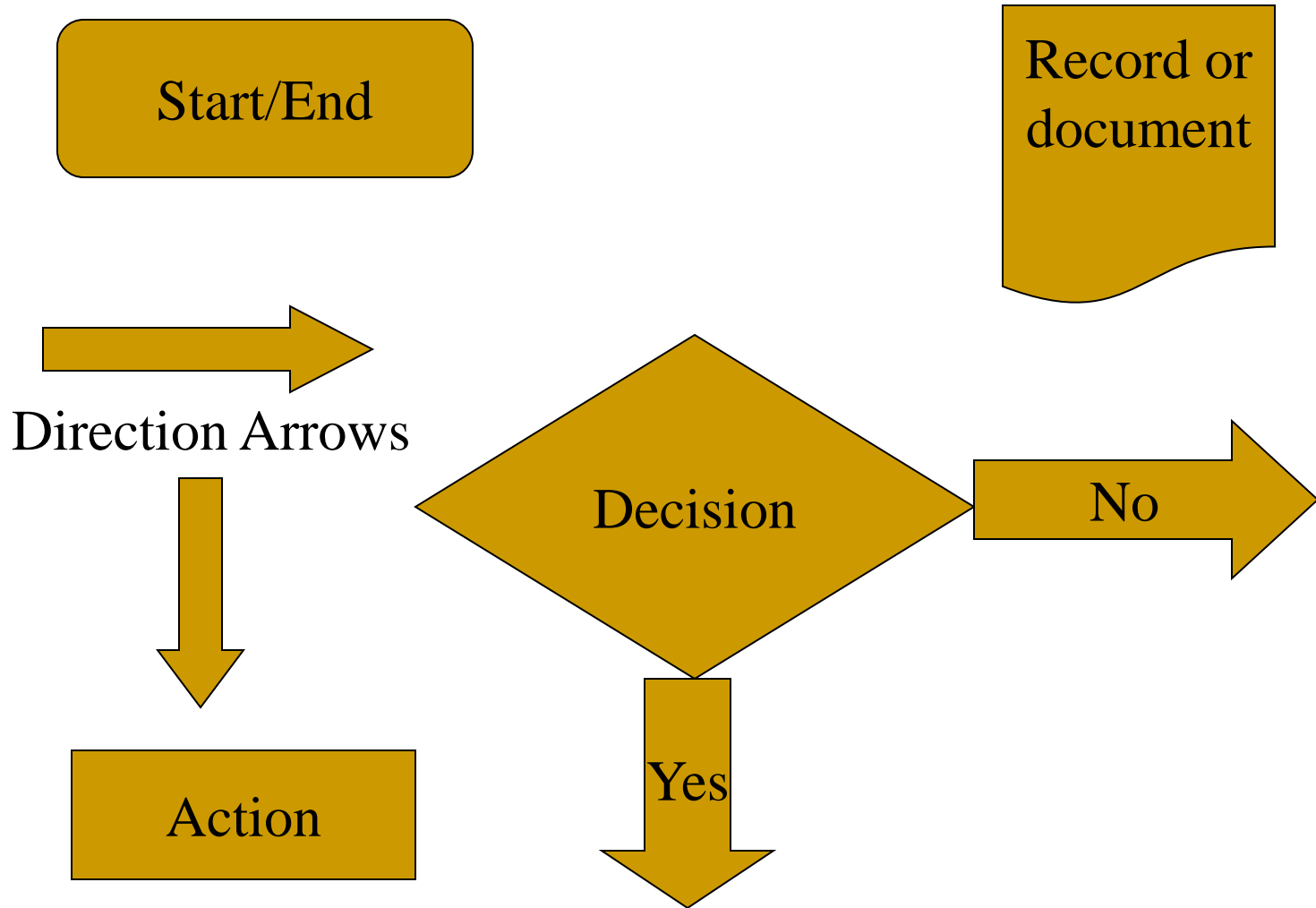
Strengths

- Easy to follow
- Logical flow
- Handles decisions very well

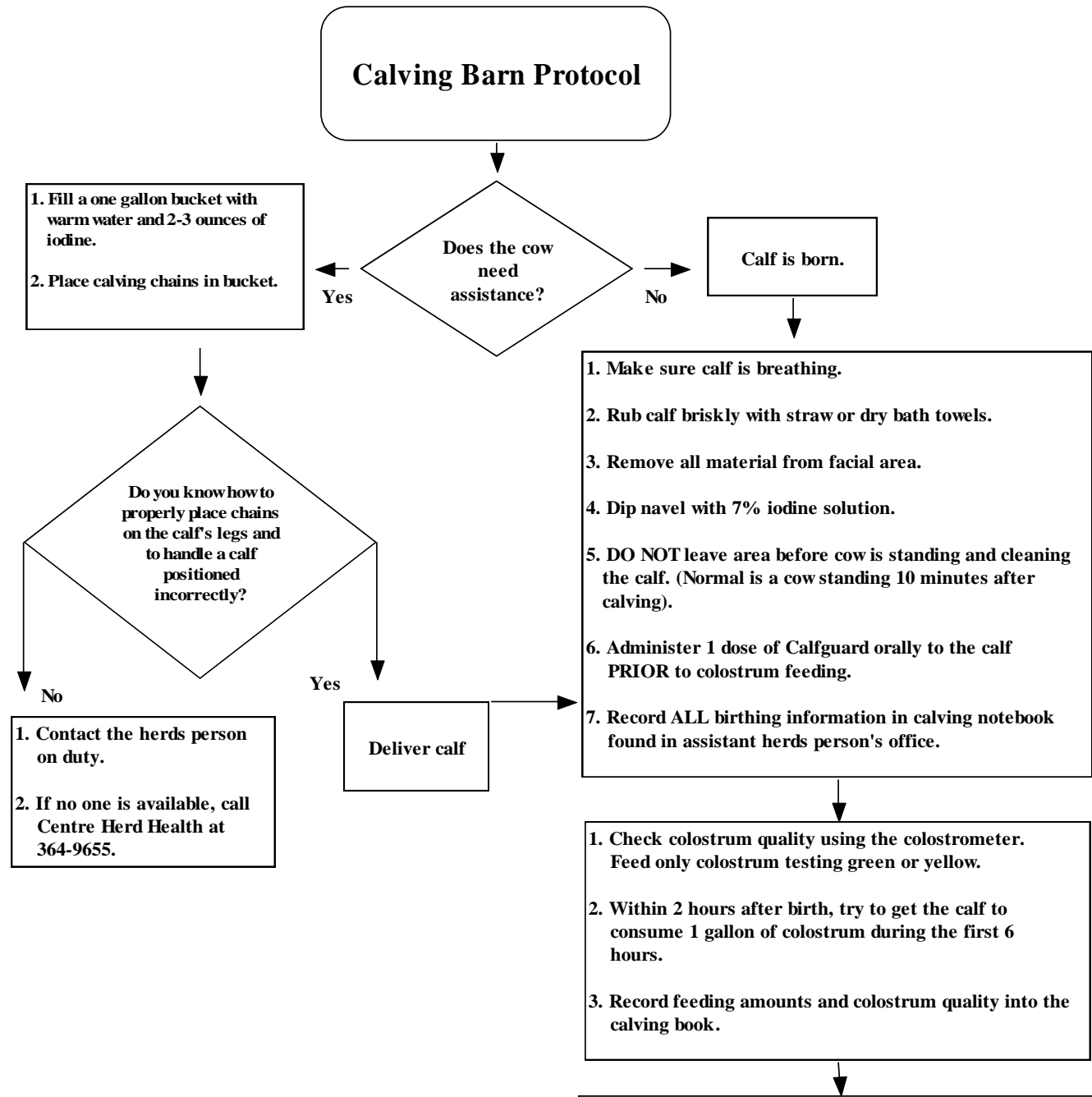
Weaknesses

- More difficult to write
 - Does not handle details well
-

Standard Flowchart Symbols



Hybrid Flowchart/ Steps Format



Part 3

Performance Monitoring and Feedback

Provide Appropriate Feedback

- Positive Reinforcement
 - Use often to establish correct behavior
 - Negative Reinforcement
 - Use sparingly to reinforce consequences of poor behavior
 - Extinction
 - Use to eliminate unnecessary but harmless behavior
 - Punishment
 - Do not use with learners at all, only with experienced people
-

No Feedback *is* Feedback

- Providing no feedback to a person's good efforts is extinction
 - No feedback indicates that an action is unimportant or unnecessary
 - Always provide positive feedback to support and encourage correct behavior
-

Follow-up feedback and Coaching

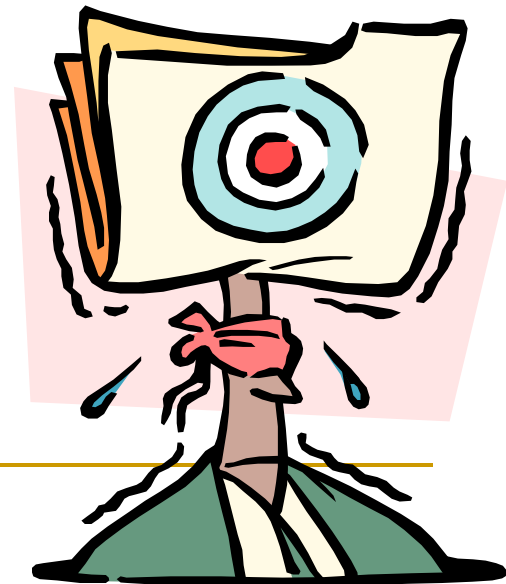
- Catch people doing things right
 - Continue providing deeper and more substantial information about why
 - Encourage people to become “experts”
 - Use coaching to develop and enhance skills
 - Use training as a way to adapt to change
-

Forums for Feedback

- Individual
 - Specific activities/behaviors within the individual's control
 - Activities that can be objectively observed or measured
 - Group
 - Regular numerical data about results of a group's performance
 - Information about emerging trends (positive or negative) that the group can influence
 - Group recognition to build teamwork and recognize successes
-

Gathering Information for Individual Feedback

- Performance check
 - Check results of work after an assigned job is completed (i.e. Are stalls cleaned and bedded properly?)
- Observation
 - Observe while completing work
- Real time information plotting



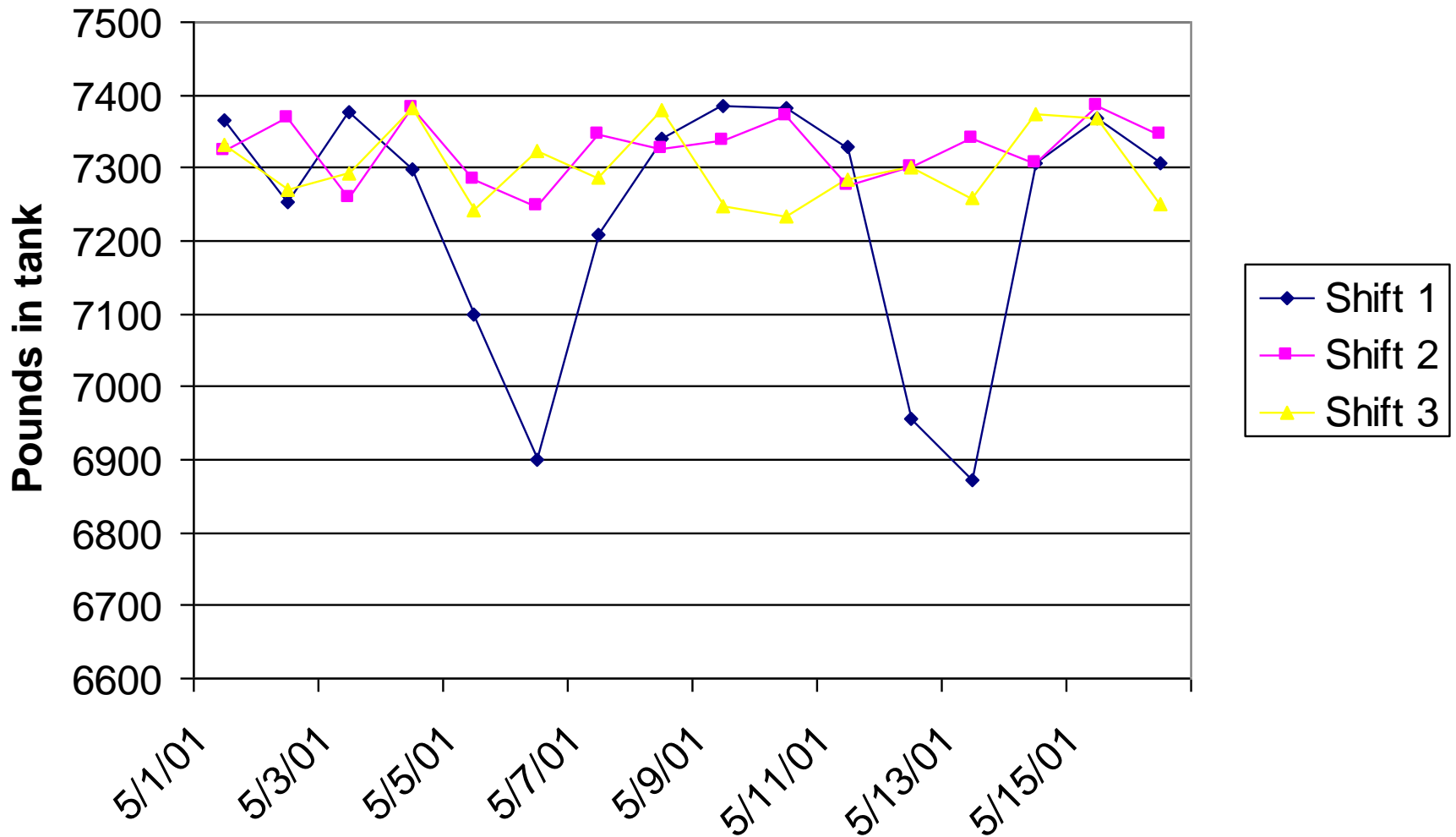
Automated Data Systems

Milking report for 8/ 5/01 Milking 2 at 6:32 PM P501 Settings: 15: 1

| PEN | Total Milk | Milk /Hr | Milk /Cow | Cows | Cows /Hr | Total Time | Start Time | Stop Time | Avg #/m | Avg Dur | Avg Dev | Not ID |
|-------|------------|----------|-----------|------|----------|------------|------------|-----------|---------|---------|---------|--------|
| 4 | 2895 | 457 | 19 | 154 | 24 | 6:20 | 11:32 | 17:52 | 4.7 | 4.1 | -2 | 2 |
| 1 | 8147 | 1537 | 35 | 236 | 44 | 5:18 | 12:35 | 17:54 | 6.5 | 5.6 | -4 | 1 |
| 7 | 396 | 72 | 22 | 18 | 3 | 5:26 | 12:36 | 18:02 | 4.6 | 5.0 | 1 | 3 |
| 9 | 182 | 44 | 20 | 9 | 2 | 4:06 | 13:00 | 17:06 | 5.8 | 3.5 | 0 | 0 |
| 2 | 5520 | 1623 | 25 | 217 | 63 | 3:24 | 14:28 | 17:53 | 5.5 | 4.9 | -3 | 0 |
| 3 | 3611 | 3186 | 22 | 163 | 143 | 1:08 | 16:18 | 17:27 | 5.4 | 4.2 | -4 | 10 |
| 8 | 352 | 918 | 25 | 14 | 36 | 0:23 | 17:27 | 17:50 | 5.4 | 4.7 | -5 | 0 |
| 5 | 1 | 30 | 1 | 1 | 30 | 0:02 | 17:49 | 17:52 | 0.4 | 2.2 | 0 | 0 |
| 6 | 17 | 204 | 17 | 1 | 12 | 0:05 | 17:50 | 17:55 | 2.9 | 5.7 | 0 | 0 |
| ==== | ==== | ==== | ==== | ==== | ==== | ==== | ==== | ==== | ==== | ==== | ==== | ==== |
| Total | 21121 | 3249 | 26 | 813 | 125 | 6:30 | 11:32 | 18:02 | 5.6 | 4.8 | -3 | 16 |

Real Time Information Plotting

Tank Weights by Milking Shift



Examples of Individual Feedback

- Teat end cleanliness
 - Total feed mixing time
 - Free stall cleanliness
 - Bulk tank weights?
 - Status of calf bedding
 - Reflective behavioral interview (+or-) of decision making while following complex SOPs like calf delivery
-

Reflective Behavioral Interview

1. Describe for me your role in the incident?
(good or bad)
 2. Tell me in detail about how you made your decisions?
 3. What were the outcomes?
 4. What would you have done differently if you could go back and change it?
 5. What have you done since?
-

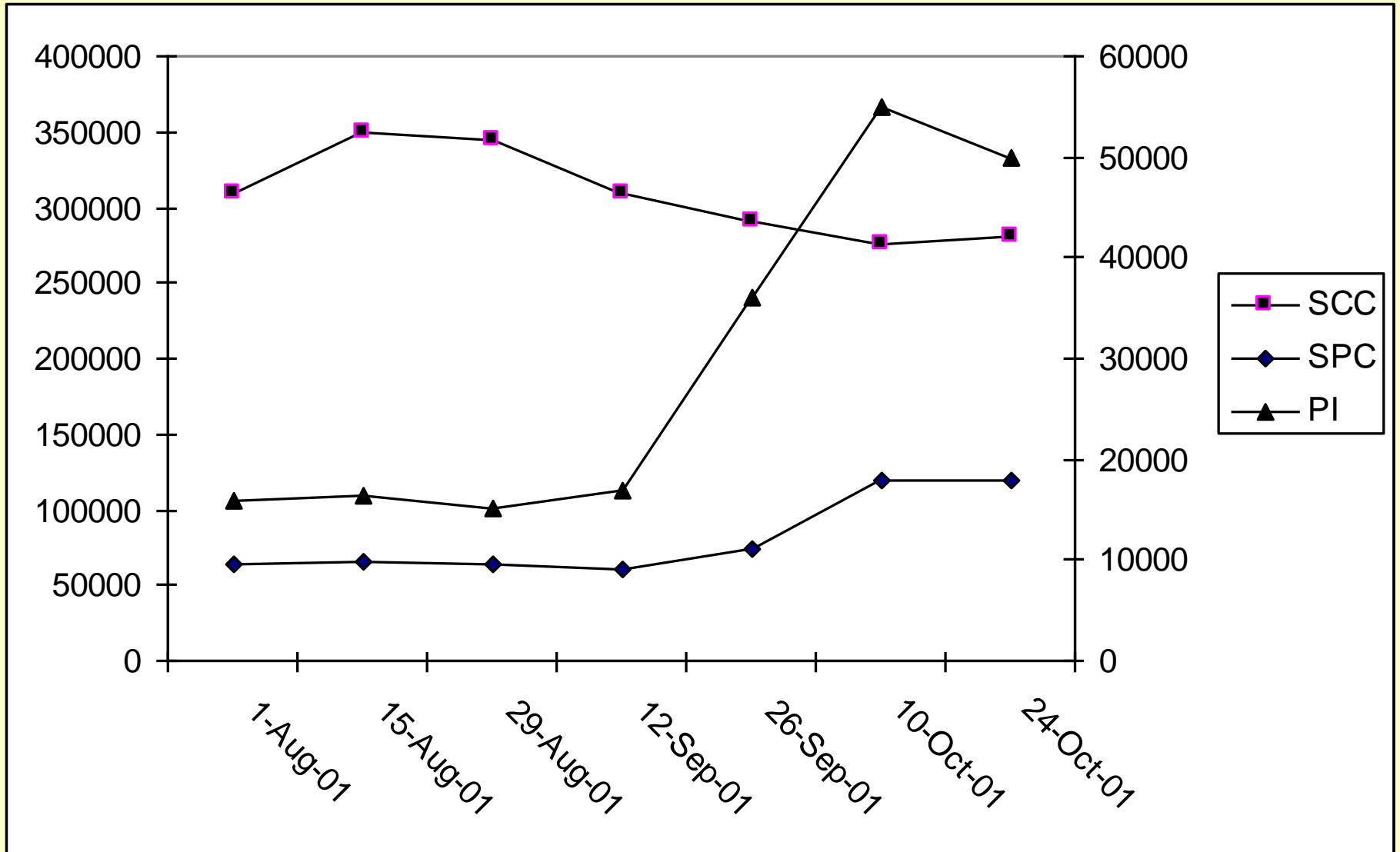
Group Feedback

- Simple plotting and trend lines
 - Control charts
 - Group problem solving meetings to address performance challenges
 - Group recognition to build teamwork and recognize successes
-

Examples of Group Feedback

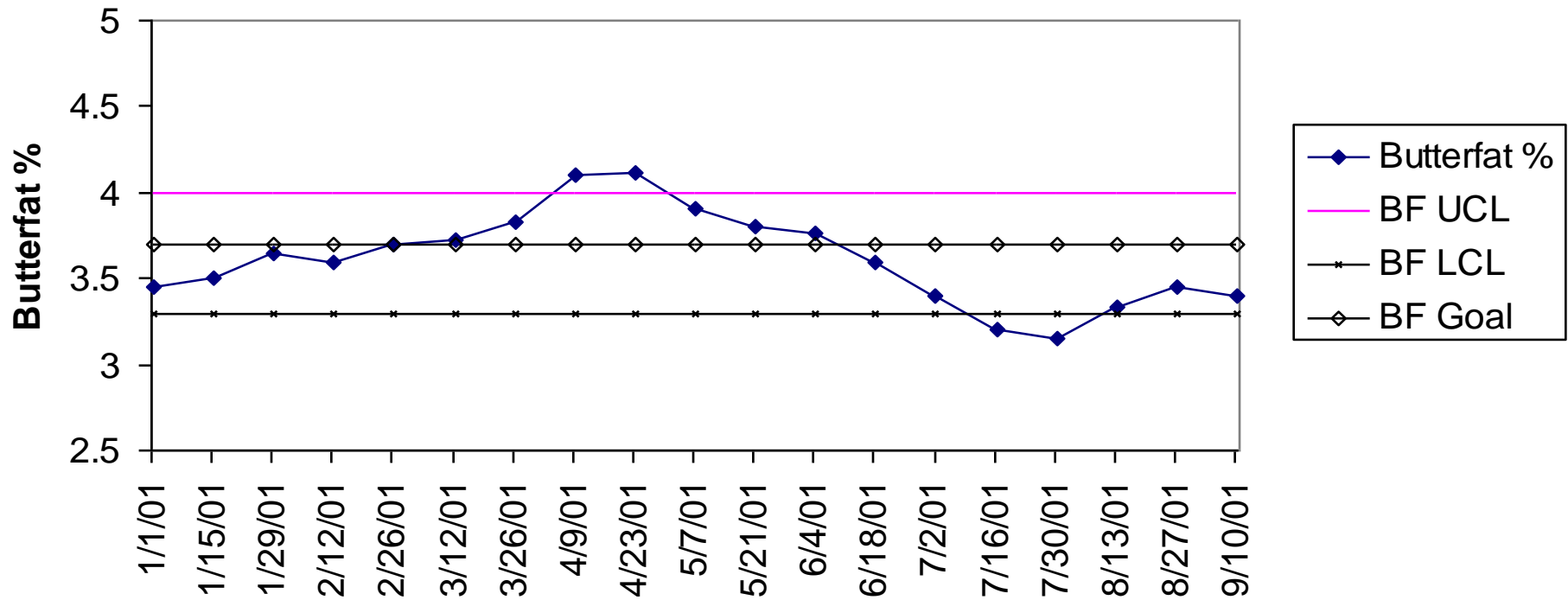
- Milk quality measures
 - Bulk tank weights (Could be individual feedback in some cases)
 - Pregnancy rate
 - Maintenance of equipment and barns
 - More...
-

Simple Plotting and Trend Charts



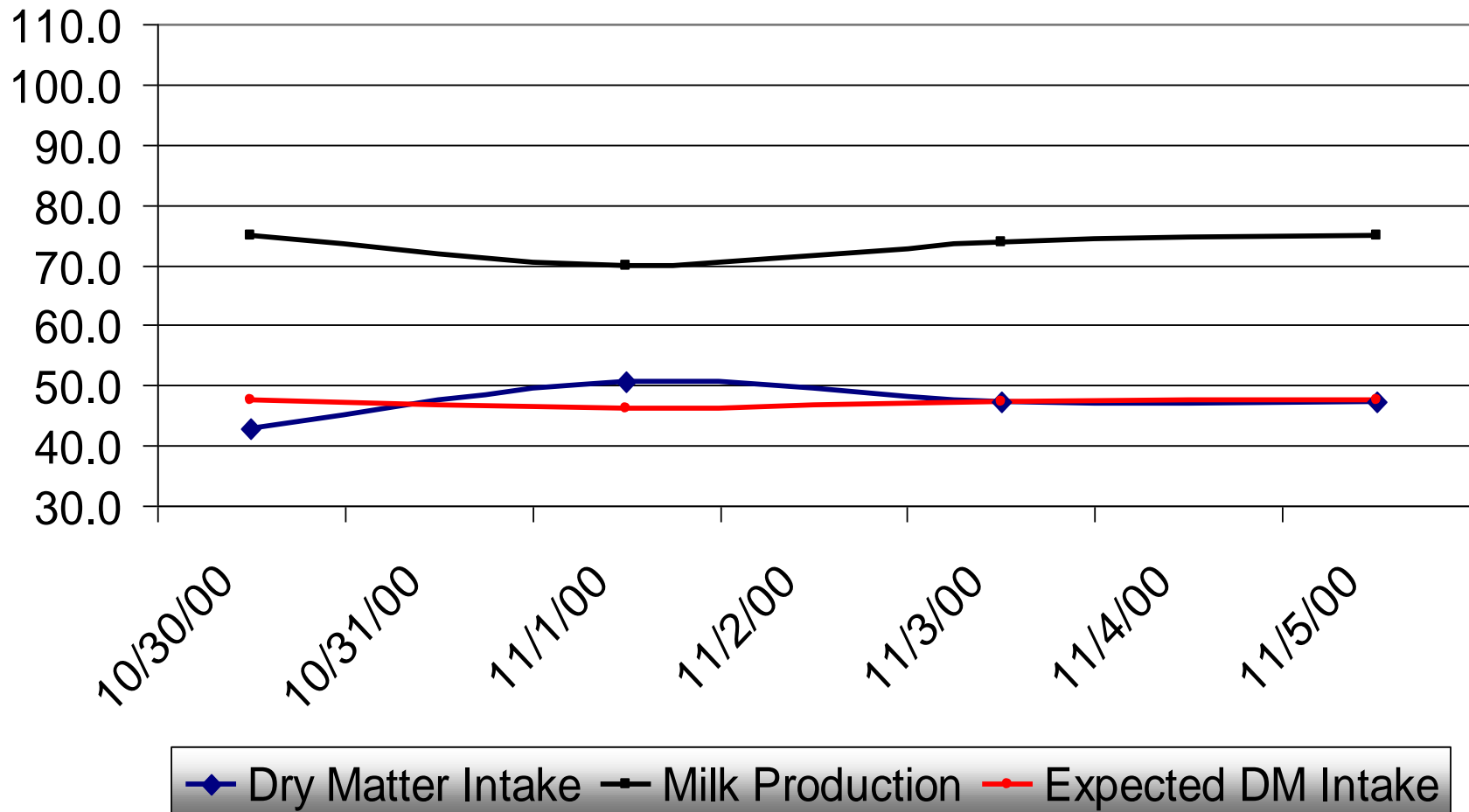
Control Charts

Dollar Dairy Butterfat %



Simple Feeding Monitor

Milk Group 1



Part 4

System Implementation and Improvement

Overcoming Resistance

- Attitude: “We’ve done it just fine the old way up to now!”
- Problem: Fear of change
- Solution: Explain need for change and listen to concerns. Overcome with communication.



Overcoming Resistance

- Attitude: “This is no benefit to me, just extra work!”
- Problem: WII-FM (What’s In It For Me)
- Solution: Share mission and values of the business. Explain how improvement benefits everyone.



Overcoming Resistance

- Attitude: “The boss wants to micro-manage everything we do.”
- Problem: Lack of empowerment.
- Solution: Encourage people to take an active role in shaping change and improving quality.



Seven Steps to Successful SOPs

1. Plan for results

- Design SOPs with definite results in mind.
- Improves communication and cooperation with stakeholders
- Leads to appropriate monitors

2. Write a first draft

- Gives a basis for discussion
- Reduces excessive speculation about how to begin

3. Internal review

- Access ideas
 - Build commitment and buy-in
-

Seven Steps to Successful SOPs

4. External Review

- Access ideas and expertise
- Build commitment and buy-in

5. Testing

- Let someone unfamiliar with the job try to follow the procedure

6. Post

- In workplace and employee information
-

Seven Steps to Successful SOPs

7. Train

- Define the learning objective
 - Explain and demonstrate both why and how each step is done
 - Give opportunity for learner to practice
 - Observe and make key corrections
 - Provide appropriate feedback
 - Be patient, follow up as needed with coaching
-

The Simple S-T-P Problem Solving Model

- S = Situation (problem)
 - Clearly define the problem
 - Seek to clarify all points of view
 - T = Target (ideal)
 - Clearly define the target
 - Clarify all aspects of the ideal situation
 - P = Plan
 - Don't rush to plan until S and T are thoroughly defined and understood by all parties.
 - Each part must be developed in order.
-

Procedural Drift

- Caused by a lack of buy-in or lack of feedback
 - Critical to get buy-in from staff and encourage everyone to take “ownership” of procedures
 - Critical to set up a monitoring system and keep it going
 - Important to assign responsibility for collecting information and providing feedback
-



In Conclusion

- Design your systems for specific results
- Use an inclusive process, everyone really needs to buy in to them
- Monitor performance and provide feedback to everyone
- Writing an SOP is only the beginning

