

Making More Effective Use of Your Data

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Introduction

Modern dairies require excellent performance in a variety of different management areas. Quite often the performance in one area influences or is affected by performance in another management area.

Some example areas for management focus include feeds and feeding; diet formulation; reproduction; transition, maternity and fresh cows; parlor performance; mastitis control; culling and replacements; genomic selection; and manure disposal. Regardless of the specific management area, performance depends on competent, conscientious personnel implementing sound programs consistently in each management area.

In general, successful management:

- Is based on sound principles involving biology, economics and management
- Is designed to facilitate implementation by avoiding unnecessary complication
- Has very consistent implementation by well-trained personnel
- Incorporates new ideas and technology quickly, but only after critical scrutiny
- Focuses on monitoring processes as well as ultimate outcomes

The proper use of accurate and timely data is critical in guiding and monitoring these personnel in their respective roles to achieve high levels of performance in any program. This paper will discuss some general principles involved in the use of data to improve management. The reader is referred to a list of publications by the authors and others that more fully address analytical approaches for specific management areas.

General Concepts

The primary reason to collect data is the improvement of management. Successful managers share certain characteristics when collecting and using data.

1. *Have a clearly stated reason (question) that determines the data to be collected (i.e., they do not collect data solely for the sake of collecting data).*

A commonly repeated mantra over the last 30 years has been that “dairymen need to spend more time collecting data/using records”. While the presence of sufficiently complete and accurate data is important, possessing data alone is not sufficient. Data must be properly placed in a well designed framework and utilized in pursuit of a specific inquiry. Additionally, analysis without decisions or actions serves little purpose.

2. *Recognize data may come from a variety of sources, not just computers.*

- Computerized and paper records (examples)
 - Individual cow reproduction and diseases
 - Feed mixing and delivery
 - Parlor performance
 - Bulk tank shipment
- Discussions with their managers and supervisors plus other third parties
- Direct observations

There is a tendency to dismiss any data that did not come from computers as unimportant or non-objective. While it is true that a manager likely will not succeed if all decisions are based on unfounded feelings, data sources such as visual observations and input from supervisors and labor are extremely valuable and should not be viewed as completely subjective.

Computers are tremendous tools, but they cannot replace humans capable of logical thought and prudent judgment.

3. *Understand the differing data and reporting needs of various audiences.*

- Personnel actually performing the tasks
- Personnel in direct supervisory roles
- Middle and upper level managers
- Owners
- Third parties (e.g., veterinarians, consultants, drug companies, and universities)
- Bankers

One-size seldom fits all. For example, the person giving prostaglandin injections today needs a different report than the banker needs for his end of year evaluation of overall reproductive performance. While the needs of all levels have merit, the needs of the personnel performing tasks must be foremost.

4. *Place focus on the current daily work-processes rather than solely ultimate outcomes.*

Performing the proper tasks at the correct times for the correct targets (animals, pens, feedings, etc.) each day is the surest path to success. Timely data should be captured and used to ensure consistent performance.

Some examples would include:

- Reproduction: Did all eligible animals receive their scheduled prostaglandin injection today?
- Feeding: Did the proper amounts of the correct feeds get mixed and delivered?
- Parlor: Did the most recent milking start and end at the scheduled times?
- Mastitis: Are treatment protocols being followed as defined in the plan?

Additionally, rewards for implementation need to be based on data that is under the control of the personnel. For example, basing parlor employee bonuses solely on monthly bulk tank somatic cell count may not be a fair method of rewards, especially if there are issues with overall cow cleanliness and bedding maintenance.

5. *Place great emphasis on capturing required data.*

- In a timely manner
- Accurately
- Efficiently (automated whenever possible)

However, without a clearly articulated question or reason, the data collection process either eventually fails or unnecessarily consumes time and resources if it becomes an end unto itself.

6. *Use data and reports in a proper manner for motivation.*

- Primarily for motivation and improvement of personnel implementing tasks
- Minimally for punishment

Even if punishment results in short term improvement, using punishment alone is seldom effective over the long run.

7. *Recognize the difference between the level of proof needed to begin a management investigation or change and the required level of proof for scientific certainty or actual field research trials.*

Many traditional performance measures were adapted from scientific trials. In science the primary focus is minimization of mistakenly stating something is true when in fact it is not. A very high level of proof is expected prior to assuming truth. The level is typically (but somewhat arbitrarily) set at 95% + certainty. While evidence is still extremely important, in many cases management must make decisions at levels of evidence less than those required for stating scientific proof.

8. *Recognize improper interpretation of records can lead to two types of mistakes.*

- Inappropriate action (acts of commission)
 - Taking an action when no action was needed

- Taking action with negative results when a positive action existed
- Taking action with positive results when a more positive action existed
- Inappropriate inaction (acts of omission)
 - Taking no action when an action would have had a positive effect
 - Taking no action, leading to a more negative effect

In many cases the concern is on avoiding inappropriate action but inappropriate inaction may be more common and more costly.

9. Carefully select monitoring tools (metrics) that possess certain characteristics.

- When a positive individual outcome occurs, the overall metric indicate improvement.
- When a change occurs, the metric should reflect the change as soon as possible.
- The metric should be useful to evaluate different groups and different interventions.

10. Do not confuse precision with accuracy.

Suppose a cow actually produced 25.2 pounds of milk at a milking. Stating the cow gave:

- 20.53 pounds would be precise but not accurate.
- In the mid-20s would be accurate but not very precise.
- About 25 pounds would be accurate and precise (enough)

11. Do not have increased trust due solely to the complexity of the underlying mathematics.

This mistake may actually be more common with increasing education. Do not place greater faith in a calculation just because it is complicated or unfamiliar.

12. Recognize the possible existence of systematic errors in common calculations.

Summary statistics such as averages can be skewed due to:

- Presence of a wide distribution or outlier values (“Variation”)
- Damping due to excessive historical data (“Momentum”)
- Delays between the action and the determination of the outcome (“Lag”)
- Inappropriate inclusion or exclusion of animals (“Bias”)

13. Are careful when using benchmarking against other herds and do not use it as the primary means of judging their own performance.

Benchmarking has been heavily promoted in recent years, but has multiple concerns:

- Many of the selected parameters are susceptible to misleading
- Summary statistic errors outlined above abound in benchmarking
- Seldom do the parameters shed much specific illumination on specific followup actions

Conclusion

Today's dairies are extremely dependent on the availability and the proper use of data. However, merely collecting or possessing data is not sufficient. Data must be utilized in manners that assist in both improved implementation of daily tasks as well as monitoring of ultimate outcomes.

The presentation will outline in more detail process and outcome monitors in several different management areas.

Related Resources for Additional Reading

Stewart, S., Fetrow, J., Eicker, S.. Analysis of current performance on commercial dairies. The Compendium on continuing education for the practicing veterinarian. Aug 1994; v. 16(8) p. 1099-1103.

Stewart, S., Fetrow, J., Eicker, S.. Field use of DHIA somatic cell counts with scatter graphs. The Compendium on continuing education for the practicing veterinarian. Nov 1995; v. 17(11) p. 1429-1439.

Stewart, S.C., Eicker, S.W.. Practical computerized monitoring of parlor cow flow. American Association of Bovine Practitioners Conference. Sep 1998; (no. 31) p. 148-153.

Stewart, S.. Large Herd Reproductive Management in the United States. Dairy Cattle Reproductive Council Conference. Nov 2009.