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PART 1: What is "monitoring" and how can we do it correctly?

The next several articles will discuss different monitoring parameters, and how to effectively monitor the transition cow program. The information in these articles has been reprinted from "Monitoring Transition Cow Programs" by Drs. Steve Eicker, Steven Stewart, John Fetrow, and Paul Rapnicki.

Definition and Goals of Monitoring

Monitoring is the routine, systematic collection and evaluation of information from the dairy, intended to identify problem areas and to track performance over time.

Monitors usually take the form of a table, with a column of numbers for each date (month), and each row is a parameter, or as graphs that track trends of data over time. These parameters are usually averages, such as average days open, or average milk production, but can also include counts and percentages. These tables often show a historical progression toward a goal. Thus, they provide significantly more information than a single test-day snapshot. For instance, a bulk tank average somatic cell count of 200,000 is much more meaningful if the past history is known. Had the previous months' values hovered near 500,000, this new result would be a cause for some celebration! Had the prior month's values been near 100,000, this result should be a strong warning.

Until the early 1980's, most of these monitors were very laborious to calculate. They were time consuming, and frequently were only done by Universities or DHIA systems. The introduction of on-farm computer systems and software has made a difference. In fact, the calculations are so easy to make they are frequently made monthly, weekly, daily, or in some instances hourly! Today's dairy manager can easily calculate many parameters, many different ways, and is now tempted to do something with that calculation. Because of today's computing power, we now have the luxury of deciding what parameter are most appropriate to calculate to answer an important question the manager is asking. Today's "smart" manager is asking "what can I change today that will improve the future performance of my herd". This is fundamentally, a new question that was not even being asked when many of the traditionally accepted monitored were developed.

Essentially, the values of these parameters are used as a "test" to identify situations where a change is needed. Thus, the purpose of monitoring is to identify areas on the dairy that can be changed such that profit is enhanced, or risk is reduced. Unlike making a calculation, records analysis takes time; it costs money to collect and analyze the information. If reports are generated, but action is never taken that increases the profitability or reduces the risk of the dairy, that time and money was wasted.

There is an important distinction between monitoring and historical evaluation of past herd performance. A banker might be interested in past herd performance, as might an academic study creating benchmarks to compare herds. Monitoring looks at what is changing now, and is more time-sensitive.

There is also an important distinction between effective monitoring parameters and outcome goals for a dairy. For example, poor heat detection rate will affect pregnancy rate, which will affect average days-in-milk, which will affect average milk yield. The goal is high milk yield, but milk yield is a poor monitor of heat detection rate.

Why Do We Monitor?

There are three general reasons, (not always in this order):

1. To measure the effect of an implemented intervention.
2. To detect the occurrence of an unintended disruption in performance
3. To help motivate behavioral change on the dairy or to market other consultingservices.

Again, the goal of monitoring must be to find an area where we canmake a change that will increase the profit or reduce the risk on the dairy.

Interventions might include ration changes, herd policy decisions (i.e., 3X milking), reproductive programs, etc. Not all changes are profitable. As these changes are implemented, the impact should be estimated to decide if the change was profitable and should be continued, or was a mistake and should be reevaluated. Changing just because a "number" is changing can be an expensive mistake for a manager to make. Changing too frequently is expensive and frustrating.

Disruptions in performance occur on every dairy, seemingly on a continual basis. One goal of monitoring is earlier detection of probems. It is almost always cheaper to fix problems sooner rather than later, whether they are diseases, reproductive problems, or even labor issues. Equally important is to NOT change something when it is not really broken.

Finally, many consultants use monitoring as a motivation and marketing tool for other services. Routine monitoring can get them on the dairy on a regular basis, where hopefully they are providing services that enhance the profitability of that dairy over and above their fees. The ideal consultant looks for opportunities to market solutions that are found in monitoring. Solutions help improve the bottom line; merely pointing to problems and making excuses does not.

Monitoring is not unique to dairies. Most businesses have been monitoring for years. For example, every patient in every intensive care unit has a chart where important parameters are monitored. If we consider our dairies as our patients, we can use a similar framework. In an intensive care unit, the purpose of monitoring is not just monitoring; monitoring is not an end in itself. The purpose of monitoring patients is to decide when to start and stop treatments. It is these actions that help the patient, not the monitoring. In intensive care units, the measured parameters have limit points. If, for example, the heart rate exceeds some cutoff, some further action is indicated – either diagnostic, therapeutic, or communication. There is almost always a clear management action if a monitored parameter is outside an expected range.

If the information on the chart is wrong, or not recorded, the patient may suffer. Treatments may be stopped that should have been continued, and other treatments may be started as soon as they are indicated.

Monitoring Failures

Most traditional monitoring parameters have been averages. Like all parameters, averages may suffer from four potential problems:

1. **Variation:** The use of averages can be misleading when an individual or a few extreme cases can distort the general trend.
2. **Momentum:** When data from long past are included in the calculation of the parameter, recent changes may be obscured by the weight of history.
3. **Lag:** The time between when an event occurred, and when it is measured.
4. **Bias:** The inappropriate inclusion or exclusion of cows.

Variation

Measures that simply report the mean ("average") of the herd or subgroup can lead to problems, especially in smaller herds. When dealing with small numbers of individuals, a single or a few values can greatly skew the mean in either direction. Usually, this skewing is upward since most measures have an absolute lower end, but no maximum value (e.g., voluntary wait period, age at first calving, and somatic cell count all have minimums, but no necessary maximums). This can lead to unwarranted alarm due to a single individual's problem, rather than a more pervasive herd problem. On the other hand, a good average does not mean there are no problem animals in the herd.

Momentum

In attempts to counteract the problem of low numbers in smaller herds, distant historical data is often included. Difficulties arise here because traditional statistics such as means and standard deviations are not "time-sensitive". For example, if these measures include a whole year's worth of information, it is difficult to differentiate between three problems: one arising recently versus one of long standing versus one already resolved.

Historical data can cause misinterpretation regardless of herd size. A relatively severe and recent problem may have only a small effect on the average due to the dampening effect of the historical data. Conversely, a recent improvement may also not be as dramatically illustrated. False re-assurance arises in the first case; in the second case unwarranted discouragement may cause abandonment of a positive change. This dampening characteristic of data analysis is referred to as momentum.

Lag

Lag is the time between when an event happens and when it is measured. Long lag times prevent prompt response to problems. For instance, calving interval requires two consecutive fresh dates. This means the information is at least nine months old (usually much older) and does not reflect any changes in reproductive performance in the last six months! Even a measure such as days open is dated by at least 35 days for any individual cow since it requires a pregnancy confirmation.

Bias

Many of these measures also report on the performance of individuals with a positive (or otherwise known outcome), but ignore (or do not reflect) the current numbers of animals either pending status confirmation or past a management cutoff with no action. In addition, bias can arise if a measure either includes cows or excludes cows inappropriately. Formally, this is termed selection bias.

Another form of bias is missing or incomplete data. There are many different forms of data corruption that exists in farm records systems. It is necessary to be concerned about the quality of the data that are available. Fundamentally, there are two types of bad data: incomplete data, and incorrect data.

Incomplete data exist because only partial information was collected into the system. For example, this can occur when a producer identifies ketosis cases, but does not record the information, or enters that data on some cases, but not others. Sometimes incomplete data exists because the data was entered initially, but later lost or deleted. One example has occurred when producers re-use ID numbers for animals and delete all evidence of a previous cow from the record system.

Incorrect data are a more insidious problem. These errors arise from both animal misidentification (ie, faulty electronic identification systems) or measurement error (incorrect milk weight was transcribed).

Most traditional parameters suffer from one or more of these four problems. Some may be unavoidable, but it is important to understand the magnitude of each potential error for each parameter monitored.

Next month we will continue this discussion and focus on transition cows.

References

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