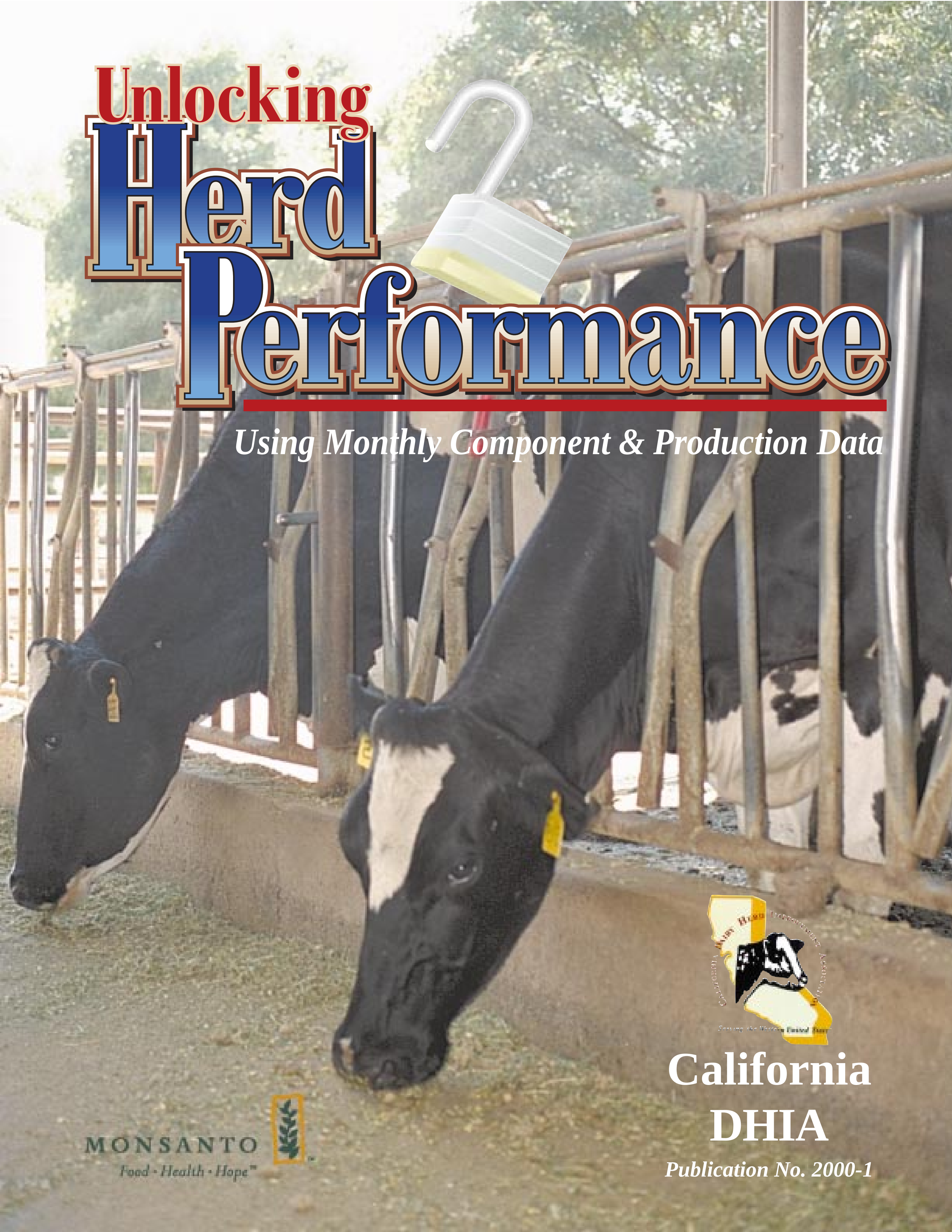
Unlocking Herd Performance

Using Monthly Component & Production Data



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California DHIA

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Unlocking Herd Performance

Using Monthly Component & Production Data

"Unlocking Herd Performance - Using Monthly Component and Production Data" is a publication cooperatively sponsored by the California Dairy Herd Improvement Association and Monsanto. This publication should be used as a tool to interpret DHIA records by analyzing patterns in herd performance and thereby reducing or eliminating problems before they have disastrous consequences.

In the past, the interpretation of DHIA records has focused on various herd averages or the individual cow – does she have a high somatic cell count or is her production level below a breakeven level? With the individual cow approach, producers have questioned the need for regular component testing and have found alternative metering systems for milk weights.

"Unlocking Herd Performance" represents a breakthrough approach to record analysis. It makes use of trends in herd performance based on monthly component testing to identify areas of current or potential concern. Component data provides biological feedback on the metabolic and physiological status of the cow.

By testing on a regular monthly basis, this data is available for you and your consultants to use to make the best management decisions possible. These best management decisions have everything to do with the profitability of your dairy operation.

This publication is divided into five sections. The first section is an overview of how data can be misinterpreted and the problem with using "averages." The second and third sections address concerns associated with the patterns in the fat and protein components of the milk. The fourth section looks at the value of herd trends in somatic cell testing. And finally, the last section provides specific tools to use when analyzing test day milk weight data.

The commitment on the part of Monsanto is to put the necessary tools to do the kind of monitoring represented in the following pages into the hands of those that want it. If your nutritionist or veterinarian is interested in helping you monitor this type of data, and is looking for the appropriate tools, they are welcome to call their Monsanto representative to help setup their system.

On behalf of the California Dairy Herd Improvement Association and Monsanto we hope you take the time to study the information provided and use it as a means of improving your level of management and overall profitability.

Bill VerBoort
General Manager, California DHIA

Contents

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Data Doesn't Make Decisions

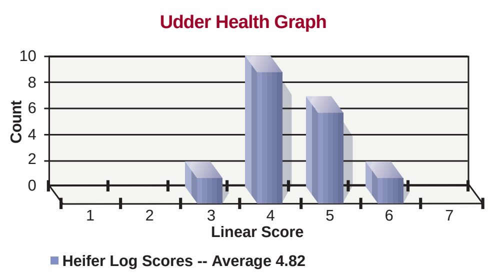
By Neil Michael, DVM and Donald Niles, DVM
Technical Service Specialists, Monsanto

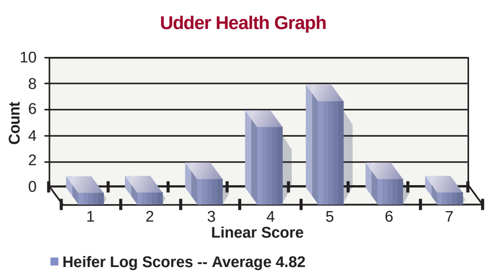
People make decisions, and the quality of those decisions depend on accurate, meaningful data. Regardless of all the technology we are blessed with in the dairy industry, the formula for effectively using data to make decisions still hasn't been patented. Many producers with daily milk weights, flow meters, bulk tank quality milk data, and inventory control programs have questioned whether milk component testing is still a profitable decision. The answer lies in knowing more about the data that we use to make decisions. Let's take a look!

The Problem with Averages

Many of the figures that we rely upon (milk/cow, SCC, butterfat, protein) are herd averages and therefore often mask important trends, health indicators, and performance opportunities. If an average you are using has a very wide distribution (variation) from low to high, or is not normally distributed (skewed), then the simple average may not be a valid representation of herd health or performance. For example, if a dairy has cows peaking anywhere from 30 to 140 pounds, the average peak is not very revealing.

The worst case scenario is that "OK" averages lull us into a state of complacency and result in no action when preventative action should have been taken. We often say that the "abnormal becomes the normal," and no corrective action takes place.





Both graphs depict herds with an L2 somatic cell score of 4.82. Note that the cows represented in the top graph have a more narrow distribution than those represented in the lower one.

Groups of Individuals

Just like making decisions on herd averages can sometimes lead to lost opportunities, making decisions on individual values can result in many improper decisions and rarely provide the answer to a much larger bottleneck or problem on the dairy. By grouping "sub" animal populations within your herd, performance can be more accurately assessed and proactive decisions made.

Some examples of "sub" populations to be assessed on a dairy are lactation groups, days in milk, pen, and previous infection status. Questions to be answered should include:

- What is my current status by groupings?
- How are my fresh cows transitioning?
- What trends can I see compared to last month?
- Can I predict future performance using past performance?
- Are undesirable breakdowns consistently occurring at a similar point in time?

Evaluating Decisions

After evaluating the data and making a decision, it becomes critical to accurately assess whether the decision was correct and improvement is being made. Sub-population performance allows the change to be quickly evaluated using data from the animals that are most affected by the decision.

Simple averages may take months to change due to the fact that they may require many test dates (as in rolling herd average) or the measurement does not occur for some time after the change has been made (i.e. days open). For example, if a ration change was made to help fresh cows take off quicker, the bulk tank would not be a good measure because fresh cows are a relatively small population in the total herd. Instead you would want to look at the early lactation sub-population. Continual improvement requires that decisions can be accurately evaluated and monitored across time.

Testing for Milk Components

Monthly individual milk components can provide accurate data to avoid many costly situations on a herd basis when routinely analyzed by producers and their management professionals (veterinarian, nutritionist, and consultant). Additionally, your DHIA field technician can be a great resource for testing requirements and can provide examples of computer generated reports using milk components.

Somatic cell count, butterfat, and protein should be a minimum for properly analyzing and managing your herd's performance. Some examples of herd situations that can be evaluated using milk component information are:

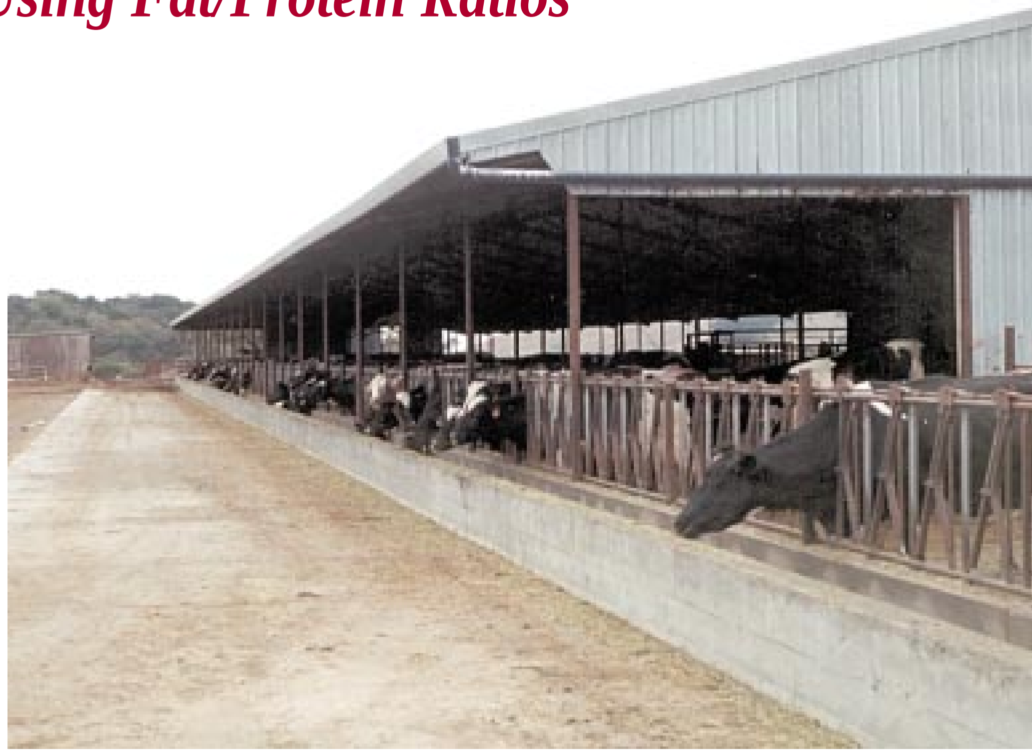
- Energy issues in early lactation
- Acidosis
- Parlor routines
- Dry cow management
- Close-up pen management
- Infection status by days in milk

In the following articles, we will take a closer look at specific methods of using milk component and production information to evaluate conditions in your dairy operation.

Utilizing Milk Component Data

Part I - Identifying Rumen Acidosis and Related Problems Using Fat/Protein Ratios

Donald Niles, D.V.M.
Technical Service Specialist, Monsanto

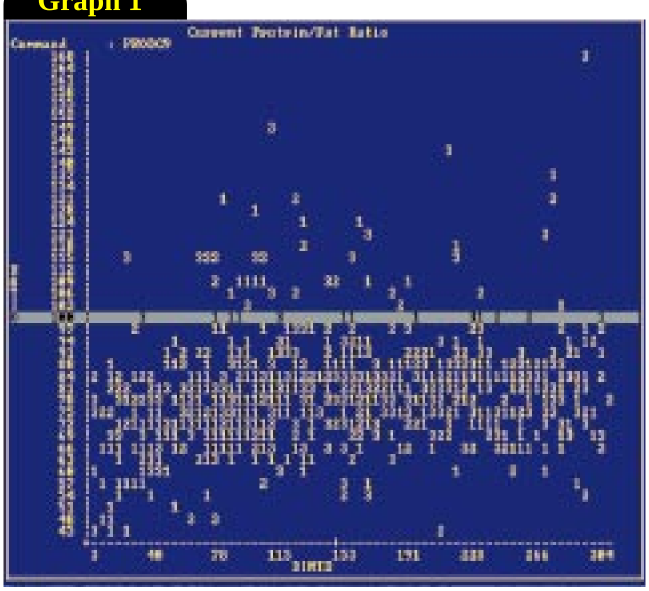


Dairy performance continues to improve with each passing year. Even 30,000 pound rolling herd averages are becoming more common. This normal state of dairy evolution means that most progressive dairymen are constantly dealing with a new level of production.

As a result, we are always working on dairy evaluation tools. We need these tools to both identify the bottlenecks preventing further progress in a herd, and to identify threats to the current production level. In this article we will talk about using *individual cow* milk component data. By analyzing the *patterns* of these components in a dairy, we can help identify conditions such as acidosis and fatty livers long before they have disastrous consequences. This article will focus on using records to identify acidosis.

A key point is that we are talking about patterns made up of *individual cow* component data. Occasionally, dairies stop testing cows for components. Their feeling is that since they are not making individual cow culling decisions based on the animal's fat, protein or somatic cell count, why pay to test for them? The answer is that they don't need it to make individual cow decisions. They need them to recognize herd problems.

Graph 1



Acidosis

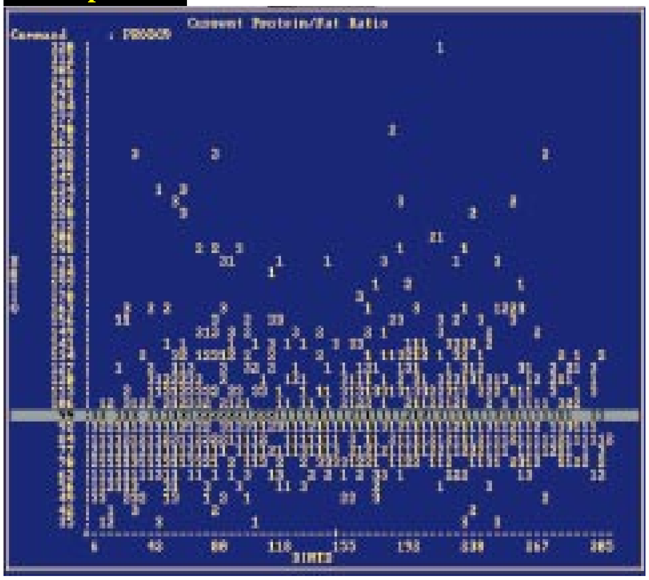
Rumen acidosis is one of the more common problems we run into on large dairies. It can also be one of the most expensive. The causes include nutritional factors such as high starch levels or low fiber levels, feed management issues such as over-mixing or TMR separation, and environmental concerns such as heat stress or poor group transition. Generally, acidosis needs to be present for a while on a dairy before it starts causing huge financial problems. A key benefit of monitoring milk components is the detection of acidosis before significant problems occur.

Signs of acidosis are well documented and can be vague and difficult to identify. They include reduced cud chewing, inconsistent intakes, increased off-feed cows, inconsistent manure and later, increased lameness.

We will also often see depressed fat tests in herds with acidosis. There are problems with the *bulk tank* fat test, however, as a monitor. The herd fat test can be depressed from causes other than acidosis. Fat tests can also be depressed from high levels of dietary fat, inefficient rumen function or heat stress, to name a few.

Also, even if acidosis exists, not all cows are acidotic at the same time. Individual cows tend to cycle in and out of acidosis. Therefore, even if one-third of the cows in a herd are acidotic, with a low fat test, the other two-thirds may have a high enough fat test to keep the bulk tank 'normal'.

Graph 2



Fat/Protein Ratio

A fairly sensitive indicator of acidosis is an individual cow's fat/protein ratio. Acidotic cows generally have depressed fat tests and normal protein tests. Many other causes of depressed fat tests, such as feeding excessive fat, tend to cause both fat and protein to be depressed. Therefore, we look at the ratio of a cow's fat to protein. This way, we can often see signs of acidosis before the cows are affected. In other words, the more cows with a fat test that is lower than their protein test (called an "inversion") the more worried we are about acidosis.

This ratio can be very easily graphed as we can see on the illustration above, (*Graph 1*). Each of the data points shows one or more animals. A "1" indicates a first calf heifer, a "2" is a second lactation animal and a "3" represents third lactation or greater.

Here, we have each individual cow's fat to protein ratio, on the most recent test, plotted against days in milk. The line is drawn at a ratio of 1:1. All cows above the line had a fat test that was lower than their protein test. As you can see in this example, there are relatively few cows above the line, indicating that acidosis was not likely to have been a problem in this herd on test day. Generally, I am not concerned until more than 30% – 35% of cows are above the line.

On *Graph 2* we can see a different situation. Here, a very substantial number of cows have fat tests that were lower than their protein tests. In this herd, some pens of cows have 50% of the cows inverted, and yet the bulk tank fat test was still 3.6%. This is a case where changes made now, can prevent expensive consequences from occurring later.

Graph 3 brings up a more alarming situation. This is a herd that had recently gone up dramatically in production (almost

20 pounds/cow in two months). Although the dairyman was delighted with his production, as you can see, there were a tremendous number of cows with a higher protein than fat test. This herd clearly needs intervention now, to prevent serious problems in the very near future.

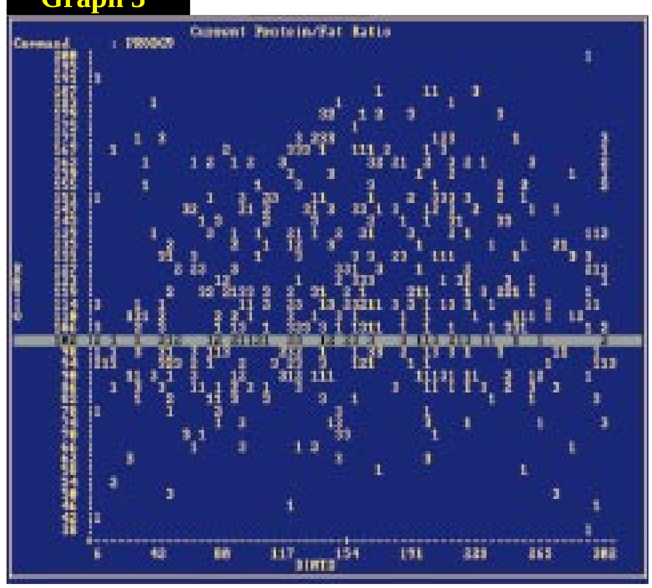
If the acidosis goes uncorrected, this dairyman could be dealing with a large number of lame and sick cows in another month or so. His impression at that time could mistakenly be that high production caused his problems when, actually, the problems resulted from acidosis.

As you can see, monitoring fat/protein ratios for individual cows can be very effective in preventing herd breakdowns. By providing your key herd advisors, such as your nutritionist and veterinarian, with the data to monitor, they can help fine-tune your operation and avoid problems.

The Monsanto commitment is to put the tools to do this monitoring in the hands of those that want it. If your nutritionist or veterinarian is interested in helping you monitor this type of data, and is looking for the appropriate tools, they are welcome to call their Monsanto representative to help them setup their system.

The next article will talk about using fat test data to monitor fresh cow energy problems.

Graph 3



Utilizing Milk Component Data

Part II - Butterfat's Relation to Transition Problems

Donald Niles, D.V.M.
Technical Service Specialist, Monsanto

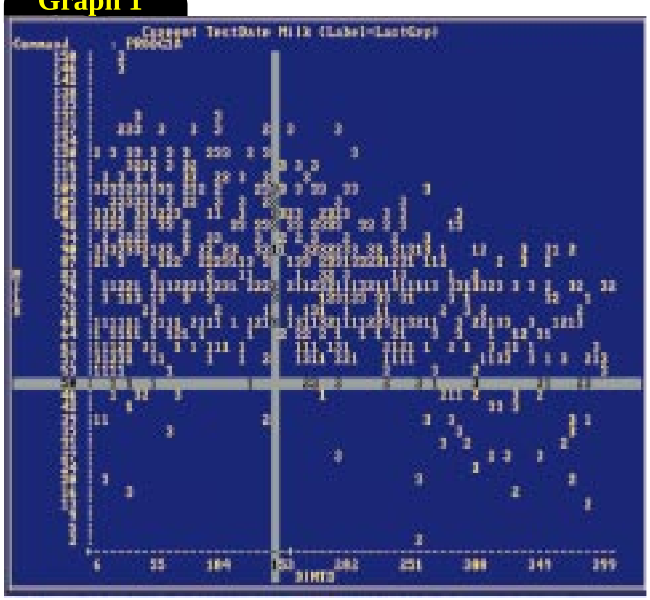
In the previous article, Dr. Niles stressed the importance of fat and protein ratios and how inversions (butterfat tests lower than protein tests) and the resulting acidosis negatively impacts dairy profitability. In this article, Dr. Niles examines the impact of high butterfat tests during the transition period.

In both articles, individual cow milk component data is stressed because the individual data allows for the analysis of patterns within the herd. Dr. Niles emphatically points out that individual cow data is absolutely necessary to recognize herd problems even though producers may not use the data for individual cow culling decisions. By analyzing the patterns in a dairy, conditions such as acidosis, fatty livers, and transition concerns can be identified before they become a greater management challenge.

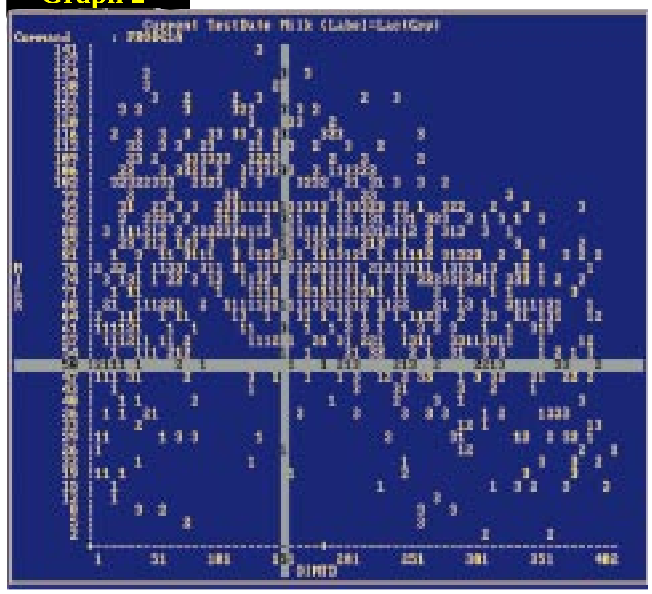
Anybody who works with dairy cattle understands the difficulties that can occur as a cow transitions from the late dry period to peak milk. These are the most dangerous times in a cow's life. Not only is she at risk for obstetrical problems, but this is the time when most metabolic problems, such as milk fever, displaced abomasums and ketosis occur.

We can easily see, on *Graphs 1 and 2*, how these problems affect production. On these two graphs, we see production data plotted for two herds. These graphs show a "snapshot look" of production on test day. On these graphs, pounds of milk on test day are plotted against days in milk on test day. Each data point represents one or more cows, with the digit indicating the animal's lactation number. As can be seen, both dairies have many fresh cows capable of producing over one hundred pounds at peak.

Graph 1



Graph 2



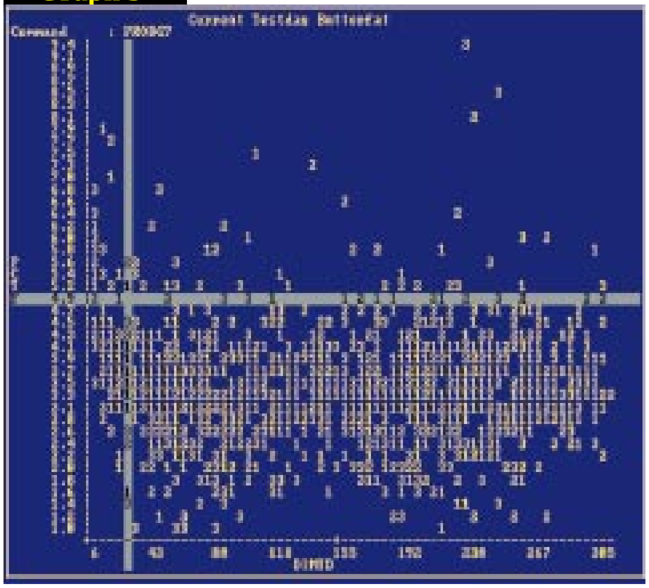
The differences lie in the area boxed off in the lower left-hand corner of the graph. These are cows producing less than fifty pounds when they are less than one hundred fifty days in milk. We refer to these cows as "falling through the cracks."

While both dairies have cows that peak well, there is a huge difference in the number that start out badly. In *Graph 1* the dairy has almost no cows in the box. The dairy featured in *Graph 2* has a very substantial number. From this, one can easily conclude that Dairy 2 does not need to spend money to increase peak milk. Rather, they need to find out why so many cows are starting out so poorly and develop plans to prevent these breakdowns.

One of the more common, and yet most frequently missed causes of these poor starts, are energy problems at transition. These lead to fatty livers, which can cause ketosis, displaced abomasums, uterine infections and even high death loss. Although the dairyman may be concerned with a "DA problem," the actual problem is an energy deficiency before freshening.

Fatty livers are caused by animals becoming energy deficient immediately prior to freshening. These do not need to be fat animals. If an animal – cow or heifer – is not consuming enough energy before freshening, she will mobilize excessive fat from her back. This tends to overload the liver with fat,

Graph 3



causing a fatty liver.

There are a number of things that can cause this pre-fresh energy deficiency. One cause would be a ration with insufficient starch. Other causes would be things that prevent cows from eating enough of a ration that was adequate in energy. This would include overcrowding the pre-fresh group, heifer versus cow competition, heat stress, and dirty water troughs, to name a few.

Although fatty livers can be difficult to diagnose while you are in the middle of the cow pen, your records will help show you what is going on. In particular, cows with fatty livers will tend to have very high fat tests for about the first twenty days in lactation.

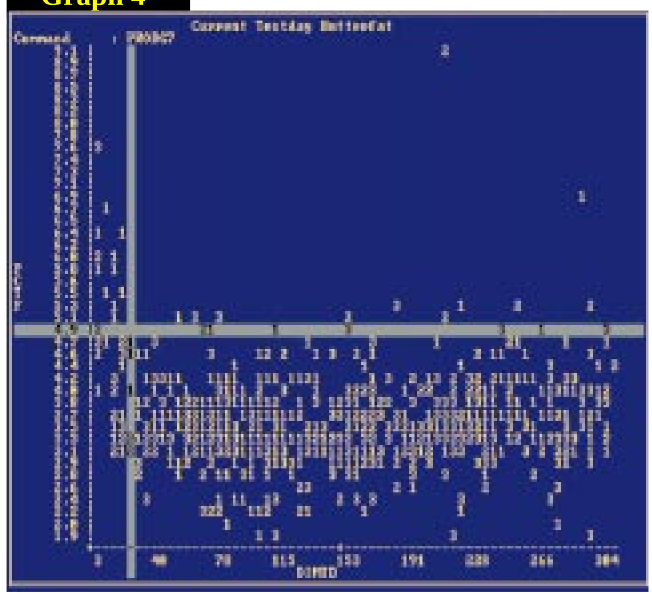
One can see this on *Graph 3,* where fat tests are plotted against days in milk on test day. We will pick a fat test of 5.0% as being abnormally high for a fresh Holstein. As can be observed, there are a large number of fresh cows over 5.0%. This is a herd that was experiencing many fresh cow problems. The records show that energy metabolism issues, prior to freshening, were a cause. Until the pre-fresh energy issues are resolved, the herd will continue to struggle with DAs, metritis, etc.

A slightly different pattern can be seen in *Graph 4*. Here, we once again have many high fat test animals helping us diagnose pre-fresh energy issues. In this case, however, most of the animals are first lactation, "1's." This helps us to focus on pre-fresh energy issues specific to the heifers. Generally, this pattern results from heifers unsuccessfully competing with adult cows in the pre-fresh pen, or heifers that are over conditioned from eating lactating cow sweepings. These over-conditioned heifers have lower dry matter intakes and more calving difficulties, which contribute to the energy deficiency problem.

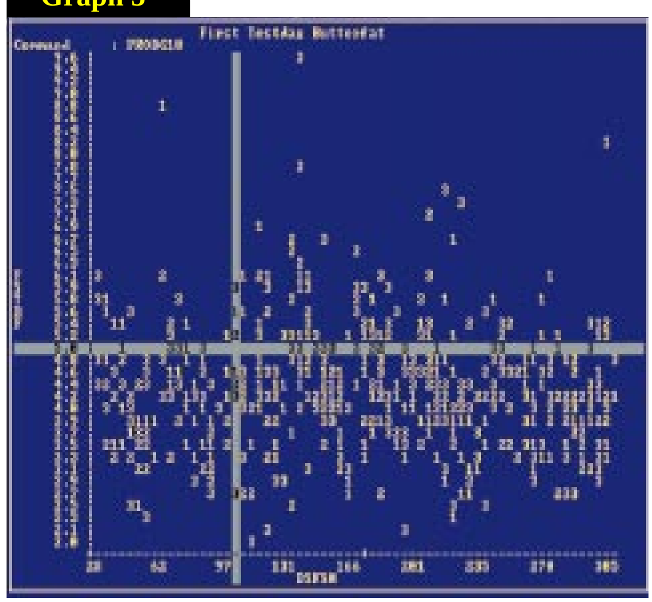
The last graph to review is *Graph 5*. This shows us a cow's *first* butterfat test, this lactation, plotted against her current days in milk. This shows us how the fresh cows have performed over time, for the past year. As can be seen in this herd, the cows have not been freshening with as many high fat tests in the last 100 days. Before that time, there seems to have been more of a problem. The challenge to the management team is to figure out what changed around that time to correct the energy problem.

As you can see, monitoring early fat tests for individual cows can be very effective in preventing herd breakdowns. By providing your key herd advisors, such as your nutritionist and veterinarian, with the data to monitor, they can help fine-tune your operation and avoid problems.

Graph 4



Graph 5



Analyzing Somatic Cell Counts

Isolating Problem Areas

Donald Niles, D.V.M.

Technical Service Specialist, Monsanto

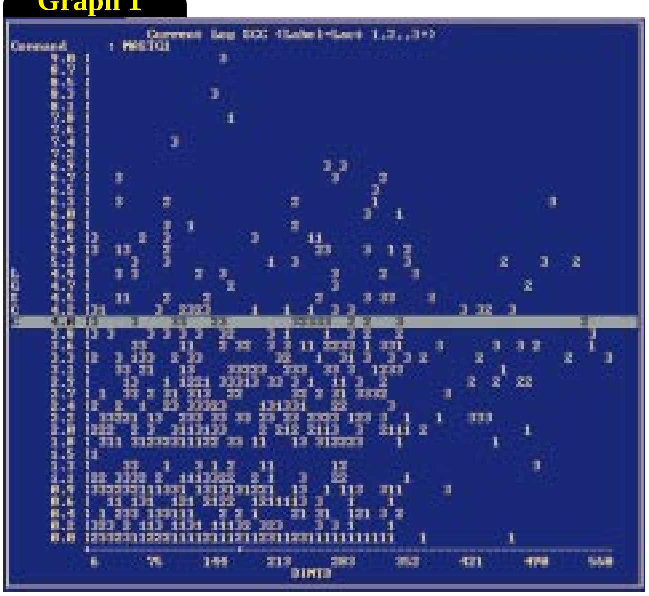
This is part of a series of articles looking at the ways that production records can be used to identify patterns of breakdown in dairy herds. This article will look at the use of somatic cell counts. As in the previous articles, this data can only be utilized with herds that test for individual animal components. Again, the approach here is to identify patterns, not necessarily identify individual animals.

In looking at somatic cell counts graphically, it is best to utilize the linear score, not the raw cell count. This gives a much more useful idea of the relative levels of problems. On this scale, the linear score is abbreviated as “LGSCC”. An LGSCC of “1” is equal to a somatic cell count of 25,000. For each increase of one LGSCC, the cell count doubles. For example, an LGSCC of ‘4’ equals a cell count of 200,000.

On *Graph 1*, the most recent test data for a 1,000-cow herd is seen. Each of the data points shows one or more animals. A “1” indicates a first calf heifer, a “2” is a second lactation animal and a “3” represents third lactation or above. This graph plots the LGSCC versus the days in milk on test day. In other words, this is a snapshot of the situation on test day.

A horizontal line has been drawn across this graph at an LGSCC of 4.0 (somatic cell count of 200,000). This is a level that is often picked to separate probable mastitis cows, which are above this level. Cows that are below this level are unlikely to have mastitis. In general, the herd shown on this graph has relatively few cows above 200,000. One can also see that there are relatively few animals with a high cell count early in lactation. A large cluster of high cell counts, early in lactation, would suggest problems, such as dry program issues, if the high cell counts are ‘2’s and ‘3’s. Heifer raising or procurement issues could be a concern if there are many high ‘1’s.

Graph 1



This same graph can also be utilized with different data labels. On *Graph 2*, the exact same data is seen as is presented on *Graph 1*. On *Graph 2*, however, the data points show an animal’s pen number, not her lactation group. For instance, a relatively large number of the high cell counts are seen to be in Pen 6. By looking at this graph, assessments can be made as to which categories of animals (by age, pen, etc.) are most impacted by udder health concerns.

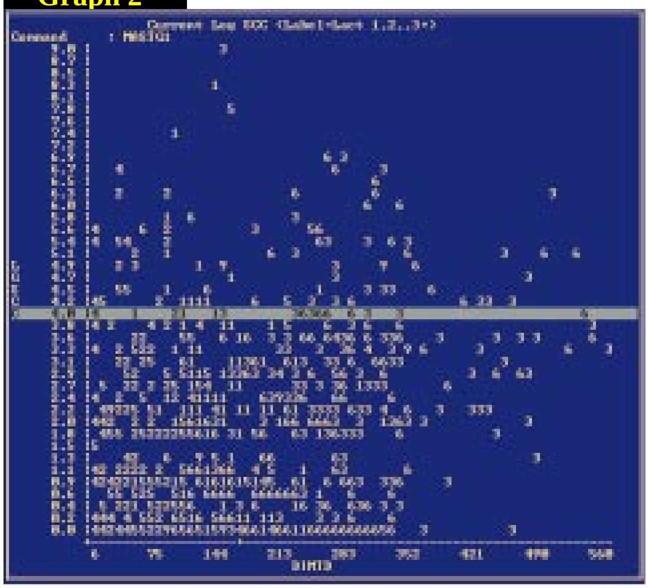
Assessments can also be made of how the situation has developed over time. In the case of somatic cells, it is often desirable to see whether problems come and go, or tend to linger. *Graph 3* is designed to show an animal’s current linear score on the present test (LGSCC) versus her previous linear score, on her previous test (PRVLG). This graph can then be broken down into different quadrants. Quadrant “A” contains cows that had a low cell count this month, as well as last month. Quadrant “B” shows animals that are low this month, but were high last month. These could be cures. Quadrant “C” shows animals that were high in the current month, but low the month before. These would likely be new infections. Finally, quadrant “D” shows animals that have been high for both of the last two tests. This quadrant tends to represent chronic cows.

Assessing patterns by this time/quadrant analysis can be useful when a dairy is concerned with measuring the impact of chronic problems, such as *Staph aureus*. This can also give an indication of whether problems are worsening or getting better.

Another common type of analysis shows how animals are starting out now compared to how other animals started out over the last year. *Graph 4* shows the LOG1, which is an animal's linear score on her first test of this lactation, versus her current number of days fresh. This gives an indication as to any increase or decrease in the number of animals freshening with mastitis over a year's time. *Graph 4* shows a dairy with more problem starts over two hundred days ago (to the right of the vertical line) than there have been in the last two hundred days (left of the line) .

Udder health problems can be very difficult to get under

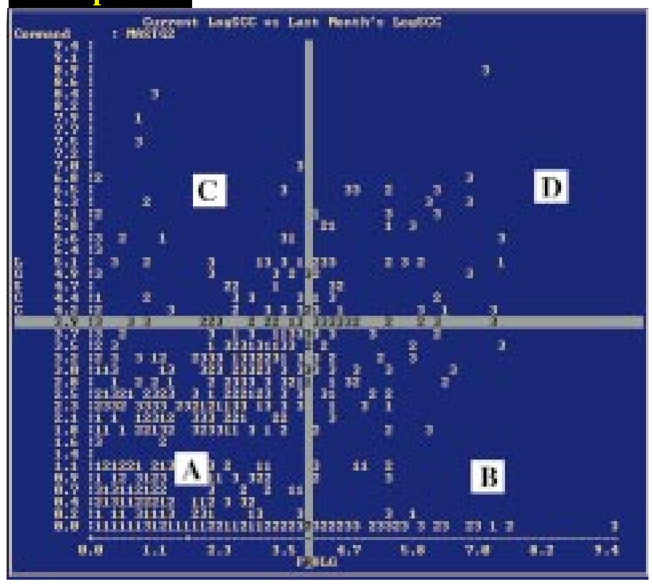
Graph 2



The linear score, also known as the log scale (LGSCC), is another method of recording somatic cell counts. Every time the somatic cell count doubles, the LGSCC increases by 1. Research indicates that, for values greater than 50,000, when the somatic cell count doubles there is a loss of 1.5 pounds of milk per cow per day (the loss for first lactation animals is half of this amount). A conversion chart for LGSCC and somatic cell counts is provided below.

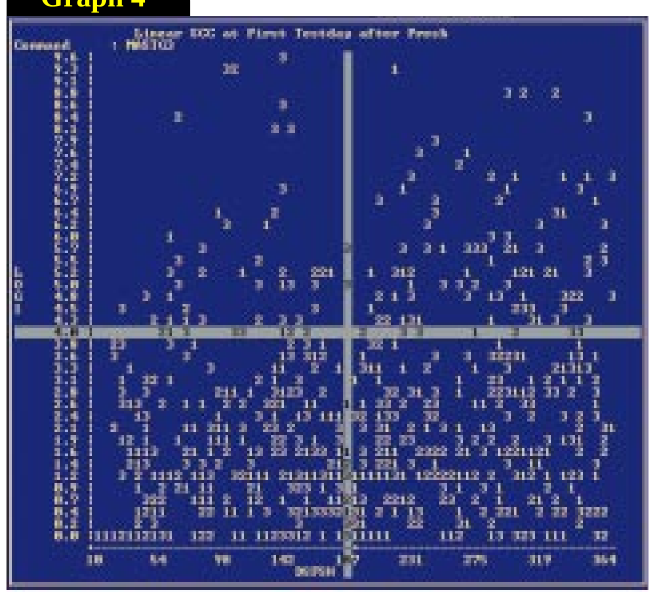
LGSCC	Somatic Cell Count (X 1000)
0	12
1	25
2	50
3	100
4	200
5	400
6	800
7	1600
8	3200
9	6400

Graph 3



control. By examining data for the patterns of somatic cell counts, a dairyman can isolate areas where problems occur. By better defining the problem, effective control can be more quickly achieved. In order to make these assessments, it is critical to have accurate, current, somatic cell count information. By collecting this on an on-going basis, the information will be available when problems occur.

Graph 4



Using Milk Production Records

Identifying Opportunities within the Herd

Donald Niles, D.V.M.
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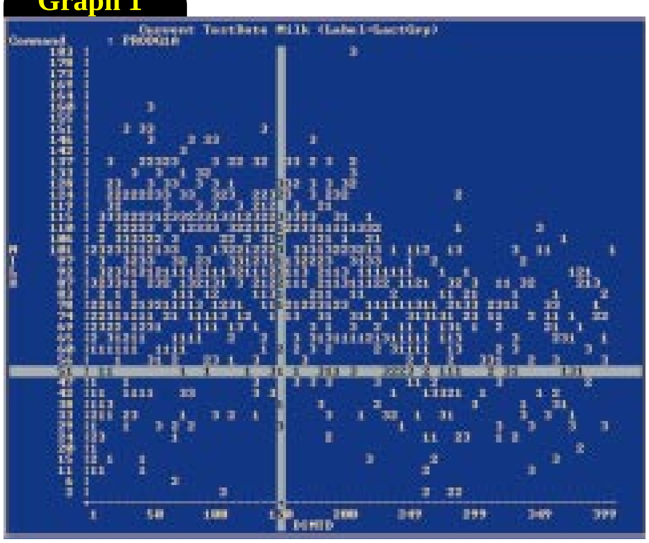
As the dairy industry evolves and progresses, it becomes increasingly clear that, in order to remain competitive, a dairy not only needs to be large, it also needs to be highly productive. This much seems obvious. However, many dairies are stymied and become frustrated on their way to higher production. One reason for this is that it can be difficult to identify which areas of the dairy management are most production limiting.

One of the fundamental misconceptions about high production is that cows are “pushed” to get them to higher production. In reality, a producer needs to create conditions that “allow” cows to achieve high production. If anything, this “pushes” the management on the dairy, not the cows. As an example, if cows are offered a “perfect” ration, yet are housed in uncomfortable conditions, they won’t get the full value of the ration.

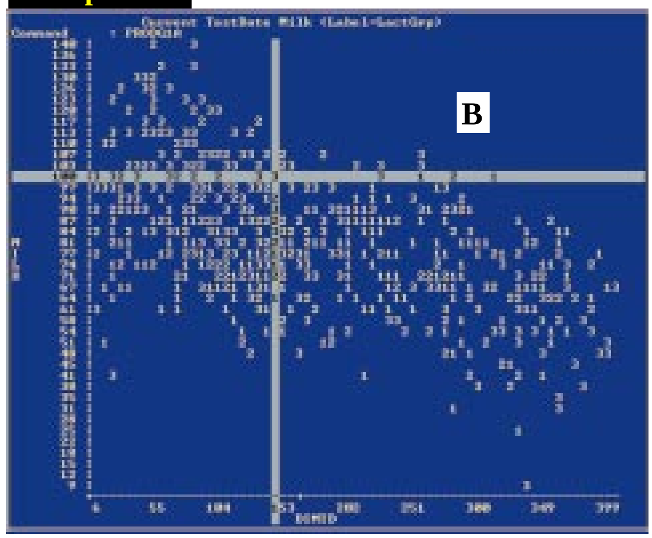
Graph 1 shows a scatter graph plot of a high producing herd (RHA = 26,200). This is essentially a snapshot of production on test day. Each of the data points represents one or more cows. The vertical axis shows the pounds of milk (MILK), and the horizontal axis shows the days in milk on test day (DIMTD). The digit indicates the lactation number, with “1” representing first lactation, “2” second lactation and “3” is third lactation or above. Although this is a high producing herd, there are still performance limiting issues that can be identified by the pattern of production.

One of the first things that can be seen on this graph is that the herd is very successful in achieving tremendous peaks. There are a large number of cows well above one hundred pounds of milk. Also, the herd is able to get cows up in their production level very quickly, as there are a number of very high cows even in the first thirty days of milk. Often, in a herd where cows remain in a conservatively balanced fresh group for too long, there will be no cows at a high production level until the time they leave that group.

Graph 1



Graph 2



Of some concern on this graph, is the area boxed off in the lower left-hand corner. These are cows that are producing less than fifty pounds of milk in their first one hundred fifty days of lactation. These animals are commonly referred to as “falling through the cracks.” It is interesting to note that the majority of the animals in this category are heifers. This gives a considerable amount of information as to what goes on in this herd.

One of the greatest production limiting bottlenecks on this dairy is problems with the fresh heifers. When the heifers are specifically the problem, as they are here, attention can be focused on that area. Do the heifers have to compete with prefresh adult cows? Are they overcrowded? Is the prefresh ration, fed to the heifers, unpalatable? Are the freshening heifers over-conditioned or experiencing calving difficulties?

Conclusions can also be made about factors that are not limiting production. Obviously, these heifers are not below fifty pounds because of genetic inadequacy. Any modern Holstein is genetically capable of producing over fifty pounds. Also, clearly, these animals are not being held back by the lactating ration, as that same ration is able to support the high peaks seen in the adult animals.

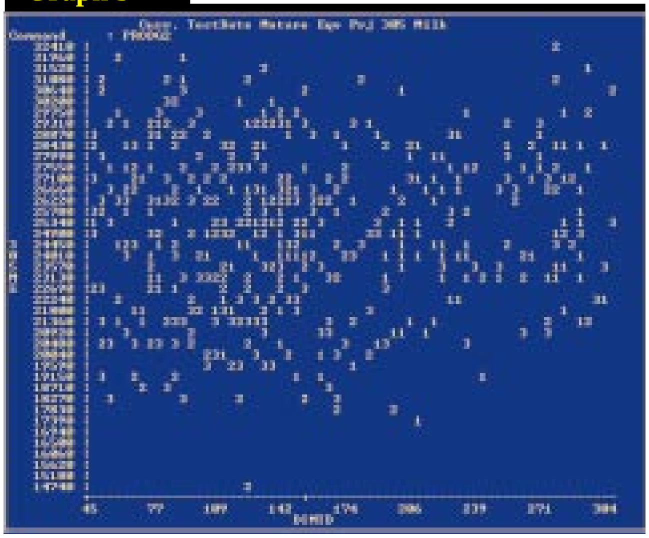
It is often very useful to print a list of the animals below fifty pounds in their first one hundred fifty days. By identifying common breakdowns such as foot problems, calving difficulties, ketosis, etc. one can formulate strategies to prevent them.

By identifying these production patterns, determinations can be made as to what areas need to be given more resources. Equally important, the same can be said for which areas do not need additional resources. In the case of *Graph 1*, the dairy needs to spend their energy on preventing poor starts, not necessarily increasing peaks. The key is to apply resources where they will have the greatest impact.

The final thing to look at on *Graph 1*, is the fact that there are a large number of animals maintaining very high production, late into lactation. On *Graph 2* we see a somewhat different situation. This is another very high producing dairy. This dairy has a completely different production pattern. As with the dairy in *Graph 1*, this dairy achieves excellent peaks. As the reader can also see, this dairy does a wonderful job of preventing poor starts, or having cows "fall through the cracks." There are virtually no cows below fifty pounds in the first one hundred fifty days in milk.

With this dairy, there is a problem area in quadrant "B." This area is boxed off to show animals above one hundred pounds, after one hundred fifty days in milk. In this herd, almost no cows fall into that category. There are two general things that could cause a herd to show this pattern. Either the cows are having a persistency problem and are dropping off too quickly in production, or the animals past one hundred fifty days in milk started out badly when they were fresh. This can be determined in two ways, by either looking at how cows are starting out now, compared to one hundred fifty days ago, or by watching this graph for a few months to see whether the pattern remains the same.

Graph 3

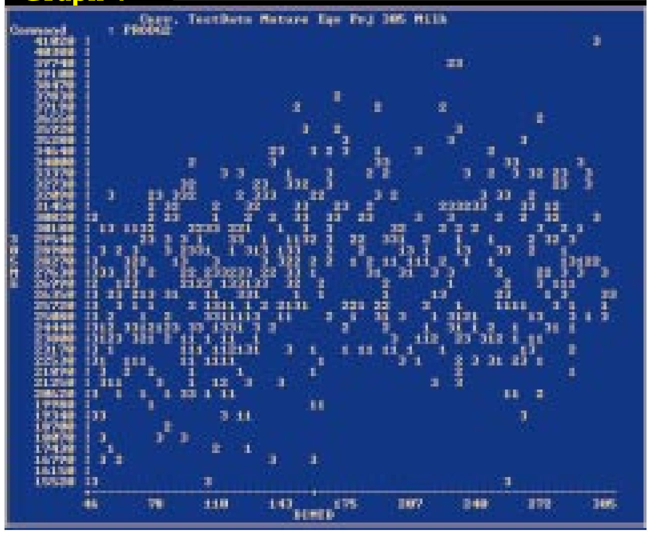


If the problem is persistency, the dairyman has several areas to concentrate on. Does anything change around this point in lactation? For instance, do cows move to a lower production ration group or a less comfortable group?

Another view that can be utilized is seen in *Graph 3*. The vertical axis shows the mature equivalent (305ME) of animals, plotted against days in milk on test day. This is an excellent way to compare heifers to adult cows. The value of looking at mature equivalents is that they allow one to compare the different age groups on an equal basis. In the case of this herd, the heifers are performing at a very comparable level, on a mature equivalent basis. In other words, nothing is happening to hold heifers back in relation to cows.

Graph 4, however, shows the opposite situation. Here, heifers are performing at a significantly lower level than cows, after the first two months or so of lactation. In a situation like this, it is necessary to identify what is holding heifers back relative to cows. It appears, from the first two months of lactation, that heifers are not starting out worse than cows. However, heifers tend to do worse than cows as lactation goes on. When this pattern is occurring, the dairyman should think in terms of what holds heifers back relative to cows. Possibilities here could include moving heifers to a less productive group at that time or moving heifers to groups where they have to compete with cows.

Graph 4



Another pattern that can be looked at is seen in *Graph 5*. The vertical axis shows an animal's 305ME, as calculated at her second test (2ndPJ), plotted against days in milk on test day. This shows how animals have been starting out in lactation throughout the past year. Once again, the data points represent lactation groups.

This herd shows a pattern of fewer second projections above 26,000 pounds six months prior. In this herd, the time of poorer starts corresponds with summer. This graph can be used to show one of the ways the dairy is impacted by heat stress. It can also help to give an idea as to the potential return of improved heat abatement practices. Once again, the key to this type of analysis is to determine where resources can be most cost-effectively applied.

In general, resources applied to a dairy, that result in improved performance, pay off. The challenge, therefore, is to avoid spending money on things that don't actually address the herd's limiting factors. By unlocking the performance bottlenecks, all the systems on the dairy can deliver maximal returns.

Graph 5