



# Milk Watch

*The latest information concerning Johne's and leukosis.*

Vol 4 Issue 2

## Leukosis: prevalence rates alarming, but manageable

Expanding the milk diagnostic platform, AntelBio began testing for bovine leukosis in June 2004. In the first four months of testing several interesting facts have emerged. First and foremost, dairy producers have shown more interest in leukosis than anticipated during the development of the milk ELISA. While interest was expected from producers that test specifically for the purpose of marketing animals, the majority opting to test are using the data for general improvement in herd health, productivity and longevity.

The neglect in addressing leukosis while the prevalence was minimal in the 1970's has led to an astronomical level in dairy herds today. It is not uncommon to find herds with prevalence rates as high as 80-90 percent, and finding herds that are entirely free of leukosis are few and far between. Many producers may be looking at their results and wondering if it is too late to control leukosis in their herds.

Although not as startling, a quick review of the data clearly shows that simply adjusting animal handling practices may reduce the lion's share of leukosis transmission. Leukosis is found more often in older milking animals than first-calf heifers, suggesting that transmission is occurring once young stock are commingled with the rest of the herd. Focusing on questionable practices when handling the adult animals should result in the gradual and continual decline in the prevalence of leukosis.

### No effective cure or vaccine

Leukosis in cattle is a viral infection with no effective cure or vaccine. Infection can occur at any age and persists for the remainder of the animal's life. Transmission occurs by the transfer of bodily fluids that contain infected white blood cells (blood, colostrum, milk, tissue exudates) to uninfected animals or fetuses. Given the mode of transmission and the multitude of shared equipment on any given dairy, countless mechanisms can be imagined that transmit leukosis.

Leukosis is widely prevalent, however clinical cases, which are associated with the majority of perceived health and productivity losses, are relatively rare. Many producers become aware of leukosis as a result of a condemned cull cow for lymphosarcoma, or malignant lymphatic tissue. In addition to this postmortem observation, clinical states observed prior to slaughter include enlargement of various lymph glands, congestive heart disease and paresis (downer cows).

The humoral response (antibody) to leukosis infection is rapid, substantial, persistent and easily detectable by ELISA in blood or milk samples. These factors make testing an invaluable component of eradication programs. In fact, many countries have official leukosis eradication programs and will not import animals unless tested free of leukosis. Therefore, AI organizations and breed associations are sensitized to the presence of leukosis because of lost marketing opportunities. Other economic losses related to slaughter values, culling rates and reproductive performance are perceived to be minor owing to the infrequent progression of subclinical leukosis into clinical cases. Its overall significance must be measured relative to the magnitude of other economic factors, but mere prevalence alone warrants some consideration of leukosis when updating herd management programs.

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## Who is testing for leukosis?

*85 percent of the leukosis testing conducted to date has come from herds that have little interest in directly marketing genetics.*

Export requirements for testing and relatively low production-related costs figured into our expectation that mainly purebred and registered breeding operations would elect to test for leukosis. Many countries require at least one or sometimes multiple negative serological tests on imported animals, while some require varying levels of herd certification. Animals and herds that test positive for leukosis are not necessarily excluded from the breeding industry, but their marketing opportunities are limited to domestic markets or countries with fewer restrictions. If things were as we expected, the establishment and maintenance of leukosis-free breeding programs to improve market accessibility should have been the predominant driver for leukosis testing.

Contrary to these expectations, 85 percent of the leukosis testing conducted to date has come from herds that have little interest in directly marketing genetics. Whether testing whole herds, late lactation animals (dry off) or individual cows, producers are looking at leukosis as another disease that can affect the net performance of their operation. Sure, only a small percentage of animals with leukosis become clinical, but with 200 head and a 70 percent prevalence rate, at any given time, about seven animals will exhibit the adverse effects of clinical leukosis. With these numbers, more producers than ever before are probably experiencing clinical leukosis and are now seeking to determine the full extent of the problem. Once the magnitude of the disease is determined, the test data are primarily used to manage animal procedures around calving and breeding. Knowing the leukosis status of a cow simply eliminates one of the many uncertainties regarding her future potential on the operation.

Not only has the profile of those testing for leukosis been surprising, but the actual volume of leukosis testing has surpassed initial expectations based on previous market surveys. An overwhelming majority of leukosis tests have been conducted on DHI milk samples. Since the prevalence of leukosis did not escalate overnight, it can be assumed that the convenience and cost effectiveness of testing DHI milk samples eliminated some of the reluctance to test in the past. Today, screening for leukosis is as simple as handing your DHI technician the list of animals you choose to test.

## How much leukosis is out there?

*Escalation of leukosis continues to this day and a national prevalence rate greater than 60 percent should be expected in future surveillance studies.*

So, you have tested your herd and found 50 percent of your animals are infected with leukosis. Most producers will look at these numbers and cringe as though they should be banished from the industry for lack of biosecurity. On the contrary, 50 percent puts your herd in pretty good company.

The number of individual cows with leukosis is astonishing. The prevalence of leukosis in U.S. dairy cattle increased steadily from 10 percent in 1975 to 43 percent in 1997 (NAHMS 1997). Upon review of the milk test data obtained thus far, the escalation of leukosis continues to this day and a national prevalence rate greater than 60 percent should be expected in future surveillance studies.

The number of dairy herds with leukosis is also remarkable. The NAHMS 1997 survey found nearly 90 percent of the U.S. dairies had serological evidence of leukosis infection with no specific geographical association or predisposition. AntelBio's testing results would concur. Since AntelBio began testing milk samples for leukosis, only two herds (<5%) have been found free of antibody titers.

Put into perspective, any herd that has purchased animals of unknown status in the last 10 years is virtually assured of harboring leukosis. How much depends on the numbers purchased and the animal handling procedures employed on the dairy.

## How is leukosis spreading?

*Horizontal transmission (cow to cow) can be readily controlled by changing animal handling procedures.*

Figure 1 depicts the results of a leukosis test for a 235 cow dairy on DHI test. Each individual point represents the antibody levels (ELISA score) found in the milk sample of one cow (animal ID) graphed in ascending order. Older animals are therefore represented on the left side of the graph while first-calf heifers are represented on the far right side of the graph.

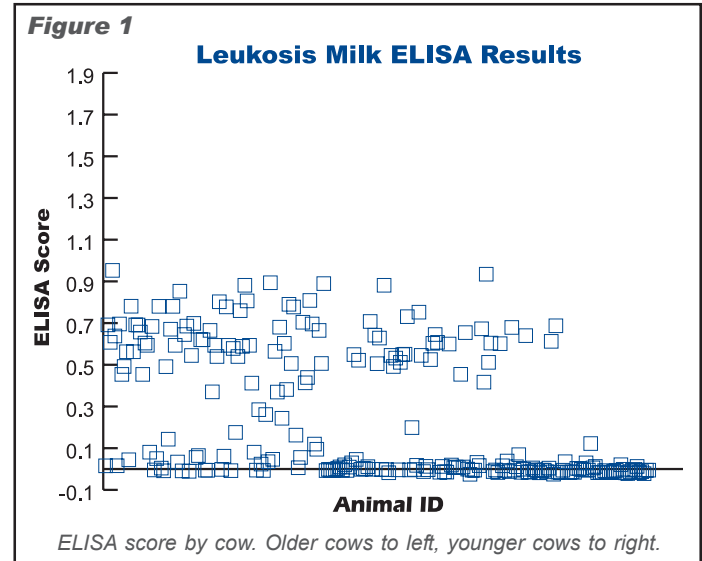
The graph clearly shows the proportion of positive milk antibody levels is high in older cows and gradually declines to zero in the most recent

additions. In this herd, since replacements coming into milk are essentially free of leukosis, vertical transmission (dam to daughter) can be eliminated as a major route of infection. This scenario is consistent with neonatal management playing a minor role in the transmission of leukosis, except for the case of feeding waste milk where a larger proportion of replacements would be expected to show measurable antibody levels. Physical separation, particularly when raising replacements, is also an effective means of limiting transmission.

Once introduced into the milking string however, the probability of becoming infected increases dramatically. A detailed review of typical health history records reveal that cows are tagged, tattooed, injected, sleeved, trimmed, gouged and treated over 250 times in an average lifetime, and all of these procedures are usually timed to take advantage of the efficiencies gained with group management. Unlike vertical transmission, horizontal transmission (cow to cow) can be readily controlled by changing animal handling procedures such as switching to single-use devices and/or disinfection between procedures.

Contact transmission, as a result of close confinement, was considered to be of minor importance when prevalence was low. However, with the levels seen today, transmission during close contact becomes significant. The risk of infection increases nearly seven times for heifers housed in pens with 50-70 percent infection compared to those housed in pens with 10-30 percent infection. For stringent leukosis eradication programs in high prevalence herds, physical separation of positive and negative animals is warranted.

Successful eradication can be accomplished by correcting all of the questionable management procedures associated with leukosis transmission. In most cases however, the cost of implementing *all* of these procedural changes simultaneously would exceed the economic benefits gained through eradicating leukosis. By evaluating the herd as a whole, it may be possible to determine which of the many avenues of infection might be the root cause of the high prevalence of leukosis in any given herd.





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Since measurable antibody levels can be detected quickly after infection, frequent testing and associating new positive cows with recent husbandry procedures will pinpoint the problematic procedures. For example, if negative cows are tested a month after a herd vaccination program and a significant number turn positive, it is likely that contaminated needles or vaccines are a major source of new infections. Through this process, new infections are linked with management practices by focusing on the patterns in test results from a group rather than just the status of individual cows.

## The reality of leukosis

*Control and eradication programs are feasible because testing can accurately differentiate positive and negative cows, and can pinpoint the most probable routes of transmission.*

The prevalence of leukosis, rather than the effects of the disease itself, will continue to be a concern of U.S. dairy producers. High prevalence rates make rare occurrences (such as clinical leukosis, contact transmission and neonatal infection) more frequent and each of these instances bring about losses in productivity and profitability. If you choose, control and eradication programs are feasible because testing is not only able to accurately differentiate positive and negative cows, but, when structured correctly, is able to pinpoint the most probable routes of transmission. Identifying and implementing key corrective procedures should rapidly result in the decline of new leukosis infections.

For more information on leukosis, or assistance with establishing a leukosis control or eradication program, call 1.800.631.3510.