Analytical Method to Manage Bovine Respiratory Disease

September 2005

Bovine Respiratory Disease (BRD) complex is the most important problem affecting the feedlot industry.[1] More beef cattle develop and subsequently die from BRD than any other cause, costing the cattle industry over one billion dollars annually.[2] The 1999 NAHMS survey shows that deaths related to BRD in feedlots increased from 52% to 67% of total feedlot death loss between 1994 and 2003, an increase of 29%.

29% increase in feedlot death loss between 1994 and 2003 due to BRD

Despite changing cattle management strategies, including antibiotics and vaccination, BRD remains a serious and increasing problem[3]. Animal Profiling International's new Animal Performance Index gives feedlots the ability to identify cattle within 48-hours after arrival that are high-risk candidates to get BRD in the first 45-days on feed. This information will ultimately reduce death loss and treatment costs while increasing animal performance and carcass quality. Identifying low-risk animals is a major benefit for operations that are targeting, or planning to target, animals for "natural" programs.

BRD -- Causes & Costs

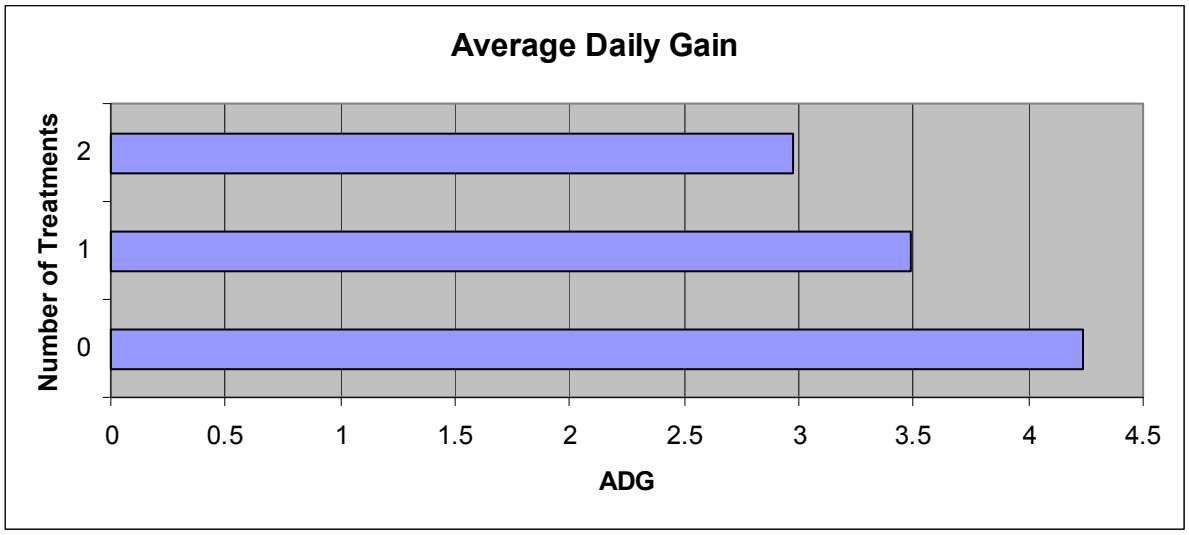
"Bovine respiratory disease complex, also known as shipping fever, is aptly called a 'complex' because of the involvement of environmental, viral, and bacterial factors."[4] "When a calf is stressed its body reacts by secreting hormones that positively and negatively affect bodily functions. On the negative side, stress causes the entire body to be more prone to infection. This occurs by allowing disease-causing organisms easier routes of entry and disarming some of the body's important defense mechanisms against disease. The first step toward respiratory disease occurs following a stressful event".[1] Stressful events include shipping, weaning, dietary changes and changes in weather. An analytical method using blood biomarkers to determine which cattle are most susceptible to BRD will have a significant benefit to the cattle industry by giving the rancher data necessary to best manage the herd.

API has an analytical method using blood biomarkers that determines which cattle are most susceptible to BRD

When estimating the cost of disease, most cattle producers focus only on death loss and treatment costs. Other factors should include reduction in average daily weight gain and poor feed efficiency. Carcasses from cattle that have had disease also tend to have lower quality grades and are less tender.

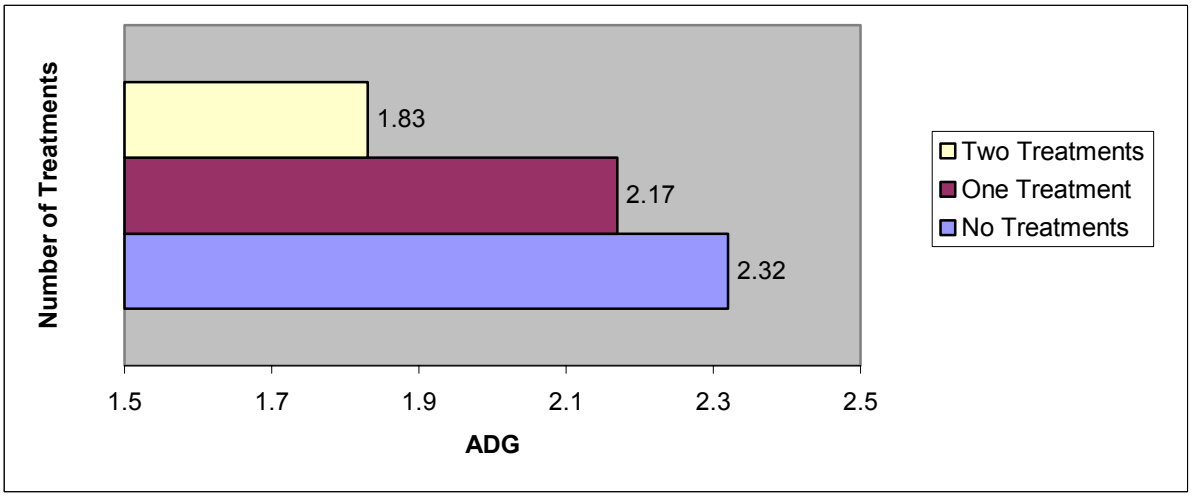
The effect of disease on average daily gain is substantial. API showed in a study conducted in 2004 that cattle that were not treated with antibiotics gained as much as 42% better than treated animals. (See Figure 1)

Figure 1



In another feedlot study conducted in Oklahoma in 2001, healthy calves gained 2.32 lb/day during a 42-day trial, while those treated once for BRD gained 2.17 lb/day. Those treated twice for BRD gained only 1.83 lb./day. (See Figure 2)

Figure 2



Such losses for cattlemen mount as the cattle get closer to harvest. A 2001 Texas A&M Ranch-to-Rail Study points out that non-treated steers returned an average of $151.18 more per head more than steers that required treatment for BRD.

Non-treated steers returned an average of $151.18 more per head

Numbers generated by Iowa State University in 2004 found that in 6618 calves fed in eight Iowa feedlots, animals that did not require health treatments had an average daily gain 6.2% greater than animals that required two or more treatments. In addition, the carcass quality of cattle untreated for BRD were 18.3% more likely to grade choice or higher than animals treated twice. [8]

The costs associated with cattle death loss, treatment, and carcass value have a substantial effect on the cattle industry's bottom line. "Steers that [get] sick not only incur additional medicine costs, but they also generally gain less, are less efficient and grade lower."[5]

Current Methods of Identifying Sick Animals

Currently, sick cattle are identified using a subjective process. The age-old method is to use experienced cowboys (pen riders) to identify and pull sick cattle and place them in a hospital area for treatment. The feedlot is dependent on the pen riders' ability to accurately select sick cattle before the disease process negatively affects the animal. It should be noted that pen riders are in short supply and training of inexperienced riders is costly. Under current conditions it is not uncommon for a cowboy to observe 8,000 head per day. With so many animals to monitor, accurately assessing the health of every animal is difficult.

Complementing the subjective judgment of the pen riders with an analytical method to measure disease susceptibility of cattle will help cowboys make faster and more accurate diagnoses

How do pen riders select cattle that show early signs of disease? Cowboys look for cattle that "look depressed". Indicators of depression might include standing alone at the back of the pen, holding its head down, and slowness moving or getting up. Symptoms of progression of BRD in cattle include thick nasal discharge, elevated temperature, difficulty breathing, discharge from eyes, red, peeling muzzle, and poor appetite.

Complementing the subjective judgment of the pen riders with an analytical method to measure disease susceptibility of their cattle will help cowboys identify high-risk cattle earlier. An analytical method that indicates the susceptibility to BRD in cattle will capture more revenue for the feedlot and the industry as a whole.

Profiling Susceptibility to BRD

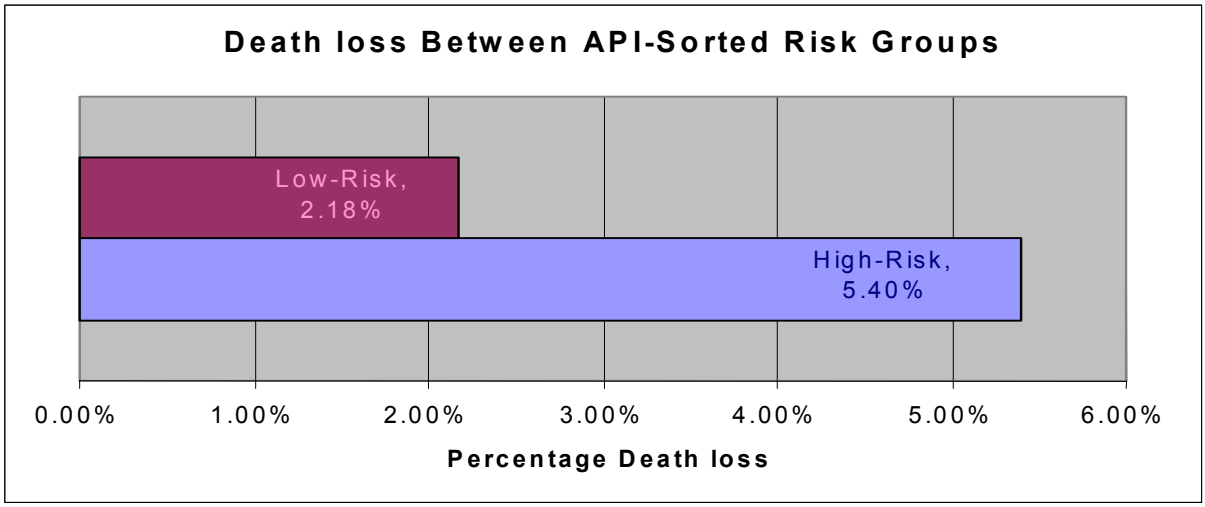
Animal Profiling International has developed an analytical tool that profiles an animal's susceptibility to disease. Studies in humans have linked oxidative stress to weakness of the immune system, cardiac disease and inflammation. BRD, like all infectious diseases has an inflammatory component. This analytical tool measures oxidative stress that correlates BRD risk. This proprietary algorithm assigns each animal an Animal Performance Index value that is used to evaluate and manage cattle.

Animal Profiling International has bled over 7000 head of cattle in different environments all over the country. The company has used these studies to design and validate its performance index.

Animal Performance Index is correlated to pull rates, total number of treatments, respiratory death loss, daily gain, and carcass weight.[1]

Data compiled from three different studies of high-risk beef cattle showed significant correlations between biomarkers and pull rates, total number of treatments, respiratory death loss (See Figure 3), daily gain, and carcass weight.[6]

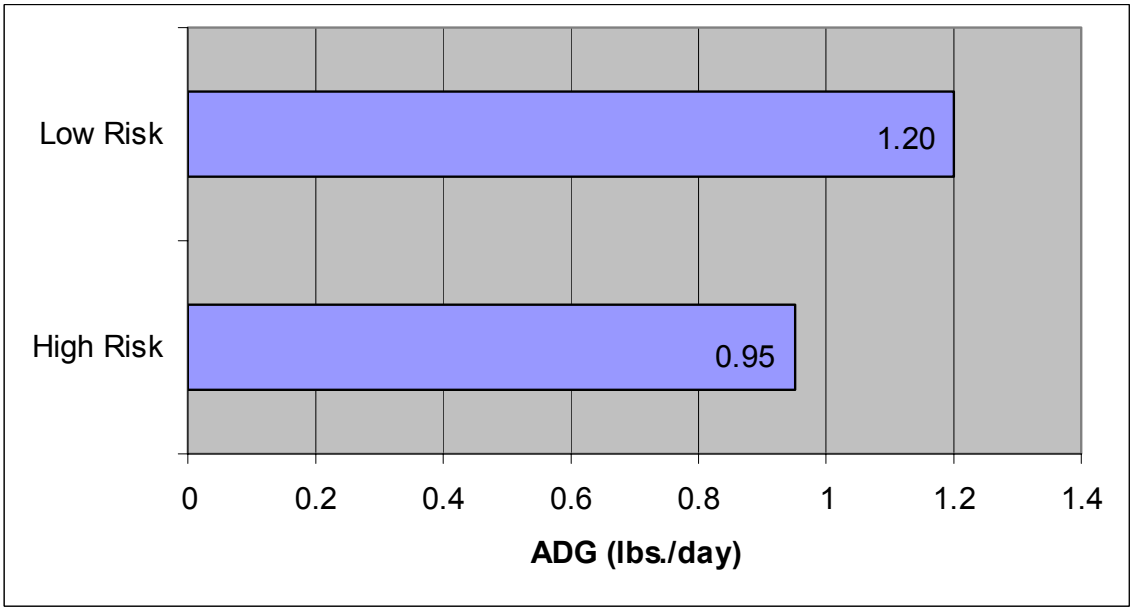
Figure 3



Note: n=2112, 50% in each group

A study completed in March 2004 evaluating risk based on the performance index revealed differences in performance between the high and low-risk group (see Figure 4)[7]. Over the 60-day study period, difference in Average Daily Gain (ADG) between two groups sorted was .25 pounds per day for the period. Using a $1.20 per pound estimated value, this equates to an $18 per head advantage for the low-risk group.

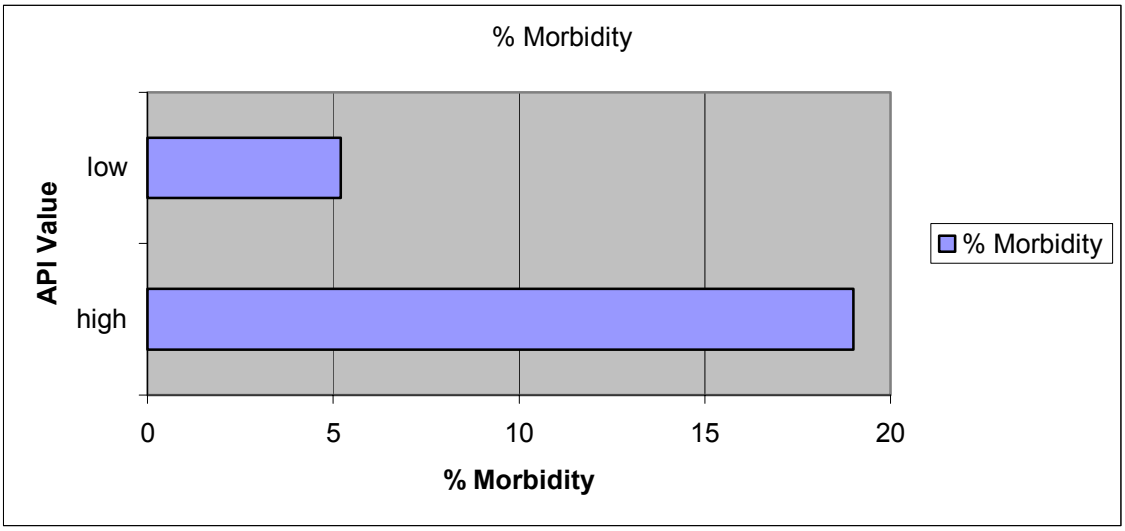
Figure 4



$18 per head advantage of the low-risk group

In a similar study completed in April 2005 we found that the sorted API groups had differences in morbidity (See Figure 5)

Figure 5



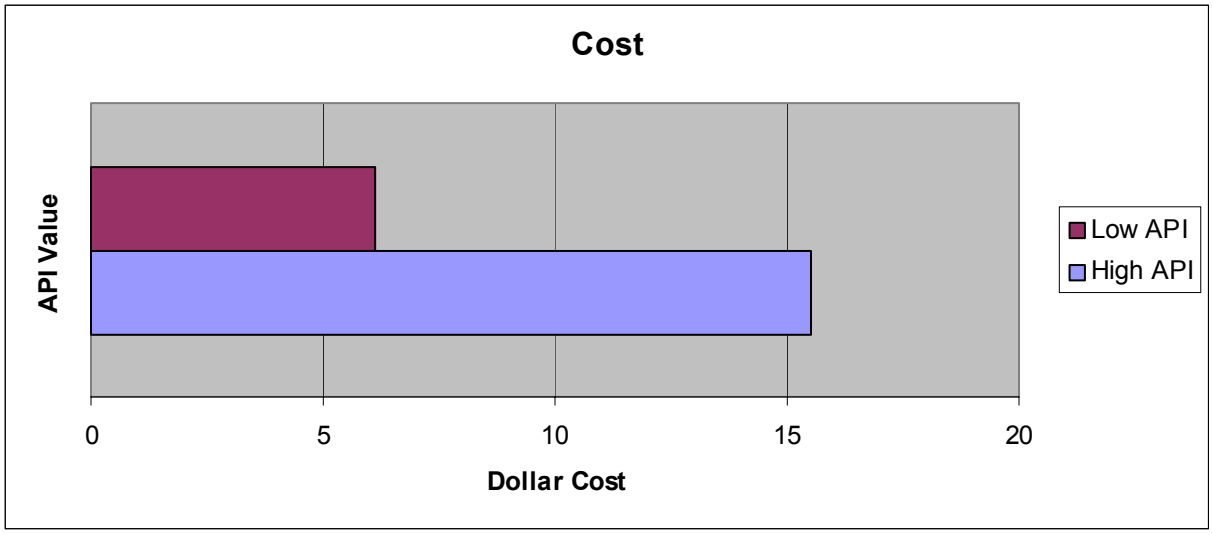
Animals testing with high performance index values were 265% more likely to become sick

The results of such studies indicate that the high correlation of the profiling data can be of significant value in identifying high-risk animals for managing disease, ultimately enhancing profitability in the cattle industry.

How to Use Cattle Profiling

Cattle profiling provides feedlots with a new management tool to detect susceptibility to disease in cattle at an early stage. This technology offers feedlots a "management over medicine" technique for increasing profitability within the industry. While each feedlot will determine how to best use profiling in their operation, the following are possible applications.

Figure 6



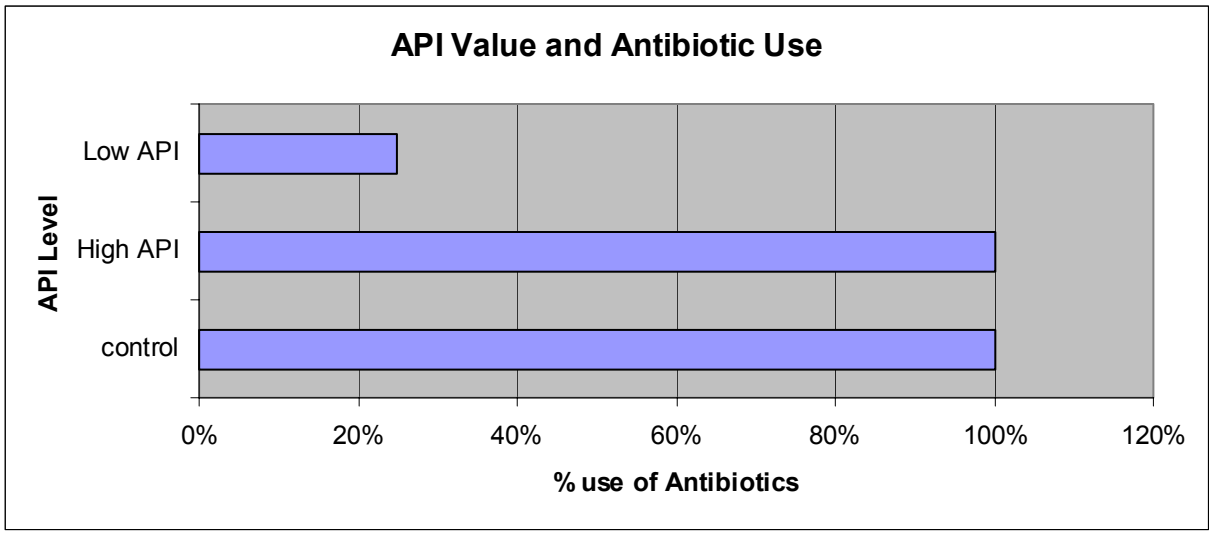
In a feedlot study conducted in Idaho with high-risk cattle, antibiotic usage was reduced when cattle with a low Animal Performance Index were not treated metaphylactically. The result was a $9.39 reduction in medicine costs per animal.[9]

By using the Animal Performance Index, cattle can systematically be sorted into risk groups of expected morbidity to better manage labor and input costs.

By only administering antibiotics to high-risk animals, feedlots will cut down on metaphylactic costs.

Low-risk cattle will likely need fewer antibiotics and attention before closeout. By only administering antibiotics to high-risk animals, feedlots will cut down on metaphylactic costs. Since the low-risk animals are not being given antibiotics, they can remain in natural beef or antibiotic-free programs where there is a substantial mark-up at closeout.

Figure 7



The performance index can also be used to select which calves are ready to be shipped to feedlots and those that need more time to develop before being shipped in order to avoid disease and even death.

Summary

Bovine respiratory disease remains one of the biggest drains on profits within the cattle industry. Animal Profiling International's new Animal Performance Index program provides a "management over medicine" technique for increasing profitability industry-wide. The program provides a quantitative way of evaluating animal health to complement the subjective approach currently used in the industry.

Some of the basic benefits from the use of this quantitative system range from cattlemen saving money by only administering antibiotics to high-risk animals. Consumers who have become increasingly concerned with antibiotics used in the food supply chain will have a product to meet their needs as API can help cattlemen provide their customers with antibiotic-free products. From the grocer endpoint the margins on these products are very high.
Animal Profiling International is committed to further research to improve and broaden the scope of the program. As the cattle industry adopts the program, new approaches to using API's Profiling Program will continue to evolve.

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For questions please call: Bruce Hoffman, D.V.M. at (406) 282-7414 or bwh@animalprofiling.com

Animal Profiling International, with offices in Portland, Oregon, and Manhattan, Montana focuses on developing technologies and products to Enhance animal management techniques. We conduct testing and research & development activities in our fully equipped laboratory in Seattle, Washington For additional information about the company, visit our Web site, www.animalprofiling.com or call. (406) 282-7414

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[1] Dr. David Bechtol's "Cattle Disease Guide". Interactive Edition. Copyright 2001.
[2] Drover's, 9/1/1999
[3] Loneragan et al.JAVMA, 2001;219:1122-7(1994-1999) and Dargatz (USDA:APHIS:VS:CEAH; 2000-2003)
[4] Howard D.V.M., M.S., Jimmy L. & Smith D.V.M., M.S., Robert. "Current Veterinary Therapy Food and Animal Practice", 4th Edition. Copyright W.B. Saunders Company, 1999. pg 446.
[5] "2000-2001 Texas A&M Ranch to Rail—North/South Summary Report"
[6] All P values <.1, Analysis performed by Dr. Guy Loneragan at West Texas A&M
[7] Data taken from API-6 (internal back-grounding study)
[8] Iowa State University 2004 Animal Industry Rpt. R1885
[9] Data taken from API-8 (Idaho feedlot study)