

# GIVE HIGH-RISK CALVES A FIGHTING CHANCE

Every year some 28 million head of calves from the annual U.S. calf crop leave the farm or ranch and move into the next production phase. Our production system requires that, eventually, cattle move by truck from their respective cow-calf system origin to the next production segment. For most of these calves that first “road trip” comes shortly after weaning.

Increasing numbers of these weaned calves are preconditioned or back-grounded at their origin due to the performance advantages and subsequent health benefits for them as they proceed through the value chain. These calves are marketed with a measurable degree of added value. However, there are still literally millions of calves that are not preconditioned in any way. For many of these calves the weaning process begins with a ride in a stock trailer to the local auction market and ends shortly after it quits bawling at the next production phase.

Calves that go through the “weaned on a trailer” process are considered high risk. That risk comes in varying degrees depending on how the calf was handled prior to this less-than-desirable weaning experience. One of the major factors that impact risk is weight. Lightweight calves are higher risk than heavier ones, which is primarily a function of age. Generally these are calves either born late in the calving season, or are early-weaned often as a result of drought or poor forage conditions and thus are at greater risk for health problems.

Management practices prior to weaning contribute significantly to the high-risk calf designation. Cowherd

nutrition impacts the a calf’s future health status. For example, a 1999 Texas A&M Ranch-to-Rail study indicated calves from cowherds on mineral programs tend to have fewer health problems in the feedyard than calves from cowherds not on mineral.

Pre-weaning vaccination programs are critical to the future health of calves. Inadequate vaccination programs contribute to an insufficient immunological response to impending pathogen exposure. Calves not inoculated for the various

respiratory and clostridial pathogens prior to weaning are at greater risk of health issues post-weaning. Calves not dehorned or castrated prior to weaning experience greater stress when these management practices must be applied post-weaning, thus inhibiting immune response and furthering the “high-risk” classification.

The poster child for a high-risk calf is one that is weaned at an early age, thus lightweight, from a herd in suboptimal nutrition status (mineral), and has never been vaccinated, dehorned or castrated. Taking this calf to an auction market the day it is weaned is setting the stage for a very difficult transition from calf to yearling.

The marketing system challenges calves already suffering from the separation anxiety of weaning further through exposure to new pathogens, sub-optimal nutrition during transi-

tion and stress from transportation and social reordering. As a result, we tend to see more health-related issues with these calves than lower-risk cattle. Consequently, there are significantly higher rates of morbidity and mortality associated with high-risk calves.

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Danny Glasgow, manager of Crow Hollow Feed Yard, a 30,000-head finishing yard near Hedley, Texas, said, “Typically we receive, on a yearly basis, probably 20,000 of these high-risk cattle. The majority of them come out of the South and the

Southeast and the East and they are extremely health challenged. Our typical pull rate within the first 30 days could be up higher than 50 percent at times. Our death loss after 45 days on average probably will run 8-12 percent.” (*The Cattle Show*, Aug. 2007)

John Bezner and his family operation in Dalhart, Texas, starts over 10,000 head of high-risk calves a year. They source calves from many different regions of the country, many of them weigh between 300 to 350 lbs., and Bezner concurs with Glasgow. “They are all a challenge, but the three-weight, naïve calf is especially problematic. In our projections we figure a 65 percent pull rate on these high-risk calves,” Bezner said, “the majority of which is respiratory.” (*The Cattle Show*, Aug. 2007)

The direct cost associated with treatment of a sick calf is quite high. “Every →

time you pull one out of the pen it's going to cost you \$30," Bezner said.

They use this \$30-per-head treatment cost figure in their breakeven calculations. With the antibiotic costing \$20 per treatment and time, labor and associated cost, that \$30 figure is a reasonable estimate. And it does not take into account the indirect costs of reduced performance and feed conversion. Obviously treatment cost is one that we need to reduce as much as possible.

Consequently, cattle that are lightweight and historically come from a high-stress environment can sell at substantial discounts compared to low-risk calves of a similar type. When you consider the associated cost of higher morbidity and mortality to the production system for high-risk calves, these discounts come as no surprise.

Applying these costs to the price of the cattle is the first step in addressing the value of these high-risk calves. A hundred calves that weigh 400 lbs., resulting in 65 percent morbidity and requiring one treatment – many of them might require two treatments – will cost the producer \$19.50 per head across all 100 head. That is a per hundredweight discount of \$4.88. If the buyer predicts that two treatments are likely required for half of the original 65 percent, then that is an additional \$2.44, making the morbidity discount a total of \$7.32 per cwt.

If the estimated mortality rate is 10 percent, that further adds to the discounts in determining value. Let's assume that the price for a 400-lb. calf is \$140/cwt. Losing 10 calves out of 100 costs a total of \$5,600 or \$56 per head. That adds to the discount by another \$14 per cwt.

If you further consider the transportation (\$25 per head) and initial processing (\$10 per head) costs on the 10 percent lost, the

discount increases another \$3.50 per head, or 88¢. If you own the calves for 180 days, then the interest on the purchase price of the lost calves at 8 percent interest is another 55¢ per cwt.

Totaling the discounts looks like this:

Morbidity	\$7.32/cwt
Mortality	\$14.00/cwt
T & P	\$.88/cwt
Interest	\$.55/cwt
<b>Total</b>	<b>\$22.75/cwt</b>

Needless to say, there is tremendous economic value to the industry in impacting the health of these high-risk calves. It is obvious that treatment is not the answer since these calves are being treated with the best technology we have and still incurring the discounts. Not surprisingly, the answer is in prevention.

### APPROACHING THE PROBLEM

Dr. L.D. Barker of Professional Animal Health Center based in Newcastle, Okla., has been in practice for 42 years, working with producers in every production segment of the beef value chain.

"A lot of these younger, lighter cattle are more susceptible to immunological challenges," Dr. Barker said. He recommends a preventive program approach that is analogous to a three-legged stool (i.e. nutrition, management and health). If one of the legs of the stool is weak or missing, it tips over and your health problems increase.

Another way to think about the three-pronged approach is in terms of a pyramid. We start with the most important part of the pyramid, the foundation on which the remaining components reside.

That foundation is nutrition and it must be established as early as possible after the cattle arrive. Often the trace mineral status of high-risk calves is compromised, so we must ensure adequate tissue levels

are reached as soon as possible. Early nutritional status of high-risk calves is determined by the nutrient content of the diet and intake. High intake of the correct diet creates an internal environment that is more able to respond to the immunological stimuli of the vaccination program.



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With an improved trace mineral status, cattle have a better opportunity to respond immunologically and experience fewer vaccination failures. In most cases the vaccine does not fail as much as the cattle fail to mount sufficient immunological defense in response to the vaccine to fend off the disease.

The next layer is immunization, which requires adherence to a recommended vaccination protocol for the prevalent disease-causing pathogens. The immunological response is partially dependent on the quality, specificity and timely application of the vaccine.

Controlling stress, the next layer in the pyramid, is very important and can be impacted by nutrition. Much of the stress comes from external factors prior to arrival and is always present in high-risk calves. Stress in fact is a major factor in making calves high-risk. By making sure that the first two layers are solidly laid, stress is reduced. We can further minimize stress with good handling and housing facilities, and handling cattle gently and slowly.

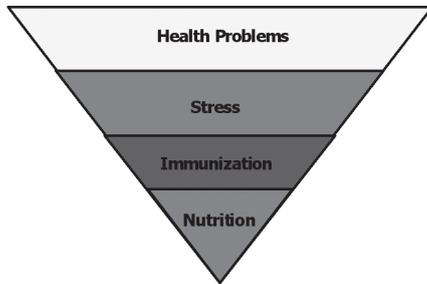
The top of the pyramid represents the relative magnitude of health issues that you experience. Management of the layers below has a direct impact on the number and seriousness of the health issues represented at the top.

What we cannot allow to happen is

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for the pyramid to become inverted. You get the point down on the bottom where the nutritional base is smaller and the issues become worse. You may still get some immune response to your vaccination program, but it will not be as great as when the nutritional base is sound. Stress is increased from inadequate nutritional status and increased incidence of disease. Consequently, health issues are more numerous and more severe as measured by morbidity and mortality rates. You can't manage a pyramid on its point because it will topple just like the stool with two legs.

### DEVELOPING A PROGRAM

Dr. Barker has dedicated a large part of his veterinary practice to improving the health of high-risk calves through prevention. That is what led him and SolidTech™ Animal Health, Inc. to develop the SolidHealth™ program.

"We needed a comprehensive program that considered health, nutrition and management," Dr. Barker said. Given the veterinary background of their business, they focused on the required vaccines and the timing of their application to effectively stimulate the appropriate immune response. Immunology is the key, but we need nutrition and management to be in direct support of maximizing immunological response.

Through hands-on experience and laboratory testing, much has been learned about the organisms that are causing the bulk of the respiratory issues. "Many diseases can be handled with our traditional injectable vaccines," Dr. Barker said. "However, the bulk of the illnesses continue to come from patho-

gens that mutate and are much less affected by the immune response from traditional vaccines."

In some cases commercially available "one-size-fits-all" generic combination vaccines may not contain the desired component or they may not contain the proper strain to protect against the pathogen (disease-causing organism) affecting the cattle. Autogenous vaccines offer producers and veterinarians the ability to formulate customized, combination products for the cattle. Accordingly, the SolidHealth program utilizes autogenous bacterins and vaccines from Newport Laboratories, Inc. formulated by SolidTech Animal Health, Inc. into pelleted dual-dose equivalents.

These autogenous products are custom-made from the bacteria (or virus) causing disease in a livestock operation. The resulting product is specific to the pathogenic strain(s) in that herd

or feedlot. The USDA regulates the use of biologics in food animals, and allows the use of autogenous biologics in situations that meet certain criteria. Autogenous products are intended for use by, or on the order of a licensed veterinarian who has a veterinary-client/patient relationship with the producer.

The first step in developing an autogenous vaccine or bacterin is identifying and isolating the causative agent related to the disease. Typically this involves the attending veterinarian submitting the appropriate tissue samples to a diagnostic laboratory. From that tissue sample the lab isolates the pathogen, which will serve as the "seed" for an eventual autogenous bacterin or vaccine. In some situations additional testing, usually using PCR (polymerase chain reduction) technology, is necessary to detect strain variation between various isolates. These tests aid in selecting the appropriate isolates for used in making the custom

vaccine or bacterin.

The selected organisms (seed isolates) are then transferred to Newport Laboratories' USDA licensed production facility. The process of growing the organisms continues in multiple steps until the quantity is sufficient for the number of doses of product requested. The result is a highly concentrated fluid containing the inactivated bacteria or virus. This product is tested for sterility and safety according to strict USDA Quality Control guidelines.

The process goes one step further by employing SolidTech's unique SoliDose™ process for finishing the biologic into a dual-dose autogenous product. The

### ***Immunology is the key, but we need nutrition and management to be in direct support of maximizing immunological response.***

SoliDose implant makes it possible to stimulate immunity for multiple pathogens with an immediate release (IR) and programmed release (PR) of the antigen over time. Dr. Barker says this vaccine

implant technology permits an initial dose and a booster dose to be given simultaneously. "With SoliDose we no longer need to work the cattle through the chute a second time to administer that important vaccination booster," Dr. Barker said. "This means cattle no longer have to suffer the additional stress of processing through the chute twice."

Conventional vaccines offer protection over a few days at best. The SoliDose implant continues to deliver antigen for up to 21 days. Stressed, high-risk cattle have depressed immunity and often diminished nutritional capacity to mount an effective immunologic response. As we improve the cattle's nutritional status their immune system begins to build a viable defense with the controlled release of the implanted vaccine.

### MANAGING STRESS

The transition period is a critical time in a calf's life. We are challenged to transition a calf from a low-stress, maternally →

centered environment to a neo-dietary, independent, peer competitive, socially ordered high-stress one. Receivers of high-risk calves have little control over the stress level of calves before arrival, but they can certainly influence further stress after they arrive.

The value of a smooth transition is achieved through three objectives: 1) Teaching cattle to eat and drink from bunks and troughs; 2) Changing behavior (gentling); and 3) Preparing for future health challenges. For the receiver

of calves it is all about making the cattle as comfortable as possible, and that process begins the minute they get off the truck. Think about it in terms of driving all day on a trip; when you finally stop all you want is something to eat, drink and a comfortable place to lie down. For cattle, a comfortable place is one that is quiet, dry, relatively cool and sheltered from adverse weather.

Processing facilities should be made as quiet as possible, and the cattle's view should be shielded from the movement of the processing crew. When the cattle are moved and processed, it should be done in a deliberately quiet and slow manner to avoid the stress associated with rapid movement, crowding and loud noises. "Processing should not be a timed event with respect to high-risk calves," Dr. Barker stated, "and the Solid-Dose implant vaccine means they won't be coming back through the chute a second time for a booster."

When cattle are returned to their pen, all of the necessary comforts mentioned above should be present. Feed bunks should have long-stem grass hay to entice cattle to the bunk and an initial offering of a diet designed for high-risk calves. This diet is not the run-of-the-mill "starter" diet.

### **THE IMPORTANCE OF NUTRITION**

Nutrition and stress are highly related

and the high-risk calf suffers both low nutritional status and high stress. The NRC's Nutrient Requirements of Beef Cattle has a section devoted to nutritional implications of stress and the increased nutrient requirements of stressed cattle. These requirements are

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in support of an active and effective immune system. Those who have experience with high-risk calves understand that, in many cases, the requirements may be higher than what is indicated in the NRC.

Nutrient deficiencies result in a less than optimal and often ineffective immune response.

Before any animal can fend off a pathological challenge or recover from an illness it must have a functioning, responsive immune system. A functioning, responsive immune system is the timely production of very specific antibodies to counter pathological organisms and a vaccination program's success is dependent on a fully functioning immune system.

During transition we know nutrition is highly related to both stress and health, so what are our nutritional challenges? Nutrient content of the diet is important. Although often discussed, crude protein is of tertiary importance in the diets of high-risk calves behind amino acid content and available nitrogen for rumen microbial growth. Potassium is important to rehydration and gains of stressed calves along with zinc, copper and selenium, which are associated with immune system function. The energy content of the diet must be balanced along with both digestible and indigestible fiber and provide adequate roughage to maintain a healthy rumen. Additionally, the cor-

rect balance of vitamins, particularly vitamin E and B (niacin) are required to support metabolic function.

The single most important nutritional effect of stress is reduced feed intake.

"We need to get these cattle eating as much as they can early," Glasgow said. The nutrient composition of the ration is irrelevant if cattle do not consume adequate amounts on a daily basis. Adequate intake of a ration, correctly balanced for high-risk calves, is the key to helping ensure the nutritional status of the calves are such that they can remain healthy.

It is believed that inadequate nutrition is the primary reason for the failure of high-risk calves to mount an effective immune response and inhibits their response to treatment. "In our practice we have determined that cattle in a depressed nutritional status, especially trace minerals, have more health issues than cattle in nutritionally sound programs," Dr. Barker said, "so we must get these cattle on the correct diet as quickly as possible.

With their programmed release, autogenous implant vaccines continue to deliver antigen while the cattle are coming up on feed. "If we can get the trace mineral status of these calves up within the first week while continuing to stimulate their immune systems, then the cattle tend to stay healthier and we substantially reduce morbidity and pull rate," Dr. Barker said.

### **THE VALUE OF COLLABORATION**

Given all these complex factors in dealing with high-risk calves, the Solid-

Health program employs the nutritional expertise of Cargill Animal Nutrition and their many consultants around the country to assist in the establishment and administration of nutrition protocols. "We needed help on the nutrition side of

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things and turned to Cargill,” Dr. Barker said. “They feed a lot of cattle and know how to deal with high-risk calves.”

Cargill Animal Nutrition consultants began working with Dr. Barker in collaboration with local practicing and consulting veterinarians and several major players around the country like Eastern Livestock, Crow Hollow Feedyard and Bezner Farms. They employed the NutreBeef® Transition technology to these operations. This technology combines the correct balance of nutrients for transitioning high-risk calves and exceptional palatability.

Because proven complete, pelleted rations like NutreBeef Ration help get cattle eating quickly they are recommended as a best practice for high-risk calves. In some cases the best solution for operations like Crow Hollow and Bezner Farms that make their own rations is NutreBeef Transition Mineral as a top dress to the standard starter ration. In either case the goal is to stimulate intake of the correct balance of nutrients to provide that foundation for the rest of the SolidHealth program.

During a visit to Crow Hollow we looked at a set of 352-lb., high-risk steer calves from Marion, Ky. The cattle had been on the NutreBeef Transition Ration for 3-5 days while being assembled from various auction markets near there. The cattle arrived at the yard the previous evening and we visited with Glasgow the next morning. “When that feed truck went by at 7:30 this morning, they were crowding the bunk and pushing each other out of the way to get to the feed,” he said. “Typically in the past, the feed truck would go by and they may or may not get up or even look at the feed. Might be a half a dozen out of the whole bunch walking up to the bunk.”

Cargill’s extensive experience in beef cattle nutrition and widespread presence in cattle-producing regions complement and provide consistency to the SolidHealth program, according to Dr. Barker. “We now have a nutrition program that comes in a form that cattle will eat and

helps raise mineral levels so the cattle can mount an effective defense,” Dr. Barker said.

**PERFORMANCE IMPROVEMENT REALIZED**

The Cargill/SolidTech collaboration is delivering impressive results for these cattle feeders. In March 2007, Dr. Barker and Cargill ran two trials with Crow Hollow Feedyard to evaluate and document the performance and economic impact of the SolidHealth program on high-risk calves.

Fourteen lots of high-risk calves assembled from various auction markets in Kentucky and Tennessee, totaling 1,436 head, were put on the SolidHealth program upon their arrival at the feed yard. These high-risk calves were destined for pasture, but due to the historically high morbidity and mortality rates, were backgrounded at the yard for approximately 45 days. The cattle were

trials involving the technology. In the most recent Cargill Animal Nutrition trial done at Kansas State University involving high-risk calves, consumption at 21 days was 2.88 percent of body weight for cattle receiving NutreBeef Transition Mineral in addition to the normal ration. These same cattle were consuming 2.16 percent and 2.54 percent of their body weight on day 7 and 14, respectively.

Even before the Crow Hollow trial was completed, the reduction in morbidity and the number of calves requiring treatment was evident. Within the first 30 days after arrival the reduction in observed sickness and subsequent treatment was reduced from a typical rate of over 60 percent to 20 percent. Overall mortality was reduced to 3.06 percent from what typically would be around 10 percent. Additionally, during the 45-day program, these 400-lb. steers gained 2.89 lbs. per day with a feed conversion (F:G) of 5.47:1.

Lot #	Head	Days	Weight In	Weight Out	ADG.	Conv.	Med. cost /hd	Dead #	%	COG \$/cwt (Deads In)
260	101	50	483	606	2.45	7.04	\$12.77	0	0.0	\$126.27
264	116	45	481	635	3.42	4.69	\$0.00	0	0.0	\$85.03
267	103	42	489	618	2.67	6.45	\$11.42	1	1.0	\$114.62
281	99	38	484	612	3.36	5.09	\$0.00	0	0.0	\$93.29
283	82	36	479	609	3.62	4.43	\$0.00	0	0.0	\$84.35
	501	42	483	613	3.10	5.54	\$4.84	1	0.2	\$99.58

**Table 1. Performance Results for High-Risk Heifers in Trial 2**

processed under the SolidHealth protocol including the SoliDose autogenous vaccine, and the normal starter ration top-dressed with NutreBeef Transition Mineral to improve intake and provide the addition mineral nutrients for high-risk calves.

The first and most obvious observation was the behavior of the cattle. After starting on the program and beginning to top-dress the standard starter ration with Mineral, intakes increased substantially within the first 21 days. According to Crow Hollow Feedyard’s Danny Glasgow, the high-risk calves in the program were consuming well over 3 percent of their body weight by day 20.

This observation is consistent with consumption patterns observed in many

These cattle were the first to go through the program, and Cargill managers as well as Dr. Barker were convinced that if they could influence the nutrition earlier in the marketing process — while the cattle were being assembled — performance could be further improved. Eastern Livestock agreed to put the next set of trial cattle on NutreBeef Ration for the 3-5 days while the cattle remained at their facility at Marion, Ky. After assembly, five loads of heifers totaling 501 head that averaged 483 lbs. were shipped to Crow Hollow.

The cattle were processed using the SolidHealth protocol and the starter ration was again top-dressed with the NutreBeef Mineral. The five lots of cattle were in the program for an average of →

42 days. During that time, less than 17 percent of the cattle required treatment for illness at an average cost per head of \$4.84 and only one calf died, which is 0.2 percent mortality. These heifers closed out of the program weighing on average 613 lbs. During the 42-day period the cattle gained 130 lbs., 3.1 lbs. per day, and converted feed to gain at a rate of 5.54:1.

These results are very exciting for the cattle industry because of the potential impact on controlling and lowering costs on millions of calves. "Since we started this program, we cut our pull rate from 65 percent to about 28 percent. So at \$30 a head, you do the math – that's worth a lot of money," Bezner said.

"We're helping to reduce some costs – not only medicine and labor costs, but also the cost of the cattle not performing up to their genetic potential. That's huge," said Jimmy Labrier, the business development manager for Cargill Animal

Nutrition who coordinated the trials with Crow Hollow. "Doing the right thing for the cattle on the front end is essential in reducing the health costs and production losses of high-risk calves. Not only is it the right thing to do, it is also the economical thing to do."

The entire focus of the SolidHealth program is in reducing health-related costs and improving performance that will positively impact the producers' bottom line. "That is our goal," Dr. Barker said. "We have got to look at the bottom line, what's best for the producer."

He stresses that the industry no longer must tolerate the once considered status quo of high morbidity and mortality for high-risk calves, and the financial return is significant. "We're talking about putting about \$4 more in a calf than you would normally in order literally to save the producer \$20-\$25 per head in unneeded costs," Dr. Barker said. "That is a 5 to 1 return, not counting the

performance improvement."

The SolidHealth program gives high-risk calves a fighting chance, is providing a much needed health solution for their owners and making their operations more efficient. Improving efficiency in the cattle business is becoming more critical. Producers who adopt new technologies like the SolidHealth program will be the winners on the efficiency front.

If you would like to view an episode of *The Cattle Show* featuring the SolidHealth™ program, go to [www.24-7agtv.com/tvguidelist.aspx](http://www.24-7agtv.com/tvguidelist.aspx). Use the "Next" button to scroll to the show titled *Improving Health of Stressed Cattle*.

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