Ga$ping for Dollar$

Bovine respiratory disease drains millions of dollars from producers' pockets each year, and it's a lot more than many of them suspect.

Story by
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Research shows pneumonia in calves — a result of clinical BRD — costs 25 pounds (lb.) in weaning weight. What no one can pinpoint are the intangible losses caused by subclinical cases. [PHOTOS BY BRAD PARKER]

The bad news is that, even with today's more sophisticated and more numerous pharmaceutical weapons and management strategies, battling bovine respiratory disease (BRD) is still a lot like going up against a raging grass fire with a busted squirt gun.

"It has gotten worse rather than better, in spite of the pasteurella vaccines that are being used more than they were before," says Bob Smith, a consulting feedlot veterinarian who also holds the McCasland Chair for Beef Cattle Health and Production in the College of Veterinary Medicine at Oklahoma State University. In round numbers, Smith says the death loss resulting from BRD in cattle and calves tallied $624 million in 1991, but feedlot death loss resulting from the disease has jumped since then.

For perspective, according to the National Animal Health Monitoring Service (NAHMS) Feedlot '99 study, 97.6% of all feedlots reported treating for respiratory disease in 1999. All told, 14.4% of cattle placed in the feedlot that same year were treated for respiratory ailments. Moreover, the NAHMS Sentinel Feedlot Monitoring Program indicates that death due to respiratory disease increased from 52.1% of all feedlot death loss in 1994 to 61.5% in 1999 (Table 1).

But worse news is that at ranch level — the first and most effective line of defense against BRD — most producers have no idea what BRD may be stealing from them or the industry.

Table 1: Feedlot death loss due to bovine respiratory disease (BRD) or digestive disease as a percent of total feedlot death loss

	Respiratory	Digestive
1994	52.1%	27.2%
1995	55.4%	24.8%
1996	55.4%	24.0%
1997	59.6%	21.4%
1998	57.0%	23.2%
1999	61.5%	19.5%

Source: *NAHMS Sentinel Feedlot Monitoring Program*

"I don't think producers in the industry have really sat down and looked at what it costs them," says Clell Bagley, an Extension veterinarian at Utah State University.

For one thing, Bagley explains, "Producers get some respiratory problems, but most of the time, they don't pinpoint exactly what it is." Consequently, they don't understand which BRD viruses or bacteria (see "BRD in detail" on page 35) may be causing the problem.

While feedlot data is plentiful, hard data about what BRD costs at ranch level is scarcer than West Texas cowboys in the Big Apple. For instance, Steve Wikse, associate professor of large animal medicine and surgery at the Texas A&M University College of Veterinary Medicine, can tell you that research shows pneumonia in calves — a result of clinical BRD — costs 25 pounds (lb.) in weaning weight. What no one can pinpoint are the intangible losses caused by subclinical cases that logic says are there. Or the labor costs, marketing costs or emotional tax.

"One of the biggest angsts cow-calf producers face is when they have to deal with respiratory disease on their own," says Mark Spire, professor of diagnostic medicine at the Kansas State University College of Veterinary Medicine. "Producers tend not to watch them closely enough, and the cattle turn into chronics and don't have the weight to market that a producer wants. We wind up with tough-looking calves that don't weigh as much, and since they look tough, they get discounted even further, so it's a double whammy."

The gnat's-back perspective

For the record, BRD also has been referred to as shipping fever, dust pneumonia, quick pneumonia and less-flattering names. Basically, it is a complex of diseases that work alone and together in concert with environmental stresses, such as subpar nutrition or weaning, to infect the respiratory tracts of animals.

Specifically, common viral agents associated with BRD include infectious bovine rhinotracheitis (IBR), parainfluenza-3 virus (PI3), bovine viral diarrhea (BVD) and bovine respiratory syncytial virus (BRSV). Common bacterial agents include pasteurella (such as haemolytica and multocida, which are common) and *Haemophilus somnus*. All these viruses and

bacteria are common in the environment, so eradicating them is not an option.

Wade Taylor, a cow-calf and feedlot veterinarian at Oakley Veterinary Services in Oakley, Kan., points out another organism called *mycoplasma* — there are at least 12 strains of it — is resurfacing as a common finding in a high percentage of lungs from animals diagnosed with BRD. While the jury is still out on whether or not mycoplasma is part of the BRD complex, Taylor believes it is.

Incidentally, he explains, what's so pesky about mycoplasma is that it has no cell wall like other bacteria. And it's the cell wall of bacteria that antimicrobials, like penicillin, attack in the case of bacterial pneumonia. Consequently, these antimicrobials don't work with mycoplasma.

"Most people involved in this consider the viruses to be the trigger that sets it off," Bagley says, explaining that, along with cost, that's why the most common BRD vaccinations are the virals.

In other words, the bacterial agents — ultimately the ones that cause the most damage — already exist in the animal and remain harmless unless the immune system is compromised by viruses and other stresses to the point that the bacteria have a chance to attack.

For the technical at heart, Spire explains that viruses create cellular damage as they replicate within cells, then burst out to invade others. As soon as a virus begins, a healthy immune system creates an antibody and begins attacking the virus. Bacteria, along with creating the same cellular damage through replication, produce a toxin that allows them to create a defense against the immune system. Consequently, bacteria can cause tissue damage (scar-tissue-like lung lesions) that the body is never able to repair.

In a general and simple scenario, you have an animal whose immune system is compromised by a stress, such as weaning, allowing viruses to take hold, which compromises the immune system further, allowing the bacteria to attack.

To the human eye BRD looks more like this: snotty nose (clear early on, then thick and cloudy or even bloody later); watery eyes; droopiness; loss of appetite; some coughing; quick, short breaths; fever.

Left to its own devices, and sometimes even when combated, the common end result is pneumonic pasteurellosis. Acute infections can kill cattle quickly. Even in those that recover, however, a growing body of research indicates that once the lungs have been scarred, performance — everything from average daily gain (ADG) to carcass quality — never catches up with potential.

As an example, Smith says that in receiving studies ranging from 28 to 42 days in length, differences of 0.31-0.50 lb. in ADG have been reported between healthy calves and those that have suffered BRD. In one Oklahoma receiving study, for instance, healthy calves gained 2.32 lb./day during the 42-day trial, while those treated once for BRD gained 2.17 lb., and those treated twice gained 1.83 lb. Bottom line, all else being equal, in the pasture and in the feedlot, animals that never become sick outgain those that do.

Plus, losses at the hands of sickness mount the closer cattle get to harvest. Smith says a calculation of BRD costs in the multiyear Texas A&M Ranch to Rail program points to healthy steers in those tests returning $49.55-$123.86/head more than steers that required treatment. Backed into the arrival weight, that meant those same steers that ended up getting sick were worth $8.65-$20.34/hundredweight (cwt.) less going on feed.

Of course, part of the added return from the healthy animals came with carcass performance. Smith points out both research and real-world experience verify that cattle that get sick tend to marble and to grade less than those that stay healthy.

A sniffle here, a dollar there

Given the cost and the heartache, you'd be right to ask why BRD is a growing problem rather than one the industry has on the run. Pick a subject.

First of all, Wikse explains, BRD is tough to wrap up in a cerebral bear hug because it's multifactorial in nature. There are multiple causes, and no one knows which added virus or bacteria or stress will unleash the hurricane of disease.

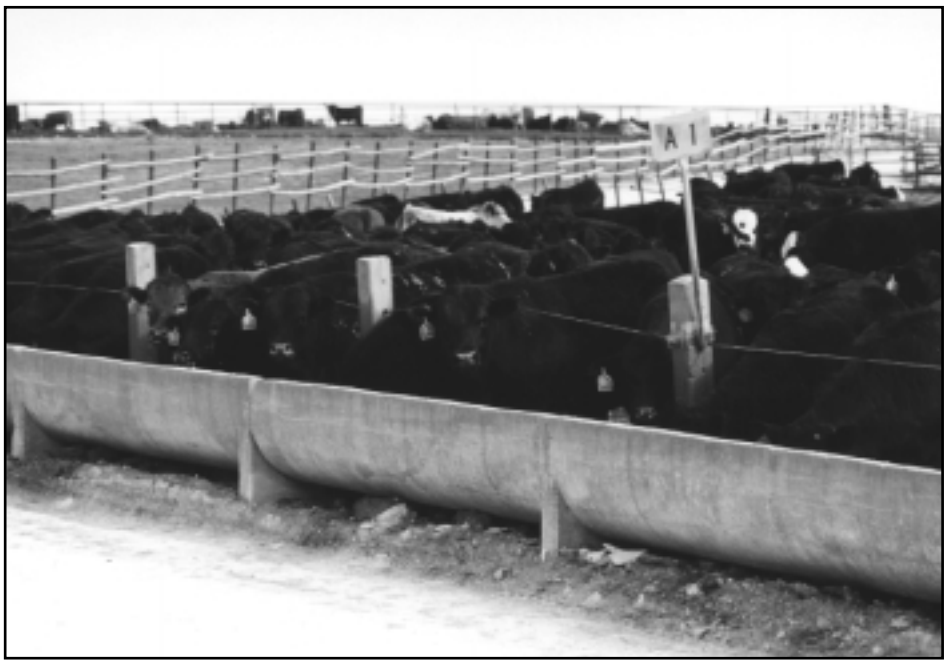
Next, Spire explains, in some cases management hasn't kept pace with the increased genetic potential of the cattle being managed.

"The players have changed, but the parameters haven't," Spire says. "I don't think we've weakened the immune system of the cattle (with increased genetic performance), but I don't think we've changed the management system to handle the cattle."

As an example, in a study Spire worked on several years ago, where commercial producers figured their cows were milking about 12-15 lb./day and were managing them that way, they discovered the cows actually were producing twice that much milk.

And natural market demographics have something to do with it. Taylor says, "I think part of it is the low commodity prices and younger cattle coming to the feedlot and being fed longer." As for commodity prices, he explains, more cattle are being backgrounded on grain rather than grass because of ration cost, so a different beast in terms of possible nutritional stress is showing up at the feedlot. And the cyclically shrinking number of calves for sale, in tandem with too much cattle-feeding capacity, means feedlots are pulling cattle from their warehouses quicker than ever.

Likewise, some of the big feedyards that Spire visits place the blame on labor. Given the shortage of knowledgeable, ex-



It's tough to make treasure from trash. While virtually all feedlots vaccinate virtually all the cattle they receive for BRD, hardly any cow-calf producers do.

perienced feedlot cowboys, some yards are running a leaner labor force in terms of manpower or experience — or both. Therefore, cattle aren't detected and pulled as soon as they used to be.

Furthermore, it would be tough to argue that part of the problem doesn't stem from our human nature to search for simple answers to complex problems.

"We're still looking for our answer in a needle and a syringe, rather than in management," Bagley says. "We tend to still ship calves longer and farther with less rest, and we still tend to spend less time ahead of shipping teaching the calves what feed is. We ought to expect them to get sick, and they do."

Finally, it's tough to make treasure from trash. While virtually all feedlots vaccinate virtually all the cattle they receive for BRD, hardly any cow-calf producers do. For the bean counters out there, 96.9% of all feedlots vaccinated for at least one BRD viral in 1999, according to NAHMS, while only 28.4% of cow-calf producers did the same at the ranch (see Table 2).

Keep in mind, part of this disparity has to do with the use of the vaccines. "Once they're at the feedlot, it's too late to prevent disease, so we're looking for a quick response to the disease," Taylor says, explaining that's one reason most feedlots use a modified-live virus (MLV) vaccine.

"Treatment of calves with BRD is essential but is considered somewhat of a salvage procedure," Smith says. "With sickness, potential mortality increases, medical costs are incurred, and feedlot performance is decreased. BRD is a significant obstacle to optimal feedlot performance. Prevention strategies are much more cost-effective than treatment programs."

Herding snakes

Unfortunately, as the vaccination statistics indicate, prevention is negligible at the ranch. Frankly, that's easy to understand.

First of all, Taylor points out that historically there hasn't been much incentive for cow-calf producers to get their arms wrapped around the problem. While BRD is not uncommon in suckling calves, the stress of weaning makes it more prevalent.

Producers who wean their cattle on the interstate usually don't see the problem. Unless they've backgrounded their cattle or retained ownership in the feedlot, there has been little economic incentive to assume the added cost and risk of preweaning and weaning vaccinations.

That may be changing, albeit slower than a turtle toting an anchor.

"A lot of it goes back to the perception — and oftentimes the reality — that producers don't always get paid for it," Taylor says. "I think we'll see more vaccination and preweaning programs put into effect, especially from larger ranches who want the repeat business based on the history of their cattle."

Wikse agrees. He thinks the premiums starting to be paid for preconditioned calves and the alliances being formed are starting to push ranch vaccinations.

Indeed, at the Jordan Premium Auction sales in Texas, where calves are preconditioned, individually identified, then mixed and sorted into uniform load lots, premiums have run $8-$14/cwt. compared to similar-weight, similar-class cattle sold at the same location on the same days. And similar examples are beginning to take flight across the nation.

However, while a producer must use a sharp pencil to calculate the health and nutritional costs of a preconditioning program, relative to the returns, Wikse points out, "Some feedyards are insisting on this. … It's not so much a matter of the premiums a producer will get as it is what the producer will be docked if the calves aren't preconditioned."

Trapping Goliath

So, if either economic incentives or disincentives continue to push along the fledgling weaning and preconditioning trend, a whole heap of cow-calf producers are faced with adding a layer of health management to their operations.

Cinching these hobbles a notch tighter, Smith explains, "Maximum control of BRD in calves begins during the calving season with management that optimizes passive transfer of colostral antibodies. Following that, proper nutrition, sound vaccination programs and proper backgrounding periods all become part of a BRD management program."

Nutrition. For starters, Wikse says, "I maintain that nutrition is the very foun-

Table 2: Percentage of operations that vaccinate for BRD

	Feedlot*	Cow-calf**
BVD	94.4%	25.3%
IBR	96.9%	28.4%
PI3	86.6%	22.8%
BRSV	87.4%	24.5%
Pasteurella	53.3%	9.9%
Haemophilis somnus	62.1%	16.2%

Sources: **NAHMS Feedlot '99; **NAHMS Beef '97*

BRD in detail

Viruses

Infectious bovine rhinotracheitis (IBR), or red nose. A viral infection of the upper respiratory tract. It is present in most herds but causes illness in unexposed animals or those with lowered levels of immunity. Many cattle carry the virus and begin shedding it to others in times of stress. This agent is commonly implicated with bacterial agents in causing shipping fever and other severe cases of pneumonia.

Parainfluenza-3 virus (PI3). A viral respiratory agent that causes a relatively mild disease by itself, but it's a severe problem when combined with a bacterial agent. It is included with all IBR vaccines and can be used on the same schedule.

Bovine viral diarrhea (BVD). A common viral agent, present in almost all herds. It may cause respiratory, digestive or reproductive problems. It has a profoundly detrimental effect on the immune system and can cause persistent infection (PI) in animals. Such animals shed the virus to other cattle throughout their lives.

Bovine respiratory syncytial virus (BRSV). A relatively recently recognized disease agent now identified across the nation in respiratory infections. It is mainly a problem in weanling and feedlot animals and in young dairy stock.

Bacteria

Pasteurella. A bacterium carried by many cattle. It becomes a major cause of severe shipping fever or pneumonia when combined with stress and a viral agent. Two common pasteurella bacteria are haemolytica and multocida.

Haemophilus somnus. A major bacterial agent involved in shipping fever. It also causes "brain fever" and heart lesions in feedlot cattle.

Source: *Clell Bagley, Utah State University*

dation of health and productivity in the beef herd. When you talk about health problems, vaccinations are just part of it."

The operative words here are *beef herd.*

"A lot of times, if we have problems, it relates back to the poor nutrition in mom, which translates to more disease in the calves," Spire explains. Specifically, he says, the calf is depending on the antibodies in its mama's colostrum to lay the foundation for its own immune system. If mama is short on the right kind of groceries, then junior is going to get shortchanged.

This is the passive transfer of colostral antibodies that Smith mentioned. And there is mounting proof that passive-transfer deficiencies can affect an animal's performance its entire life.

In the real world, Spire says, "If we have cows that are borderline nutritionally stressed — cows in decent condition but that are heavy milkers so are always on the borderline of being a notch too thin — they may not be getting the trace mineral and vitamin pack they need.

"I recommend putting out a trace-mineral program to the cows all of the time, particularly right after calving until the calves are 5 or 6 months of age."

While mineral deficiencies vary from region to region and across ranches, Spire says zinc, copper, selenium and manganese deficiencies are among the most common. In terms of vitamins, he cautions producers to make sure they're covered on vitamin A.

Basic as that may sound, Wikse says, without question, trace minerals and macrominerals are the most overlooked part of the cow-calf nutritional program. He says, "You go to so many places, and they have a salt block out, and they think they are taking care of the mineral program."

Vaccinations. If you're normal, the subject of BRD vaccinations can get confusing fast. For one thing, there are all the different companies making all the different viral and bacterial vaccines and combinations thereof. For another, there are killed vaccines and MLV vaccines from which to choose.

"We've probably confused producers more than helped them because we've made it so complicated," Bagley says. In terms of choosing the type of vaccine, he offers some advice.

MLV vaccines offer the quickest response with some overall immunity through interferons in about three days. He says you have to read the labels carefully, though, because some MLV vaccines are not intended for calves nursing pregnant cows — the virus in the vaccine can cause abortion.

On the other hand, producers long have relied on killed vaccines for pregnant cows. And since there is no live virus in the vaccine, there is no risk of the vaccinates' shedding the virus. But these vaccines require a couple of weeks to produce a response and require a booster dose to get the full effect.

If Taylor knows the vaccination history of a cow herd — specifically, that the cows have a high-enough level of immunity to IBR and BVD — he'll use an MLV vaccine on the calves, noting that use is extralabel. If he doesn't know the history, he'll use a killed vaccine the first time but will make sure he gets at least one round of MLV vaccine into them at some point.

In terms of the virals and bacterials for which to vaccinate, starting with your own veterinarian's experience is a solid bet. In general terms, though, Spire says, "We put a lot more emphasis on BVD just because of the nature of it." Specifically, he explains, estimates peg about 1% of the nation's cow herd as persistently infected (PI) with BVD, and there is constant shedding of the virus.

With BVD, Bagley says IBR is one of his first focuses at the ranch because it's so common and because it can cause abortion.

Cutting closer to the grain, Smith says, "Where the immune status of the herd is in doubt, a vaccine combination containing chemically altered modified-live IBR and PI_3, modified-live BRSV, and killed BVD is appropriate. This provides maximum modified-live antigens and is cleared for use in calves nursing pregnant cows.

"In herds where the vaccination history is known and the cows are immune to IBR and BVD, a modified-live virus IBR-PI_3-BVD-BRSV vaccine is appropriate. The use of a combination modified-live IBR-PI_3-BVD-BRSV vaccine in calves nursing pregnant cows is extralabel. At weaning, calves should receive booster vaccinations with modified-live IBR-PI_3-

The most frustrating thing about the industry's lackluster prevention of BRD is that the tools and the management techniques are available to take a big bite out of the problem.

BVD-BRSV vaccine." (See Table 3.)

In terms of timing, since BRD morbidity rates prior to weaning are low, Smith says using respiratory vaccines at branding time is not necessary. However, he emphasizes, "Vaccination with respiratory vaccines two to four weeks prior to weaning is critical. By beginning the vaccination program while the calf is still on the cow, the immunization process can begin while the animal is under minimal stress and prior to exposure. Also, maternal — colostral — antibodies have declined to negligible levels by this time, allowing for an optimal immune response."

As for boosting those calves at weaning, Spire says his response runs stronger if he waits three to five days after weaning, so the initial stress has passed.

Finally, these folks advise the use of bacterials on a herd-by-herd basis. Bagley says part of that goes back to the fact that, if you can control either the viruses or the bacteria, you should have a handle on BRD, and it's cheaper to vaccinate with the virals.

Moreover, Wikse stresses, "Just because cattle have been vaccinated doesn't mean they can't get the disease." Enough stress, man-made or not, can overwhelm the best immunization program.

Still, the most frustrating thing about the industry's lackluster prevention of BRD is that the tools and the management techniques are available to take a big bite out of the problem, reduce cost and inefficiency, bolstering beef's competitive advantage along the way.

"If we just use the information we already have, we can put a big dent in it," Taylor says.

"What it really comes down to is that we have never convinced the cow-calf producer that there is more value in producing calves that are more feedlot- and stocker-friendly, and we haven't done a good enough job, in some cases, of convincing the feedlots those calves are a good buy," Smith says. "We've got to convince producers to prepare cattle for where they're going, rather than where they've been."

Table 3: Customizable BRD vaccination and management schedule

2-3 months of age (branding)
- Castrate
- Dehorn
- Administer growth implant
- Subcutaneous clostridial bacterin
- Optional: combination MLV and killed virus IBR-BVD-PI_3-BRSV or intranasal IBR-PI_3 or MLV IBR-PI_3-BVD-BRSV

2-4 weeks prior to weaning
- IBR-PI_3 (MLV chemically altered), BVD (killed), BRSV (MLV)

Or
- MLV IBR-PI_3-BVD-BRSV
- Booster subcutaneous (sub-Q) clostridial bacterin
- Optional: pasteurella bacterin/toxoid if calves will be sent directly to the feedyard at weaning or if the herd experiences notable BRD during the postweaning period

At weaning
- MLV IBR-PI_3-BVD-BRSV

Source: *Bob Smith, Oklahoma State University*