

Consider the Consequences of Convenience



A look at remote drug delivery and concerns that surround it.

by **Troy Smith**

The dart gun discussion is not a new one. It has been a topic of debate for several years between rapidly growing numbers of dart gun enthusiasts and others that have misgivings. Cattle producers who espouse remote drug delivery (RDD) typically cite the convenience of using dart guns to administer medications to cattle. But some skeptical producers, country cow doctors and veterinary researchers worry about the consequences of convenience.

RDD technology

If you are not familiar with RDD technology, check with your neighbors. Chances are one or more of them can put on a little dart gun show-and-tell for you. By prowling the internet, you can find various online discussion groups where cattle folk have shared their opinions. They have posted comments regarding the perceived advantages and shortcomings of different RDD devices. Participants have also shared personal successes and failures resulting from administration of dart-delivered medications.

It is common for the advocates to tell about treating pasture cattle for ailments such as pinkeye, foot rot or respiratory infections with no need for sorting, capture or restraint of the afflicted critters. Typically, the cattle are located at a remote site and far from a catch pen and chute. Maybe the producer is not skilled at roping and restraining cattle for treatment, and hiring it done is challenging too. With a dart gun, however, a lone person can position him or herself within range of a target animal and fire a dart containing a dose of medication.

According to this writer's observation, a majority of online posts offer positive reviews for RDD. Satisfied users claim the technology works when applied correctly and animals have responded to treatment. Based on this anecdotal evidence, RDD meets producer expectations most of the time.

On the other hand, some contributors to online discussions complain that their respective RDD devices did not perform as expected. They sometimes cite ongoing dart gun adjustment problems, such that darts are propelled with too little force or too much. They bounce off the animal's hide or, in some instances, penetrate too deeply. There have been rare reports of dart needles breaking off, failed discharge of medication contained in darts and long delays before spent darts fall out of treated animals.

Other producers complain about dart gun accuracy and how difficult it is to place darts within the injection site area of the neck, as required for Beef Quality Assurance (BQA) compliance. One Western wit joked that his marksmanship improved eventually, after he practiced on the neighbor's cattle. Other producers have complained that getting within range and placing a dart properly became harder over time, because cattle became gun-shy. And a few producers have admitted they have stopped worrying about BQA and are satisfied if they hit a targeted animal.

RDD in the field

Darrel Kraayenbrink, DVM, says there really is a learning curve and proficiency with an RDD device does not come easily. Based in Platte, S.D., with satellite clinics in Corsica and Lake Andes, Kraayenbrink says dart guns can be used with accuracy. Some of his clients use them and use them frequently. Kraayenbrink has



Dartguns are known for their convenience, but many veterinarians caution against regular use of this technology in administering injections.

seen producer application of RDD increase steadily in recent years. He has mixed feelings about that.

Kraayenbrink believes RDD can be a suitable choice in certain situations. When an ailing animal is in a faraway pasture, no working pens are near and the producer does not possess cowboy skills, antibiotic treatment by dart may be the best way to administer timely treatment. However, he knows some cattle feeders and backgrounders use dart guns to treat animals held in feeding pens, even when they have working facilities nearby. The commonly stated reason is RDD saves animals from the stress of sorting and going through a chute. But Kraayenbrink suspects, in many instances, producer convenience is the primary driver.

“I try to discourage use of RDD when a producer can use another method to treat cattle,” offers Kraayenbrink, who is concerned when dart gun use becomes a standard operating procedure. “Dart guns have their place. I think that’s mainly in pasture situations where you don’t have many options. But, it shouldn’t be a routine method of treatment. I think we have to consider the drawbacks of remote injections.”

According to Kraayenbrink, one of the disadvantages of RDD is that it typically involves extra-label drug use. Most producers load darts with a low-dose, low-viscosity, water-based antimicrobial product (such as Draxxin® or Zactran®) for RDD treatment of infections. These products must be injected subcutaneously.

“But even when using a dart with a ½-inch needle, some of the medication will be injected intramuscularly. I don’t see how it can be avoided. An antibiotic injected intramuscularly will have a different tissue concentration and duration of effect, as well as a different withdrawal time, than when it’s given subcutaneously. And its extra-label drug use which, legally, requires a prescription,” Kraayenbrink explains. “Plus, those products are expensive, so treatment costs can add up pretty fast.”

Also worrisome is, despite warnings about the danger to human health, some people continue to use Micotil® in darts. “That can’t be condoned,” Kraayenbrink warns.

Texas A&M University veterinarian Virginia Fajt is concerned that the ways some producers use or misuse antimicrobial products for RDD may affect their efficacy. According to Fajt, a dart must be filled to full capacity in order for its contents to be discharged after striking an animal. And while commercially available darts come in a variety of sizes, producers in the field may not always have a dart whose size matches the amount of medication required to treat a certain animal. In some cases, an animal may have to be darted twice to receive the correct dose. Or, a producer might use a too-large dart and “round up” the volume of medication to fill the dart, which results in overdosing the animal.

Alternatively, says Fajt, some producers use the correct amount of medication but add another liquid to it to fill the dart. Producers may carry sterile water for that purpose, but others have reported the use of tap water or water from a nearby stock tank. One “creative” fellow claimed that having nothing else at hand, he used Dr. Pepper to top off a dart. Producers have also reported using more than one drug in a single dart. According to Fajt, dilution of a drug with any other substance or using two or more products in combination amounts to “drug compounding” – a restricted practice that may put animals at risk.

“Every drug has been developed, tested and approved for use in a certain way, as instructed on the label,” emphasizes Fajt. “Doing anything different is extra-label use and has potential to impact the efficacy of the drug and its withdrawal time.”

Fajt was part of a Texas A&M team whose research, like previous studies at the University of Nebraska, Mississippi State University and Iowa State University, raised questions about the reliability of RDD and its consequences for BQA. The studies were conducted under controlled conditions with animals under restraint and RDD applied optimally to eliminate operator errors.

Collectively, results suggest darts do not always discharge their contents or may deliver only a partial dose. RDD may also result in increased trauma and tissue swelling at the injection site, as compared to conventional injection by a hand-held syringe. Outcomes of studies also show considerable variation in the absorption rate of dart-delivered drugs and inconsistencies in the amount of time required for elimination of drugs from the bodies of animals treated by RDD.

“So, I have to question whether the disposition of a drug administered by dart is the same as with the conventional method of injection, and whether a drug’s effectiveness may be



Sometimes producers get caught in the field with a dart whose size does not match the amount of medication required. In those cases, an animal may have to be darted twice, or a producer might use a too-large dart and “round up” the volume of medication to fill the dart, which results in overdosing the animal.

compromised,” Fajt warns. “There are situations where using a dart gun might be critical to an animal receiving treatment. But we ought to consider whether it’s really the most prudent and judicious use of an antimicrobial, and not just use a dart gun for the sake of convenience.”

Benkelman, Neb., veterinarian and stockmanship clinician Tom Noffsinger agrees. For the producer who is not handy with a horse and rope but must pasture doctor an animal located far from a corral, treatment via dart gun can make a lot of sense. It may be the most prudent course of action.

“In my opinion, if a stockman needs to treat an animal that’s in a pen, and there are working facilities available, then using a dart gun is silly – especially if you’re treating BRD (bovine respiratory disease),” Noffsinger states.

“Research has shown that treatment with a dart is not always reliable,” Noffsinger adds. “So, if I’ve spent \$1,000 for a 6-weight calf that needs treatment, I want to know that it’s gets done with the right dose, in the right way. Why would I take a chance on being wrong?” **HW**

From a veterinarian’s perspective

Based in Stillwater, Okla., and associated with Veterinary Research and Consulting Services, Bob Smith, DVM, says remote drug delivery (RDD) technology gained traction early in wheat pasture country where cattle commonly graze hot wire-fenced fields located far from a set of corrals. As that practice occurred, debating the pros and cons of dart guns became common where cattle people gathered. Smith says that debate seems to have happened as RDD caught on in other regions. And it is happening still.

Smith says it is hard to deny the convenience of treatment by dart gun, but conscientious producers should consider the dart gun downside. For one thing, adequate technical expertise is required to properly apply RDD. It takes training, but Smith suspects that many producers learn through trial and error.

“Producers should do the right thing by seeking instruction and then using the technology responsibly,” advises Smith, warning that making mistakes has consequences.

There is the risk of over- or under-dosing and animal. “Missing the mark” with a dart can injure an animal or inject medication incorrectly, which could result in injection site lesions. RDD mistakes have also resulted in packers finding broken needles and even entire darts embedded in beef carcasses.

“It’s always better if we can restrain an animal, correctly diagnose the problem and give proper treatment in the correct way. Whenever it’s possible, that’s the best way,” states Smith.

Also serving on the Beef Quality Assurance (BQA) Advisory Group, Smith advises producers to exercise the best possible husbandry and not resort to any certain practice just because it is faster or it seems easier. He recommends consideration of the Advisory Group’s concerns regarding RDD. The list, taken from the “Beef Quality Assurance National Manual,” is shown below.

Concerns surrounding RDD technology

Entire darts or dart components embedded in the muscle tissue from cattle have been and continue to be found during fabrication of carcasses in packing plants. This adulterant creates beef quality and safety issues, violates federal food safety regulations and risks losing consumer confidence. Research has repeatedly demonstrated failure to RDD systems to consistently deliver the intended labeled therapeutic dose of the antibiotics commonly used to treat BRD in beef cattle tested including failure to achieve the FDA intended therapeutic blood and tissue levels of the antibiotic.

Darts delivered with an RDD can inadvertently strike sensitive tissues, such as the nose or eye, deliver the product into a non-BQA (Beef Quality Assurance) compliant area (i.e., round, loin, shoulder) rather than the injection triangle of the neck, or administer the product intramuscularly rather than subcutaneously or vice versa.

In university and independently sponsored studies, antibiotics injected into the rounds of beef cattle using an RDD caused visible lesions and loss of tenderness in muscle tissue. **HW**