



John Barsness

Many hunters have firm beliefs about how expanding bullets should act. Some believe they should remain inside the animal, “expending all their foot-pounds” or “dumping all their energy.” Others believe the bullet should exit the animal, mostly to leave a blood trail. Some think that the more of its original weight the bullet retains, the better it performed.

Bullets kill big game animals in one way, by tearing apart vital tissue. How quickly they kill depends on two things: the vital tissue they hit and the extent of the damage done.

If a bullet hits the brain or spine in front of the shoulders, death is pretty much instantaneous, and it doesn't really matter much how the bullet expanded. Hunters who specialize in head shots don't care about much except extreme accuracy. Most hunters, however, take the less iffy chest shot, tearing up the vascular tissue of the lungs and/or heart. Shots here kill through a drop in blood pressure: The brain dies from lack of oxygen.

Some other organs have a lot of blood running through them, mainly the kidneys and liver. Chopping some major blood vessels outside the chest can also cause a rapid drop in blood pressure. These include the vena cava under the spine, the

femoral arteries in the rear legs and the jugular vein and carotid artery of the neck. In general the more damage to any of these organs, the quicker the animal dies, because blood pressure drops more rapidly.

Three major factors affect how much vascular tissue is effectively destroyed: the width of the bullet's expansion and (for lack of a better word), the “violence” of the expansion, plus penetration. Many hunters say violently expanding bullets “explode.” No. Dynamite explodes; bullets disintegrate. How much they disintegrate has a direct effect on tissue destruction. This is denied by some hunters, especially those who firmly believe in high weight retention being one of the secrets of killing power, but it's easily demonstrated.

At one extreme in hunting bullet performance we have very thin-skinned, soft-cored “varmint” bullets, designed to totally disintegrate on impact. At the other extreme, we have “solids” designed not to expand at all. Let's take some 6mm bullets of the same diameter and weight, one a varmint bullet and the other a solid, and shoot them at a couple of different animals.

First we'll shoot a woodchuck. The varmint bullet disintegrates so violently that the woodchuck's chest turns inside out and the chuck dies instantly. The solid punches a 6mm hole through the lungs, and the woodchuck runs into its hole. It may eventually die, but if hit around the fringes of the lungs it might survive. This is why varmint shooters use bullets that disintegrate violently.

Next, let's shoot an elephant with both bullets, trying for a side-on brain shot in the ear. The varmint bullet disintegrates on the thick hide of the elephant's ear, resulting in an annoying but

Berger Bul

A New Slant on Hunting Performance

not fatal wound. The solid goes on into the brain and kills the elephant instantly. This is why elephant hunters use solids. (If you don't believe this, read John Kingsley-Heath's *Hunting the Dangerous Game of Africa*, where he discusses killing two elephants with a .243 Winchester, using 100-grain pointed solids.)

Most hunting bullets are designed somewhere between those extremes, and the "big game" animals most of us hunt are bigger than woodchucks and smaller than elephants. We can use one expanding bullet on all of them, but in general the smaller the animal the quicker a bullet that partially disintegrates kills. This is why many deer hunters prefer bullets like the Hornady InterLock, Nosler Ballistic Tip and Sierra GameKing. These lose around half their weight, so often do not exit.

Their energy is indeed expended inside the deer – but not in the way many hunters think, as a sort of hard blow that "shocks" the deer. Instead, the energy is used to tear apart the front half of the bullet, and this violent fragmentation tears up lots of tissue inside the deer's chest. Consequently the deer usually drops quickly, on average far more often than when shot with a bullet that loses little weight and zips out the other side.



Wildlife was abundant at Wanganui Safaris, including many large red stags.

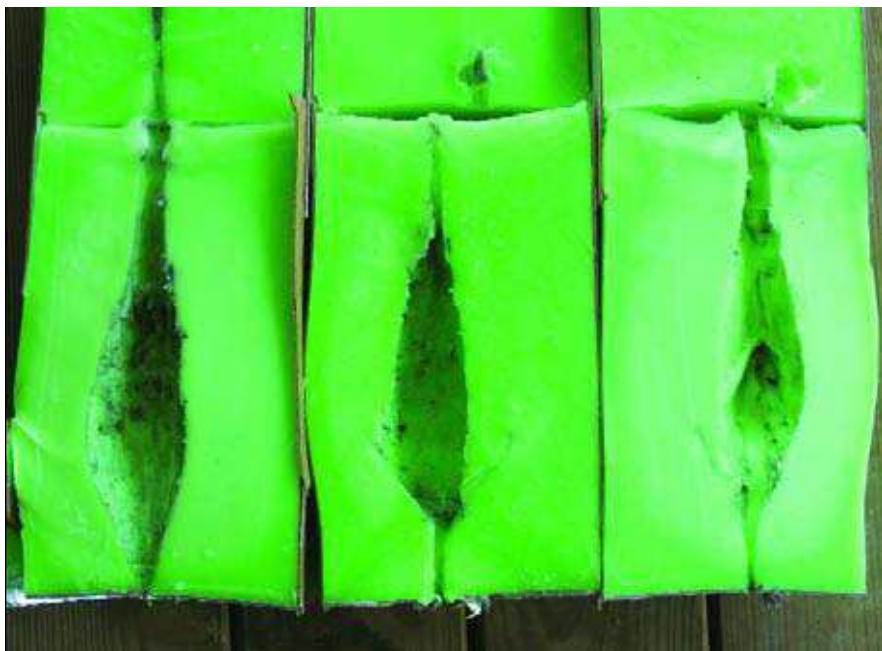
On bigger animals, a bullet that retains a majority of its weight kills more consistently. A bullet that loses half its weight may only poke a hole in one lung – or perhaps a shoulder, not vital tissue. Here a bullet that opens a less dramatic but longer channel in both lungs is more consistently effective.

Bullet expansion can be modified in several ways. A bullet that always partially disintegrates yet retains, say, two-thirds its weight tends to kill deer-sized animals more quickly than an expanding bullet that retains almost all its weight, yet the rear end penetrates deeply on larger game. This is the Nosler Partition, in smaller sizes the ultimate compromise bullet. (In larger sizes it loses far less weight, in order to deeply penetrate really big game.)

We can make a bullet that expands very widely yet

Three major factors affect how much vascular tissue is effectively destroyed.

lets on Big Game



Above, on left is the wound channel from a 125-grain Nosler Partition impacting at 3,200 fps, the bullet entering the Test Tube on the bottom. This channel is typical of most expanding bullets, the wound cavity starting almost on impact. On the right are two Test Tubes showing typical Berger VLD wound channels from a 140-grain 6.5mm at 2,950 fps and a 168-grain 7mm at 2,750 fps. Note that the bullet does not start expanding immediately.



And many bullets tumble after expanding (far more often than hunters suspect) destroying more tissue. But we cannot control this as we can expansion or velocity.

Recently many hunters have started judging big game bullets not by how well they kill animals, but on secondary characteristics such as exit holes and retained weight. Somehow it doesn't mat-

Below, this is a typical Berger VLD wound channel from a Test Tube with a 168-grain, .30-caliber bullet at 2,800 fps.

retains most of its weight. This is easily done by bonding the lead core to a relatively thin jacket of copper or gilding metal. This bullet will usually retain somewhere between 75 and 90 percent of its weight and expand to over twice its original diameter. This also tends to kill quickly, but penetration is limited by the wide "mushroom." This is the Norma Oryx, Remington Ultra Core-Lokt, Woodleigh, etc.

We can make a bullet that retains 90 to 100 percent of its weight and expands to less than twice its original diameter. This bullet will create a narrower wound chan-

nel but penetrate deeply. This is the late Combined Technology Fail Safe and all the varieties of the Barnes X-Bullet.

We can also combine various aspects of these designs, in bullets such as the Swift A-Frame, North Fork, Winchester MP3 and Trophy Bonded Bear Claw. But no matter the design, *all* hunting bullets operate somewhere along the continuum between total disintegration and solid.

Higher impact velocities tend to destroy more tissue, no matter how the bullet expands. Many hunters have noticed, for instance, how much quicker Barnes X-Bullets kill when cranked up to well over 3,000 fps at the muzzle.

ter if the animal ran quite a ways more before falling, as long as a recovered bullet retains at least 90 percent of its weight, or the bullet exited the animal and a big oak on the other side.

A few months ago, I was invited to go on a trip to New Zealand to test a bullet that behaves very differently than any hunting bullet on the market today, the Berger VLD. The initials stand for



This is where a Berger VLD starts, with a very consistent jacket. This cup has just been punched from a strip of metal.

Berger Bullets

BERGER BULLETS

At the moment Berger VLDs are made in .224, 6mm, .25, 6.5mm, 7mm and .30 calibers. Some are so long that the standard rifling twist of hunting rifles won't stabilize them. For instance, the 105-grain 6mm is recommended for one-in-8-inch twists, though there's also a 95-grain model that will stabilize in 9-inch twists, standard in 6mm Remingtons and also found in some .243 Winchesters. Berger is planning to introduce .270-caliber bullets in traditional 130-, 140- and 150-grain weights. Obviously, these will mostly be for hunting, as .270 has never been a popular target



Berger VLDs recovered from the Test Tube retain about 40 percent of their original weight.

rifle caliber (though that might change with the introduction of the Bergers).

Why don't the VLDs start to expand until inside an average big game animal? The best guess is

the extremely long ogive, combined with the tiny hollowpoint. When shot into The Bullet Test Tube, they retained an average of about 40 percent of their initial weights, but the Test Tube is an extremely consistent medium. In animals the recovered bullets showed a much greater range of expansion; sometimes only the twisted jacket was found, along with a few lead fragments.

Berger also makes some extremely accurate varmint bullets in .172, .204 and .224 diameters. For more information contact Berger Bullets, 4275 N. Palm Street, Fullerton CA 92835; e-mail: sales@bergerbullets.com; website: www.bergerbullets.com. •

Very Low Drag, an extremely high ballistic coefficient created by a long secant ogive, a tiny hollowpoint and a boat-tail. The VLD was designed for punching holes in paper targets, especially at longer ranges. The jacket's very thin, about .02 inch on average, and the lead core only contains .5 percent antimony. Most lead-core hunting bullets use cores with around 2.0 percent antimony.

In theory this would be a fine varmint bullet and a lousy big game bullet, prone to expanding on the surface of anything larger than a coyote. But some big game hunters had tried them, mostly

on deer but also on larger game, and reported incredibly fast kills – and no problems with surface wounds. The Berger people started to investigate.

These people included Walt Berger himself, a legend in bench-

On bigger animals, a bullet that retains a majority of its weight kills more consistently.

rest shooting. Walt started making his own bullets in the 1950s, in order to win more matches. Enough target shooters started using his bullets that eventually bullet-making became his career. Walt is what might be called

semi-retired now, living in Arizona, and the bullet plant in Fullerton, California, is run by his grandson-in-law Eric Stecker.

After hearing the hunting reports, Eric sent boxes of 7mm and .30-caliber VLDs to 160 mem-

bers of the North American Hunting Club who handload. The NAHC members hunted deer with them, reporting very quick kills and no failures.

The Berger company also hired a public relations firm, Ellis Communications of West Virginia, run by Chris Ellis. Another of his clients happened to be Ballistic Technology, Inc., the firm that makes The Bullet Test Tube, a wax-based media that I've reported on before in *Handloader*.

The obvious thing was to shoot Berger VLDs into Test Tubes. The results were interesting. Any expanding bullet tested before had started to expand almost immediately on impact. This helps ex-

The New Zealand countryside is mostly steep and green.





Above, John's stag was bedded on a hillside, 250 yards away. After being shot with a 185-grain VLD in the heart, it never got to its feet and in a few seconds rolled down the mountain a little ways. Above right, Walt Berger and Eric Stecker with Walt's huge stag, taken with a 115-grain VLD from a .257 Roberts through the liver. Right, the VLDs proved to be about the deadliest bullet on tough feral goats that the Wanganui guides had ever seen. Eileen shot this billy at just over 200 yards with a 115-grain bullet from her .257 Roberts, broadside through the lungs. The goat collapsed at the shot.



plain why most tissue destruction is near the entrance hole – and sometimes even starts at the entrance hole.

But the VLDs did not show any indication of expansion until they penetrated at least 1.5 inches into a Test Tube. This was strange, but it happened over and over. As the bullet expanded, it tore a huge hole.

Now, any test media cannot match what goes on inside a big game animal. Animals are made of bone, muscle, blood and internal organs of varying density.

Sometimes a couple of different kinds of test media (boards and wet newspaper, for instance) are combined to try to simulate this conglomeration, but nothing really simulates animal tissue exactly.

Consequently, some hunters remain skeptical of any test media, claiming the only real test is animals. This is obviously correct, but any industry uses some sort of simulation when developing products. It would be foolish, for instance, to send somebody up in a brand-new airplane without some wind-tunnel testing beforehand. This does not mean that wind-tunnels (or computer simu-

lations or bullet test media) will absolutely predict what will happen when a new airplane flies. But such tests are useful in product development, both because they can prevent disasters (whether crashed airplanes or bullets that bounce off deer), and because “test” and “real” results can be correlated, and the product can be tweaked using information from both sources.

Since the NAHC results did not include any extensive autopsies of deer, the folks at Berger de-

Berger Bullets

CABELA'S OPTICS

Cabela's also partially sponsored the trip to New Zealand, and we used the company's clothing and optics. The GORE-TEX® outfits worked just as advertised on the rainy days, and the optics in general were more than adequate. I had been using one of Cabela's 3-9x Alaskan Guide scopes for several years, and put it on my NULA .30-06, while Eileen used a new one on her NULA .257. Hers had to be readjusted slightly after a couple of days of hard hunting (and riding around in ATVs) but that often happens in new scopes.

We also tested a couple of Cabela's Pine Ridge 3-12x scopes with adjustable turrets, one on the Cooper Arms .257 that Walt used on his red stag, and one on Chris Ellis's .300 Winchester Mag-



John and Eileen used Cabela's 10x42 Euro binoculars in New Zealand.

num, made by Charley Sisk. Since these were made in China and only retail for about \$200, I was especially interested in how they worked. Chris made several shots from 300 to 500+ yards, once we figured out the difference between the "standard" settings for 180-grain .300 Winchester loads and the flatter-

shooting VLDs. After measuring the range with our Cabela's range-finders, Chris would click in and start dropping animals. Particularly impressive was a string of three consecutive kills between 312 and 442 yards on one rainy day.

Eileen and I used Cabela's 10x42 Euro binoculars, made by Meopta. We were familiar with them from a sample sent when they were introduced a couple of years ago and were just as impressed with the latest model. At \$800 or so, they are right at the front of their price-class optically, and they helped enormously in finding any sort of game. In fact, the guides frequently asked to borrow mine. For more information on these binoculars contact Cabela's online at: www.cabelas.com. •

cided to go to West Virginia and shoot some feral pigs with Chris Ellis and Richard Mann, the inventor of The Bullet Test Tube and a widely published gun writer. The autopsy results matched the Test Tube's, but only a few pigs were shot.

So they decided to do a bigger field test in New Zealand, where a bunch of animals could be shot and carefully cut open, both in order to see how consistently the bullets worked and how their on-game performance correlated with results from the Test Tube. On this trip they decided to invite another firearms/hunting writer, namely me, just in case things did work out the way they hoped. (Inviting writers to places like New Zealand is a good way to get them to come along.)

Altogether seven shooters hunted with Wanganui Safaris (PO Box 7227, Wanganui, New Zealand; www.wsafaris.com) on the upper reaches of the river of that name, close to the ridge of volcanoes that bisects the North Island. Our group included Walt Berger, Eric Stecker and Mark Durfee of Berger; my wife,

so the first afternoon we shot Chris Ellis's handloads in a pair of .300 Winchester Magnums belonging to Paul Bamber, owner of Wanganui Safaris. Primarily we were after feral goats. These have inhabited New Zealand for centuries and are a major pest, since the island has no natural predators.

I was invited to go on a trip to New Zealand to test a bullet that behaves very differently than any hunting bullet on the market today, the Berger VLD.

Eileen, and me; and Chris Ellis and Richard Mann. The rifles used were a pair in .257 Roberts (115-grain VLD at 2,900 fps); a .264 Winchester Magnum (140 at 3,000); a pair of .30-06s (168 at 2,900 and 185 at 2,800) and a .300 Winchester Magnum (168 at 3,100 and 185 at 3,000 fps).

The field tests started slowly, because the small plane from Auckland didn't have room for our rifle cases. Our ammunition was in our duffle bags, however,

Richard and I did the shooting that afternoon, with mixed results, partly because we weren't shooting our own rifles. We started a couple of hours before dark and killed three goats. Richard spined one at about 300 yards, while I shot another a little low in the shoulder at 350. However, even with a low shot, the billy traveled less than 100 yards, wounded severely enough that I could walk up within 20 feet and put another bullet in its neck. A female I shot a little too far back,

**Berger
Bullets**

with an angling shot, went about 75 yards and died.

When Paul Bamber heard all this, he took a look at a VLD sticking out of a .300 Winchester case and told us the bullet would never work, that goats were the toughest animal in New Zealand, far harder to kill than a 400-pound red stag. What we needed were some roundnosed bullets with lots of lead exposed.

Our rifles showed up late that evening, and Chris, Eileen, Richard and I took a hike along a mountainside with Mike Ranginui, a 20-year-old New Zealand guide. We shot goats, and shot goats, and shot goats, at ranges from 20 to 400 yards, and in the end Mike said the VLD was about the best goat bullet he had ever seen.

At first what we wanted most was a clean, broadside lung shot. Mike said goats normally go 50

yards or more before falling from such a shot. Eileen spotted a big, black billy across a canyon, laser-ranged at 207 yards. At the report of her NULA Model 20 .257 Roberts, the goat dropped and rolled down the hillside, dead on its feet from a broadside lung shot.

We killed a few others over there, including another broadside lung shot from Chris's .300 Winchester. All dropped right there. Chris volunteered to do the autopsy cutting, and every goat showed the same pattern: an entrance hole so small that we had to part the hair to find it, then a very tiny wound channel a couple of inches long – even when the bullet hit shoulder blade – and then massive destruction inside the chest cavity, two to three times more than I've seen with any big game bullet.

Most bullets exited, but New Zealand feral goats, no matter

how tough, are relatively small animals. Even a big billy is only about the size of a South Texas whitetail buck, the reason we'd also arranged to shoot four big red stags, averaging around 400 pounds.

These were taken the next day. Mine was first, found bedded 250 yards across a canyon. The stag was angling slightly away, the vital chest area barely visible. Richard, Chris and I debated for at least 10 minutes whether to shoot the stag in its bed or wait until it stood. Bedded animals are tricky targets, but bedded animals that leave suddenly can be even trickier. Eventually I waited for a lull in the wind and aimed for where we guessed the heart lay. This exact spot would not be too tough to hit, since the 185s averaged .3 to .4 inch for three-shot groups at 100 yards from my NULA Model 24.

The shot essentially paralyzed

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the stag. He extended the leg in front of the bullet's impact, leaned his head back, and rolled down the mountain about 15 yards, dead. When cut open, the

heart was turned inside out, like a woodchuck hit with a .220 Swift, but there was that tiny entrance hole again, with no evidence of expansion until the

bullet made it inside the ribs. We found the twisted remains of the jacket on the far side.

Both Richard's and Chris's stags were shot at 150 to 200 yards, standing up, with lung shots. Both dropped at the shot, and both bullets exited.

But it was Walt's stag that really astonished me. I got to go along, and the four of us – Walt, Eric, head guide Lee Winterburn and me – ended up on a ridge overlooking a flat where several big stags had been feeding each morning and evening. Walt wanted a really big one, and the third stag out of the woods had huge, palmated antlers with points going every which way. Lee said that was the one.

The stag stood just under 200 yards away, angling slightly toward us. The ideal shot would be tight behind the shoulder. At the report I saw dust puff about 10 inches behind the shoulder, and the stag humped up and started walking very slowly toward the timber, 70 yards away. Walt's .257 was a single-shot Cooper bolt action, so I started to raise my .30-06. I never even got the stag in the scope before it fell dead, about 15 feet from where it had been shot.

It turned out the bullet had turned the liver into liver-burger, then gone on and shredded the rear half of the lung beyond. Walt knew it was a "bad" shot and was ticked at himself, but the stag died within seconds.

We saw similar results from goats hit a little too far back. Any hit from the diaphragm forward put them down within 25 yards. Double lung hits normally dropped them instantly, and no animal shot in the lungs went more than 15 feet. Altogether we killed 30 animals, mostly goats, but also one feral sheep and a female fallow deer Eileen took with a head shot for the lodge's table. Ranges ran from 20 to 531 yards (lasered), and the range really



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Close to 200 big game animals have been killed during field-testing.

didn't seem to matter. The bullets went in a couple of inches before expanding, then *really* expanded. The .30 calibers did more damage at the longer ranges, but that's to be expected, and the .257s and .264 did very well out to 300 to 400 yards, the longest shots attempted with either.


The bad rap on such "tender" bullets is that they'll sometimes expand too quickly, creating a surface wound rather than tearing up the vitals inside the chest. This never happened, even on shoulder shots. I propped up one dead lung-shot billy goat and shot it through both shoulders at 10 yards with the .30-06. The bullet went right through both shoulder joints. Even the head-shot fallow doe showed the typical VLD expansion: a tiny entrance hole through the skull just beneath the ear, then de-

struction of the far side of the skull.

I'd hoped we'd take more like 50 animals during our stay, but the last two days it rained hard almost all day long. We did go out, slipping and sliding in the lodge's ATVs, and shot some goats but not nearly as many as on nicer days. Between the NAHC deer hunters, the pigs in West Virginia and the trip to New Zealand, close to 200 big game animals ranging from 40 to 400 pounds in weight have been killed during field-testing of VLDs. None failed to penetrate, and in general the bullets killed very quickly, understandable when we opened up the animals and saw the amount of tissue destruction. The penetration results in the Test Tube matched those of many popular deer bullets, about 11 inches, but some hunters

have used VLDs on big bull elk and reported very quick kills.

The VLDs are very flat shooting. With my .30-06 sighted in 2 inches high at 100 yards, conventional 180-grain spitzers are 2 feet low at 400 yards. The 185 VLD at the same muzzle velocity was 2 feet low at 450 yards. Accuracy was also very good to excellent in our mix of custom and factory rifles. None grouped over an inch at 100 yards, and several essentially shot ragged cloverleaves. I would be comfortable using VLDs on any North American game from pronghorn to caribou, and probably will, partly because when placed correctly they do not shoot up a bunch of meat. The entrance hole is needle thin, and by the time what's left of the bullet hits the far side of the chest, the real damage has been done inside. ●



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