

# Broadheads, Arrows and Bowhunting Success

## The Ramblings of an Old Derelict Bowhunter

*By Dr. Ed Ashby*

**T**he wait for the right trophy animal had been long. When he finally arrived before the laboriously constructed blind, the wait for him to present the right shot had seemed interminable. Nerves were strained to the breaking point. Finally the shot was presented, and the hours of practice took over. Conditioned motor nerves aimed and fired the wicked looking arrow almost by reflex, and with deadly accuracy. The hit looked perfect. After a short wait, the blind was abandoned and the blood trail located. Foot by foot and drop by drop the blood trail had been followed, but after hours of diligent search the trophy could not be located. What could have possibly gone wrong?

Throughout my 35 years of big game bowhunting, I have seen and heard this same scenario repeated many times. The story seemed to become increasingly frequent as the years went by. Why? What was causing the increased frequency of apparently well placed hits resulting in wounded and lost animals?

The following are personal opinions and personal recommendations. Many may well not agree with them. They are, however, not opinions drawn from thin air but are, rather, based on the detail study, recording and analysis of several hundred big game animals killed with bow and arrow and, more importantly, the examination of a great number of arrow wounds that were non-lethal.

Examination of the shots which did not perform have proved of much greater value than examination of those which were lethal, for they often revealed the root cause of failures to reach the vital organs, or to do sufficient damage once the "kill zone" was reached. The opportunity to examine these non-lethal hits came during the Natal Broadhead Study.

Much of the information contained herein is a recap of that presented in detailed form in my previous articles on Broadhead Performance and the Tissue Penetration Index. Those articles were written with other researchers and the bowhunter with a technical bent in mind. Here it is presented without all the technical supporting data. It is hoped that this will result in a much more readable format. It is the basic "nuts and bolts" without all the engineering "why it works" background.

The selection of the broadhead and arrow used is the most important factor in determining if a hit will be lethal.

Next to sheer hunting skills, it is the biggest determinant of bowhunting success.

When I first began my bowhunting career there were few commercial broadheads available, and many bowhunters still made their own broadheads. Most were rigid heads based on designs centuries old. There were single blade heads, the oldest design, three blade heads, based on designs dating to medieval times, and a few, more modern, heads of four blade design.

At that time only a handful of contemporary bowhunters had challenged truly massive animals with bow and arrow. Art Young and Saxton Pope had taken grizzly and brown bear, lion and Cape buffalo with bow and arrows, using their long and narrow, homemade, single blade broadheads. Howard Hill, using broadheads of his own well known design, had taken an impressive array of large animals: elk, moose, bear, bison, lion, leopard, Cape buffalo, and even elephant with bow and arrow. Bob Swinehart, shooting the Howard Hill broadhead and the Ben Pearson Deadhead, had taken all of Africa's Big Five with his bow and arrows. Soon after I started hunting with a bow, Fred Bear and Ben Pearson both took brown and polar bears with arrows. Fred ventured to Africa where he took lion and Cape buffalo.

All of these hunters, except Fred, had used the time proven rigid single blade broadheads. Fred had used his original Razorhead, a rigid single blade head with a small bleeder blade insert made of a hard, brittle, carbon steel similar to the old blue steel razor blades. I well remember Fred saying that the purpose of the bleeder blades was to open a larger hole on the skin on entrance, and that they were designed to "shatter" on impact with any bone or "fold up" when they met firm resistance, allowing the main, rigid, single blade broadhead to penetrate deeply to do its deadly work. Fred felt that opening a large hole in the skin on entrance reduced the drag of the skin on the arrow shaft and also offered a better blood trail. The purpose of his bleeder blades was not to increase the cutting area of the broadhead as it penetrated deeply into the animal.

Still, the Razorhead was responsible for ushering in a whole new era in broadhead design. It soon became difficult to find quality single blade broadheads. Ben Pearson's fine

Deadhead fell by the wayside. Outside of the Black Diamond and the Howard Hill broadhead, a quality single blade broadhead soon became difficult to locate in any archery suppliers inventory. Then came the proliferation of replaceable blade broadheads. Blades of thin stainless steel, designed to be discarded and replaced after each shot, thus negating the need to laboriously sharpen the broadhead after each shot.

I, and many others, soon discovered that these "new and improved" broadheads, with their stainless steel blades, were not designed to withstand the impact of heavy bone, cutting through undamaged, or to shatter on impact, but rather would bend quite easily. It was concurrent with the advent, and wide spread use, of these new broadheads that I first noticed a marked increase in the number of animals being hit and not recovered.

These fragile, multiblade broadheads were not the only factor contributing to the increase in lost animals. Coinciding with their proliferation was the development of the compound bow. Its contribution was not a direct result of its design but was, rather, a bi-product. The compound bow's let off produced a less violent thrust to the arrow shaft. Compound shooters soon discovered that smaller and lighter arrows could be used with the compound bow as opposed to a conventional longbow or recurve of equal draw weight. The use of the lighter arrows resulted in increased arrow speed and flatter trajectory, which extended the effective window of the "hit range" on any given shot. The reduced drop of the lighter, faster arrow allowed the bowhunter to extend the range at which he could place his arrow in the kill area of an animal.

I have no intent to degrade the compound bow. It is an engineering marvel and, properly tuned, will transmit more energy to the arrow, in a given draw weight, than any conventional bow. It has opened the joys of bowhunting to many individuals who are not able to learn to draw, hold and shoot a conventional bow of adequate weight for big game hunting. The problem came in the misuse of the compound bow's available energy. Instead of transforming that extra energy into increased arrow momentum, lighter arrows were used to transform it into higher arrow speed, at the price of reduced momentum.

Manufacturers of broadheads responded to this demand for ever increasing arrow speed by designing lighter broad-

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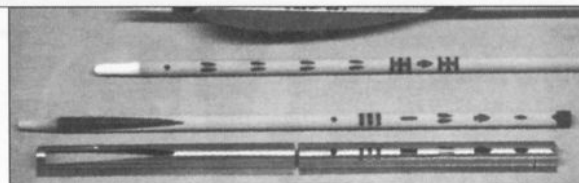
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heads, still clinging to their concept of replaceable multiple blades, of thin stainless steel, for "increased cutting area."

Let's now look at the facts which have emerged from the study of literally hundreds of both lethal and non-lethal hits with arrows on real animals, not from penetration tests on tissue as real as wood, ethafoam, leather or beef sides with the hide and bones removed.

The facts which emerge are: Many broadheads are fragile, bending or breaking on impact with bone. The rigid single blade broadhead is the least likely to be bent or broken. A broadhead which is bent or broken almost always assures inadequate penetration. Rigid single blade broadheads, of good quality, penetrate better than any multiblade broadhead in both soft tissue and bone. Single blade broadheads penetrate bone far better than any multiblade broadhead, whether of rigid or replaceable blade construction, and regardless of the presence or absence of any so called "bone breaker" tip. When bone is hit, heads with four or five blades penetrate better than heads having three blades. A single blade broadhead hitting the spine is lethal over 80% of the time, as opposed to a zero percent lethality for all multiblade heads in my research data.

Furthermore, when a rib is hit on entrance, a good single blade broadhead is three times more likely to be lethal than a three blade broadhead, and twice as likely to be lethal than a head having four, five or six blades. Single blade broadheads are more than twice as likely to produce an exit wound (which also results in a better blood trail, particularly when the entrance wound is high as in a shot taken from a treestand). Using my cumulative data in real animal tissue, when all shots are considered, the degree of wound inflicted by a rigid single blade broadhead (depth of wound channel times the total cut width) is equal to, or greater than, that inflicted by any multiblade broadhead.

Fortunately, there has been a remarkable resurgence in traditional archery in the last decade. Along with the proliferation of custom bow makers producing longbows and recurves, a number of major manufacturers now feature some traditional archery equipment in their product lines.



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Along with this renewed interest in the longbow and recurve has come a revival of the rigid single blade broadhead. Along with the Black Diamond and the Hill broadhead, both quality broadheads which never ceased production, there are many good single blade broadheads now available from which one can choose. Some of the finest single blade broadheads ever to grace the tip of a hunting arrow are available to today's bowhunters.

What constitutes a "good" single blade broadhead? I have several criteria. The broadhead must be of good steel, neither bending nor breaking when hard bone is hit. I prefer a broadhead of good carbon steel having a Rockwell hardness from 49 to 55. Such a head will break before it will bend, is darn hard to break, yet is still readily sharpenable with file and stone.

I prefer a broadhead which is long and narrow in shape. The ferrule should taper long and smoothly into the blade, with no abrupt junctures. Both Hill and Swinehart felt that a single blade broadhead 3" long and 1" wide offered the best penetration. Pope and Young used heads of similar dimensions for big game. I can agree up to a point. The longer the cutting blade for any given width, the better—so long as rigidity of the head is maintained. It is the ratio of the length of the broadhead to its width which is important in making maximum use of any given arrow's available energy to penetrate as deeply as possible. My research indicates that inadequate penetration is the number one cause of game, properly hit, being lost. Quality of the broadhead is important because a broadhead which becomes bent or dam-

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aged almost guarantees inadequate penetration.

Next to broadhead design, arrow shaft weight and diameter are the most important design features of a good hunting arrow. Pope and Young recommended, as a guideline, ten grains of arrow weight for each pound of bow draw weight as the optimum. My research indicates that they were not far off. A 70# longbow, such as Pope and Young used, shooting a 700 grain arrow, with a single blade broadhead of the design they commonly made, is adequate for all but the largest of animals. They had a limited selection of arrow shaft materials from which to choose. Their choices were limited to wood of various densities. Their favored shaft material was birch, which was a good deal heavier than the standard cedar shaft of their day.

My hard data on arrow mass (weight) and shaft diameter are less definitive than that on broadhead design. This is because of the difficulty in collecting a sufficient quantity of shot records. To be valid, all such shots must use the same broadhead and have the same momentum, but be with shafts of different weight and diameter. Research is suggestive that the minimum arrow mass should be at least 650 grains for "standard" big game animals to assure adequate penetration when ANY bone is hit or under adverse conditions (when things go wrong and the arrow does not hit precisely the perfect spot—and that still frequently happens to me!).

My standard hunting arrow is 710 grains. The shafts


are of compressed cedar. I have absolutely nothing against the use of the more modern shaft materials, be it fiberglass, aluminum or graphite. It is simply that I cannot currently get sufficient shaft stiffness and weight in a shaft of small diameter from these materials without resorting to the use of double shafts (one shaft inside another—a device which I sometimes do use when making really heavy arrows for the biggest of animals).

My favorite broadhead is the 190 grain Grizzly. In recent years, I have routinely narrowed these to 1" (or less) cut width, leaving the length at three and one-quarter inches. On the truly big animals, I have found that arrow mass of 900+ grains offers vastly superior penetration, all else being equal.

All else? Yes, the other factor which seems to greatly affect penetration is shaft diameter. On arrows having the same broadhead design and equal arrow momentum at impact, a shaft diameter larger than the diameter of the broadhead ferrule will have 33% less penetration than a shaft equal to the ferrule diameter and will penetrate only 60% as much as one with a shaft diameter smaller than the broadhead ferrule. My compressed cedar shafts are very slightly smaller in diameter than the ferrule of the Grizzly broadheads I use.

It matters not one bit what bow you shoot. The compound is more efficient, giving more arrow momentum per pound of bow draw weight. The longbow and recurve bow are less efficient but, I feel, offer an additional challenge to one's hunting skills and are even superior in some hunting situations—but that is for another story.

So here, in a nut shell, are my personal recommendations for consistent bowhunting success. Select a quality



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single blade broadhead of good steel and of long and narrow shape. Mount it on as heavy a shaft, of as small a diameter, as your bow will handle while still maintaining reasonable trajectory. Remember to reach at least 650 grains of total arrow mass for most big game animals and 900 grains if after one of the super heavies. Study your quarry's habits until you know it better than it knows itself. Practice, practice, and practice. The heavier arrows will definitely cost you some range, so spend the time to get closer to your game before shooting. Expend the necessary time and energy to get the broadheads really sharp (and that's a whole different subject, too). And, lastly, remember that "stupid persistence" always prevails—never give up.

By following the above steps in arrow and broadhead selection can I guarantee 100% success, given any reasonable hit? Not exactly, but I can only remember hitting two animals out of several hundred taken with such an arrow and broadhead in my long, and sometime spotted, bowhunting career which did not end up hanging in my camp. One was a Minnesota black bear shot with a 115# longbow and a Howard Hill broadhead. It was a forward quartering shot, and arrow penetration was complete. Within 20 yards of where it was shot that bear plunged over a steep bank and into an incredibly thick cedar swamp, with chest deep water, and I totally lost the trail and was never able to locate him. The other was a mule deer shot in Colorado with an 81# Panther recurve and a, then still prototype, Ben Pearson Deadhead. The blood trail ended with a puddle of blood and a body print, just five feet from a jeep trail—and I'm pretty sure it ended up in someone else's freezer!

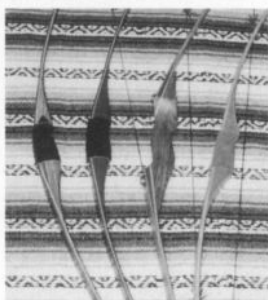
That, in total, is my own formula for bowhunting success. Develop your hunting and shooting skills, as any bowhunter should, give some thought to selecting the right hunting broadhead and arrow, be persistent in your hunting, and it is highly likely that you will find your trophy, quite dead, at the end of a rather short blood trail!



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