



# Field Comparisons of Various Expanding Bullets

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*Left to right - Partition-style bullets. Swift 9.3 mm 300 grain A-Frame before and after firing into elephant followed by Nosler 9.3mm 286 grain Partitions before and after firing into elephant. The Swift A-Frame is a far superior bullet to the Nosler Partition whose performance is only mediocre compared to other bullets tested.*

## Introduction

There are so many different types of expanding bullets available to the hunter today that it makes choosing one to use on safari quite difficult. Each manufacturer touts the supposed technical advantages of their bullets, but without trying them in the field it is difficult for the hunter to determine what works well and what does not. To compare some of the bullet structures currently available, I tried them out on elephant carcasses during a recent safari. Although no expanding bullet is designed for use on elephant, elephant carcasses made a convenient test medium to compare the performance of various expanding bullets.

## The Tests

For this article I tested nine different types bullets fired from a 9.3 x 62 mm Mauser. This test included both premium and non-premium bullets. Premium bullets are called "premium" not only because they cost more, but also because they include a mechanism to control expansion. Non-premium bullets can over expand and even break apart when stressed severely. Examples of premium features include an internal partition structure (Nosler, Swift), a lead core bonded to a copper jacket (Woodleigh, North Fork, Rhino, Norma Oryx), a thickened jacket (Rhino), a solid shank design (North Fork, Rhino), monometal or monolithic construction (GS Custom and Barnes X), and driving bands on the exterior of the bullet (GS Custom and North Fork).

The bullets were tested for expansion, penetration and weight retention by firing them into the torso of fresh elephant cadavers. Heavy bones were intentionally avoided. The elephants were opened with the precision available to those

working in the field, bullets recovered, and penetration depth noted. Each bullet was fired at a maximum velocity within safe pressure ranges. A summary of each bullet and analysis are provided below.

## Bullets Tested

All of the bullets tested were 9.3mm calibre, fired from a 9.3 x 62. **BARNES** - Barnes offers a 286 grain Barnes X bullet of solid copper construction. It has a hollow point in its nose which expands to form 4 petals which can serve to cut flesh and increase bleeding. Expansion will not continue beyond the bottom of the hollow point. However, the petals will break off if the bullet is pushed at high velocity or hits heavy bone. This bullet fouled the bore of my rifle very quickly, which is a bit irritating, especially when there is no copper remover handy. It also lacked the accuracy that many of the other bullets in this test achieved easily. However, in my test the Barnes X penetrated well, expanded perfectly, and retained all of its original weight. Initially that sounds very good, but the reader should still use caution with regard to Barnes X bullets. Barnes X are very long for their weight, and tend to destabilize and tumble in game more readily than lead core bullets. This seems to have been a particular problem with the .416 400 grain Barnes X bullet and the .458 500 grain Barnes X bullet. Disturbing field accounts of bullets skidding around the edge of a rib cage instead of entering it can be attributed to the bullet losing stability on striking flesh or bone even though it was stable in air. The reason for this would be that the ultra-long Barnes X is too long for that particular rifle to stabilize. The solution is to go with an aftermarket barrel that

has a faster twist, or to select a Barnes X bullet that is 10% lighter than standard for the calibre (350 grains for .416 calibre and 450 grains for .458 calibre). A lighter bullet is not as long and therefore tends to avoid the instability problem. Overall I would rate the Barnes X a good bullet for heavy game as long as excessive bullet length can be avoided. The new Barnes TSX should prove to be about the same, although its grooves (which Barnes improperly calls "bands") are so large as to fail to perform according to the principles of a driving band bullet. Reports so far are that accuracy is very good with the TSX but bore fouling remains a problem. Website - <http://www.barnesbullets.com/>

**GS CUSTOM** - GS Custom's 260 grain HV bullet is made from solid copper. It is a long, sleek bullet suitable for long range shooting. It has a hollow point to begin expansion, and the solid copper material limits expansion at the base of the hollow point. The exterior of the bullet is moly-coated and has driving bands which engrave on a rifle barrel's rifling with very little pressure. This helps to avoid pressure spikes, permits higher velocity loads, reduces obturation of the bullet, increases accuracy, and reduces copper fouling. My experience has been that the bullet is very accurate. This bullet combines excellent performance on game with everything that an extreme long range bullet should offer. I would rate the GS Custom HV an excellent bullet for long range and for medium game. However, there were other bullets tested that probably offer stronger performance for heavy game. GS Custom also offers a flat nose solid bullet which picks up where the HV leaves off. Website - [www.gscustom.co.za](http://www.gscustom.co.za)

**LUTZ MOELLER** - Lutz Moeller of Germany offers solid copper, hollow point, boattail, driving band bullets of very light weight called the Kupferjagdgeschöß. The bullets are extremely accurate and are excellent for long range use. The fact that the bullets are light-for-calibre allows velocities to be pushed high in order to achieve a flat trajectory. In my tests, the Lutz Moeller bullets blew their nose off and lost a lot of weight, causing me to believe that they will be best when used on light game. However, they are very accurate and achieve surprisingly high velocities. Website - <http://home.snafu.de/l.moeller/>

**NORMA** - Norma's 286 grain Oryx is a bonded core bullet having a lead core and a jacket of copper gilding material. It is similar in design to the Woodleigh soft nose. Bonding of the core to the jacket must produce some effect because the Norma Oryx held together better than I would have expected. For general plains game hunting, the Norma Oryx is a very good bullet. However, for heavier game, better performance can be found from several of the other bullets tested. Website - <http://www.norma.cc/>

**NORTH FORK SOLID SHANK SOFT** - North Fork's 286 grain soft nose semi spitzer bullet features a solid shank design, a lead core in the nose that is bonded to the jacket, and a driving band design. The use of a lead core in the nose followed by a solid shank allows the North Fork soft to open up over a wide range of velocities, but expansion stops when the shank is reached. Use of lead also makes this bullet shorter and more stable than a Barnes X. Bonding of the lead nose core to the jacket assures very high weight retention. This is probably the ultimate bullet for the hunter who prefers lead in his bullet, and it performed very well in my tests. Website - [www.northforkbullets.com](http://www.northforkbullets.com)

**NORTH FORK CUP NOSE** - North Fork offers another expanding bullet in addition to its soft nose. It is a 286 grain cup nose solid. This is a monometal bullet made of copper. It has a cup-shaped divot in its nose which acts like a large hollow point to start expansion and increase the effective cross sectional area of the bullet. However, the cup of the cup nose is not very deep, so expansion is fairly minor and is absolutely controlled by the monometal construction. Driving bands keep pressures low, velocities high, and avoid copper fouling. Of all the bullets tested, this one is without a doubt the most rugged and is suitable for the toughest of game where an expanding bullet

would be used. I would rate the North Fork Cup Nose as the best choice for use on heavy game where the shooting angle may require deep penetration. Website - [www.northforkbullets.com](http://www.northforkbullets.com)

**NOSLER PARTITION** - Way back in the bad old days when bullets were fragile and game was frequently lost due to bullet failure, John Nosler had the idea of adding a partition structure to the middle of the bullet. The partition provided a physical wall past which expansion could not take place, guaranteeing that the bullet would retain about 2/3 of its original weight. This was a very significant advance in its day, and for many years Nosler was the only premium bullet. Nosler remains a good bullet today, and is very popular with North American hunters. The design has changed little since John Nosler's original work, and technical advances made by others have not been incorporated into Nosler's Partition® bullet. Consequently, many of the other bullets mentioned in this article outperformed Nosler by a wide margin. Hunters wanting the deepest penetration, highest weight retention, or greatest accuracy will not find the Nosler Partition® the most attractive offering. Website - [www.nosler.com](http://www.nosler.com)

**NOSLER BALLISTIC TIP** - The Nosler Ballistic Tip is a lead core bullet with plastic tip. The lead core is not bonded to the jacket. Many scorn this bullet for hunting because so many failures have been reported. Personally I have experienced four failures on game with the Nosler Ballistic Tip. However, in this test, the Ballistic Tip held together far better than I expected. Without driving bands, the A-Frame tends to foul bores more rapidly than I would like. Website - [www.swiftbullets.com](http://www.swiftbullets.com)

**WOODLEIGH** - Woodleigh's 286 and 320 grain soft nose bullets feature traditional bullet with a lead core inside a copper jacket, with the addition of bonding between the core and the jacket. Bonding the core to the jacket serves to control expansion and resists overexpansion. However, because the Woodleigh has no physical feature to absolutely stop expansion beyond a certain point, it is possible to overexpand a Woodleigh soft by firing it at a velocity higher than that for which it was designed. Woodleigh softs which are fired at excessive velocity tend to turn inside out until they look a bit like a badminton birdie. Overall the Woodleigh soft is a very fine bullet if kept within its velocity window. In my tests the 320 bullet was remarkably better than the 286 grain bullet. That leads me to think that going a bit heavy on the bullet weight in every calibre when using Woodleigh softs may be advantageous. Website - <http://www.woodleighbullets.com.au/>



*Left to right - Solid copper bullets. Barnes X 9.3 mm 286 grain bullet new and recovered from elephant, followed by North Fork 9.3 mm 286 grain Cup Nose new and recovered from elephant. The North Fork achieves lower pressures, higher velocities, less copper fouling, more penetration and greater accuracy than the Barnes, and the author feels the North Fork Cup Nose is an ideal buffalo bullet.*

### Bullet Expansion & Penetration Data

The following is a summary of the data collected per the tests described above.

Bullet	Weight (grains)	Retained Weight (grains)	Retained Weight (%)	Penetration depth (inches)	Velocity (fps)
Barnes X	286	286	100	30	2395
GS Custom HV	265	200	75	22	2575
Lutz Moeller					
Kupferjagdschoß	183	90	49	9	2938
Nora Oryx	286	247	86	11	2388
North Fork solid shank soft nose	286	282.5	98	30	2350
North Fork cup nose	286	285.5	99	42	2448
Nosler Partition	286	217	75	23	2378
Nosler Ballistic Tip	250	152.5	61	5	2594
Rhino	286	280	98	28	2371
Swift A-Frame	300	298.5	99	42	2297
Woodleigh RN	320	305	96	40	2244
Woodleigh RN	286	269	94	20	2415

### Analysis

The North Fork cup nose penetrated deepest, produced a good wound channel, and had an extremely high percentage of weight retention. It is a great bullet for heavy and medium game. The North Fork solid shank soft nose creates a more traditional mushroom, which meets with greater resistance in the animal and penetrates a bit less. It is an excellent bullet too, however, and may be better than the cup nose for mid-sized game like kudu and waterbuck. The Rhino bullet stays together extremely well, and its four petals seem to cause a lot of tearing in the wound channel which increases blood loss. But the Rhino lacks driving bands, so it may reach peak pressure at a lower velocity than the North Forks. The Barnes X did well in the tests, but occasional field reports raise a concern about tumbling due to excessive length.

Woodleigh bullets in general are excellent within their velocity envelope, but because they are of a lead core design, there is nothing to stop them from overexpanding. The Woodleigh's used in this test overexpanded a bit, but still performed extremely well. The Norma Oryx is similar to the Woodleigh softs, but with somewhat inferior performance.

The GS Custom HV did extremely well even though it started off 26 grains lighter than the other bullets tested. Weight retention was excellent, and penetration was very good. This bullet would be a fine choice for long range shots at medium game, but would not be my first choice for heavy game.

The Barnes X did reasonably well, but it caused copper fouling after only ten shots or so, and accuracy was below my expectations. I understand that Barnes has made a partial attempt to address these problems with their new Triple Shock bullet, but at the time of this test, Triple Shocks were not available in 9.3 mm calibre. As for penetration, the Barnes X was good but not nearly the best.

The Nosler Partitions were reliable, as they always are. Although they lost their nose while penetrating an animal, penetration was still reasonable. Back in the days when Nosler Partitions were the only premium bullets, they were clearly the best choice. Today, there are several bullets which outshine the Nosler Partitions by a wide margin, including the North Forks, Swift A-Frame, GS Custom, Woodleigh and Rhino.



*Left to right - Solid shank bullets. North Fork 9.3 mm 286 grain solid shank soft nose before firing, followed by two of the same fired into elephant. Next is a Rhino 9.3 mm 286 grain soft nose before firing, and another fired into an elephant.*



*Left to right - Woodleigh 9.3 mm 320 grain soft before firing, followed by the same recovered from an elephant. Next, Woodleigh 9.3 mm 286 grain soft before firing, followed by recovered bullet. The Woodleigh 320 grain soft had far greater penetration than the 286 grain and the author would favour the 320 grain for hunting any game over 400 pounds. Although Woodleigh bullets have the lead core bonded to the jacket, they can still overexpand if pushed too fast or if they hit heavy bone.*

*Left to right - Nosler 9.3 mm 250 grain ballistic tip before firing followed by the same bullet recovered from an elephant. Although the bullet held together, penetration was very shallow. At higher velocities the author has experienced complete failure of this bullet on game. Next is a Norma Oryx 9.3 mm 286 grain soft followed by two of the same recovered from elephant. The Oryx seems a fine bullet for medium game.*



If you want to use the best that there is, I would recommend either of the North Fork bullets, the Rhino, the Swift A-Frame or the Woodleigh (preferably the heaviest Woodleigh you can get). On medium game, particularly at long range, the GS Custom HV should be excellent, and for light game at long range the Lutz Moeller bullet can totally change the character of your rifle. That may be a long list, but it only means that we are graced with many fine bullets available today.

**Caveats**

Although the bullet expansion/penetration tests described above were performed under as consistent conditions as reasonably possible in the field, the fact remains that bullet placement and angle were not identical for each bullet, nor can the anatomy of different members of the same species be considered to be identical. Consequently, the bullets may have faced slightly different penetration challenges from each other, but there is no way to take that into account when interpreting the data.

Another issue is bullet stabilization. It is thought that bullets yaw upon leaving the muzzle, but that the yaw is reduced and the bullet stabilizes somewhere between 10 - 75 yards from the muzzle. This is referred to as the bullet "going to sleep". Most bullets go to sleep about 20 to 25 yards from the muzzle. If a bullet strikes its target before going to sleep, it may tumble or veer off course,

and penetration can be reduced. The chance of this occurring is increased with excessively long bullets, such as the Barnes X bullet. All of the bullets documented for this article were fired into animals from a distance of less than ten yards simply because longer distance shooting at cadavers was not practical, so there was not sufficient opportunity for the bullets to go to sleep. Penetration results might vary somewhat from those documented in this article for bullets fired from a greater distance.

The number of bullets that I tested for each brand and bullet type is not sufficient to create a statistically reliable sample space, so it is possible that if this test is repeated, somewhat different results may be observed.

Additionally, I have not tested any of these bullets at reduced velocity, such as the lower velocities the bullets would be traveling at when striking an animal at 300 yards distance. 🐾



*Left to right - Solid copper driving band bullets. GS Custom HV 9.3 mm 265 grain bullet followed by one of the same recovered from elephant. Lutz Moeller 9.3 mm 183 grain Kupperjagdgesschoß bullet followed by the same recovered from elephant. Both bullets were extremely accurate and are excellent for long range. Velocity from the Lutz Moeller bullet is surprisingly high owing to its light weight and minimal contact with the bore.*

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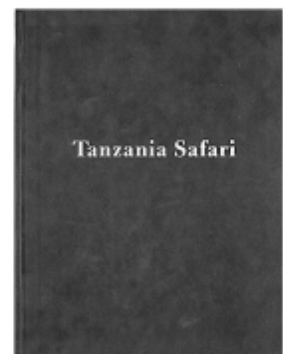
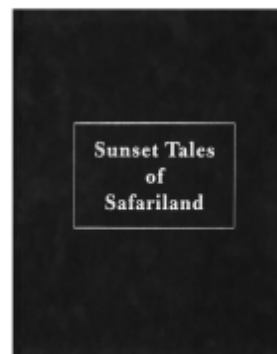
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