



The Dr. Ashby studies.
Breakdown. Part 5

In part 5, I will look at the 2007 update part 3. In this update, Dr. Ashby is looking at two things. Extreme FOC and internal footers. In this test, three bows are used, 82lb at 27", 70lbs at 27", and 54lb at 27".

The first test was the 82lb longbow. The arrows are all built with an internal footer. All shots were for a punishing test—the shots were either on direct or angle shots on an adult buffalo's upper leg bone.

The arrows used a 100gr brass insert and 100gr steel adaptor with the 190gr grizzly broadhead. The MA on this head is 2.75. One of the sets uses the modified grizzly, which puts that broadheads MA 3.25.

The shots were taken at close range. Dr. Ashby did this to keep the arrows in "paradox" at impact.

After this, no more information as far as data numbers are given. He starts into a second build. Interesting how or why he does this.

The next arrow build is a carbon express heritage. Spine not noted—internal footer with 100gr brass insert, 125gr steel adapter, and the modified grizzly broadhead. The modified broadhead has a MA of 3.25. total arrow weight is 790gr, FOC is 26.3%. Impact kinetic energy is 38.94, and momentum is .523.

The first test was on the scapular taken at an angle with six arrows. The angle noted was 37° to 38°. One-shot penetrated 14.125". the other two shots showed penetration of 10.5" and 11.25". Now here is the odd part of the test. The next three arrows he does not give the penetration, just the average of all six. The average being 9.6".

Chart 1
Scapular shots.

	mass	FOC	KE.	momentum	pen in
arrow 1	790	26.3	38.94	0.523	14.125
arrow 2	790	26.3	38.94	0.523	10.5
arrow 3	790	26.3	38.94	0.523	11.125
Average pen.					11.917

arrow 4	790	26.3	38.94	0.523	?
arrow 5	790	26.3	38.94	0.523	?
arrow 6	790	26.3	38.94	0.523	?

given average pen."	9.96
---------------------	------

Decrease in penetration.	16.42%
--------------------------	--------

As you can see, looking at the three arrows, the data was given shows an average penetration of 11.917". Without the other data provided and just the average, the last three arrows caused a decrease in penetration by 16.42%. What happen? He states three of four arrows impacted the scapular flat with 75% penetrating an extremely adverse angle. No other shots penetrated the flat at the shooting angle of 45°. Why give measurements of penetration on three arrows and not the other three?

The next test is broadside shots. The shots were taken at 20 yards on a very large buffalo; out of the five arrows shot, one hit somewhat high in the shoulder. Penetration on the arrow was 18.875". Average overall six was listed as 21.86". Five of the arrows gave exit wounds. Dr. Ashby lists an average of 23.875" for the five arrows.

He compares these arrows back to arrows in 2005 part 5. He talks about a norm/high FOC arrow of 900gr at .53 momentum to have the same amount of penetration. This is where he is showing a lighter arrow with EFOC outperforms a norm/high FOC. When comparing arrows with FOC, he lists the FOC in the EFOC range (19.1% to 30%) but never list the FOC when its norm/high. There could be a large gap between FOC. Norm/high FOC is (0% to 19%).

Dr. Ashby then continual talking about comparing back to the testing in 2005. Very confusing when writing this way. If you are going to bring up past data, you need to show that data.

Right in the middle, he brings up a test with a 553gr arrow. There is zero data on the arrows other than he has four, and they are low FOC. Dr. Ashby states in FOC, we have normal (0% to 12%), high (12.1% to 19%) extreme (19.15 to 30%), and ultra-extreme (31.1% and greater). Now he comes in and writes low FOC. What is low FOC? For whatever reason, he does not want to give all data. Three of these arrows break on, impacting the on-side ribs, giving an average of 5.21" of penetration. The one arrow that doesn't break gives an average of 14.125" of penetration. He states he had forgotten to bring any more of these arrows, so he stopped the test. The question is, why did the arrows break. Did he not build them to the number 1 of his 12 penetration factors? It looks to me that he wants the reader to think it was due to the low FOC. Any arrow built properly will not break on impact no matter what the FOC is.

Now we are at the testing done on the 70lb long bow. This test's arrow is a Cabela's 45-60 outfitter, at a total of 756gr, 190gr grizzly broadhead (MA 2.75), 100gr brass insert, 125gr steel adaptor. FOC is 27%. The arrow has an impact kinetic energy of 33.84 and momentum of .477.

Nine shots were taken, broadside from 20 yards. Three of the arrows hit low in the shoulder with leg bone being hit. He talks about how one arrow fractured, giving only 9.75" the second arrow deflected of leg bone giving an average of 11.375" of penetration. The third arrow hit square on the leg bone, giving only 6" of penetration. The next six arrows were shot back of the shoulder. The average penetration of these six arrows was 15.65."

Next, he starts in on the comparison of the 82lb bow vs. the 70lb bow. Here we must bring up a few things. When testing for comparison, you want to remove as many variables as possible. Dr. Ashby doesn't seem to follow this type of rule for testing.

The 82lb bows arrows use the modified grizzly broadhead, and the 70lb uses the 190gr grizzly broadhead. Why is this important to know. Remember above I stated the modified broadhead has an MA of 3.25, and the 190gr grizzly has a MA of 2.75. in the 2004 update, part 1 shows the modified broadhead had a 26% increase in penetration over the standard 190gr grizzly broadhead.

Chart 2

	mass	FOC	KE.	momentum	MA.
70lb bow	756	27	33.84	0.477	2.75
82lb bow	790	26.3	38.94	0.523	3.25

			Gain/loss.		
	mass	FOC	KE.	momentum	MA.
70lb bow	756	27	33.84	0.477	2.75
82lb bow	4.50%	-2.59%	15.07%	9.64%	18.18%

Dr. Ashby writes between the two arrows. The 82lb set up had 39.7% more penetration than the 70lb. Looking at the charts, what gives the 82lb bow a 39.7% increase in penetration. There is only a 4.55 increase in mass and a decrease of 2.59% in FOC. I would call that a wash. That leaves us the MA of the broadhead and the kinetic energy. I would say it's both giving the 39.7% increase, but the MA would be the most significant factor. If the test had been done correctly, the MA would not have been a factor. So, we do not honestly know which one was the most significant factor. Note the 39.7% increase was what was measurable. The actual penetration difference would have been more significant.

Now he talks about comparing a 70lb EFOC arrow vs. an 82lb bow with norm/high FOC. There are three different arrow builds. The 70lb bow's arrow has a total mass of 756gr, broadhead MA of 2.75, and EFOC of 27%. The second arrow is for the 82lb bow. That arrow is 736.9gr. The FOC is listed as norm/high. This means we have no clue, so we have zero comparisons. The broadheads used are a mutable type of heads, which means we have no clue to the heads' MA. The third arrow, 792.2gr FOC, is norm/high. The broadhead is the 190gr grizzly, MA 2.75.

The test was done on a large trophy male Asian buffalo with all shots being broadside and back of shoulder, rib impacts only.

Chart 3

	mass	FOC	K.E.	momentum	MA	avg pen"
70lb	756	27	33.84	0.477	2.75	15.63
82lb	736.9	?	?	?	?	9.83
82lb	792.2	?	38.94	0.523	2.75	12.5

	gain/loss over the 70lb bow					
	mass	FOC	K.E.	momentum	MA	avg pen"
70lb	756	27	33.84	0.477	2.75	15.6
82lb	-2.53%	?	?	?	?	-37.11%
82lb	4.79%	?	15.07%	9.64%	0.00%	-20.03%

One thing to look at in this test is the kinetic energy and momentum. Both have an increase over the 70lb bow, but the 70lb bow increases 37.11% and 20.03% of penetration from the 82lb bow.

Can we see why? Yes. Let's compare the 70lb to the 82lb bow with the 736.9gr arrow. Even though Dr. Ashby did not give the kinetic energy or momentum, it will be close to the 792gr 82lb set up. Why the 37.11% decrease in penetration? We look at the FOC and MA. Not knowing the MA, we can not calculate it. But we know there was a 26% increase in penetration going from 2.75 to 3.25 MA broadheads in the previous testing.

The difference in FOC is also a guess. What we can do is look at what would be the least amount of increase. Let's assume a 19% FOC, which would be at the limit of high FOC. The 70lb bow would have a 42.11% increase in FOC. If we based it on the top of normal FOC (12%), the increase would be a 125% increase. We can see that having an arrow with EFOC and high MA broadheads shows a benefit.

Comparing the 70lb to the 82lb bow with the 792gr arrow. There is still a 20.03% loss in penetration. In this arrow build, we see that the MA is the same. This would mean that the decrease in FOC is what caused the loss in penetration. It also shows with this setup, kinetic energy or momentum are not a predator for penetration.

Note; the 70lb bows arrow had most of the 12 penetration factors. The arrows used on the 82lb bows did not. But without a doubt, we can see an increase in penetration with FOC. Just not sure how much due to the 12 penetration factors not being the same between the setups.

Reference

1. [Ashby Reports — Ashby Bowhunting Foundation](#)