

## ASHBY BOWHUNTING FOUNDATION

### “HEAVY BONE”

ABF is often asked what we mean by “heavy bone”. Our basic heavy bone for testing is the in situ ribs of freshly taken (shots taken within 30 minutes of expiration) Cape and Asiatic buffaloes. These buffalo are utilized because of the overlapping nature of their ribs. Assuring a rib hit on virtually every test shot taken. The thickness of these ribs ranges from 0.67 inch to a full inch, depending on species, sex, age and size of the individual buffalo. Ribs of these true buffalo have a near nonexistent bone marrow cavity and effectively represent near solid cortical bone. Among smaller game animals, based on ABF testing, this bone equates well with their heavier shoulder and hip bones, such as scapular ridge, heads of the scapula, humerus, femur and the bones of the pelvic girdle, as well as bones of the skull.

### THE “HEAVY BONE THRESHOLD”

Every broadhead that has been tested against in situ rib bones of the Cape and Asiatic buffaloes shows an increase in heavy bone penetration when the total arrow weight is at or very near 650 grains. Many people misinterpret the Heavy Bone Threshold to mean that *only* arrows of this mass or greater *ever* penetrate heavy bone, or that *any* arrow above this mass *always* penetrates heavy bone. This is incorrect.

The Heavy Bone Threshold is merely a point of arrow mass where the data indicates an *abrupt and marked increase* in the *frequency* of heavy bone penetration. It is present for all broadheads tested, of all types, and is consistently *near* a mass

of 650 grains; ranging from approximately 625 grains for the high Mechanical Advantage (MA) single-bevel broadheads, to approximately 675 grains for some low MA broadheads.

Above 'threshold value' the *probability* of heavy bone penetration abruptly increases for *all* broadheads tested. However, the increased *is not* equal in either frequency or degree of heavy bone penetration. The poorer performing broadheads jump from virtually zero to as much as 10 or 12 percent, while others might jump from 20 or 30 percent to 65 or 70 percent. When arrow weight is above threshold value, in all but extremely massive heavy bone, and when arrow-integrity remains intact, the best overall-design broadheads show frequency jumps from 85 or 90 percent to a full 100% frequency. Broadhead type, bevel type, tip type, main blade profile, ferrule profile, and the overall broadhead MA are all *strong influencing factors*. All structurally intact arrow systems having broadheads with a MA of 2.6 or greater demonstrates a 100% frequency of in situ rib penetration on all thicknesses of buffalo ribs tested.

*For fresh in situ bone, the Heavy Bone Threshold is a definite and persistent, thoroughly repeatable entity.* Testing into both 'old bone' and extricated fresh bone proved equivocal, showing poor correlation to in situ results. It is *suspected* that changes in composition influences 'old bone' results, and absence of supple support from supporting and cushioning collateral tissues influences extricated-bone results. Irrespective of cause, these media do not yield outcomes consistent with that shown by fresh, in situ bone.

For a given broadhead, the Heavy Bone Threshold shows little change throughout a fairly wide range of impact forces. It is *theorized* that this is because the Heavy Bone Threshold represents a *time* of impulse which acts ('pushes') sufficiently *long* (time wise) to exceed the structural limits of a heavy bone's

supporting matrix; more so than the level of 'raw force' applied. A loose analogy might be: *how* an armor piercing round applies the impact force it carries is far more important in penetrating a tank's armor than is the level of raw force it carries.