



# The Target Book

## for North American Big Game

### MAXIMUM EFFECTIVE RANGE

Upon impact, a bullet should expand fully and then transfer enough energy to cause sufficient damage.

Bullets are designed to perform at speeds of 2000 feet per second or greater. When striking game at such speeds, a bullet will expand and thus maximize the damage it can do. Most game cartridges produce muzzle velocities greater than 2000 fps; but the moment a bullet exits a rifle barrel, it begins to slow down. At a certain distance it slows to 2000 fps. Beyond that distance the bullet is traveling slower than its design speed and it will not properly expand upon impact. The distance at which the bullet slows to 2000 fps is the **Velocity Range** for that cartridge to shoot at any game animal.

An expanded bullet also needs to carry enough energy to produce damage that is immediately lethal. For deer-sized animals, 1000 foot-pounds of energy is ample. Energy is a product of mass and velocity. As a bullet travels, its weight remains constant, but because it slows down, it loses energy. At a certain distance its energy drops to 1000 ft-lbs. Beyond that distance the bullet does not pack enough energy to inflict the necessary damage. The distance at which the bullet energy drops to 1000 ft-lbs is the **Energy Range** for that cartridge to shoot at any **deer-sized animal**.

The certain amount of energy that is sufficient depends upon the size of the game animal. The amount of energy, and thus damage, that may instantly put down a small deer may not be enough to soon put down a large elk. For elk hunting, a minimum of 1500 ft-lbs is more adequate. The distance at which the bullet energy drops to 1500 ft-lbs is the **Energy Range** for that cartridge to shoot at any **elk-sized animal**.

**The shorter distance between a bullet's Velocity Range and its Energy Range is the Maximum Effective Range** for that particular cartridge to shoot at a certain-sized game animal.

**Big game can certainly be taken beyond a bullet's Maximum Effective Range; but long-range shooting intensifies the need for precision, and long-range shot placement is less exact.**

### SIGHTING IN YOUR RIFLE

When making a shot on big game, none of the vital zones is a 1-inch bull's-eye; they are at least as big as a 6-inch diameter circle. You can miss the exact point you are aiming at by three inches and it will still be a lethal shot. Allowing this, there is a concept that big game hunters should consider for sighting in their rifles. It is called **Maximum Point-Blank Range**.

The riflescope is adjusted so that the bullet will rise to three inches above the horizontal crosshair, but no higher. This maximizes the range a shooter can hit a 6-inch target without making any allowance for distance. The selected targets in this book show the effect of this strategy for common factory ammunition.

These ballistics are for rifles with customary scope sights. The standard mounting height for scopes puts the line of sight 1½ inches above the center of the rifle barrel.



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**THE BASICS.** Clean your rifle and scope. Use the same ammunition you will take hunting. Go to a level rifle range with measured distances. Shoot from a sitting position, use a firm gun rest, and hold the rifle tight against your shoulder. Control your breathing; half exhale and hold your breath. Slowly squeeze the trigger.

**SHORT-RANGE SHOOTING FOR PRELIMINARY ADJUSTMENTS.** Start at the distance where the target shows your bullet first impacting the bull's-eye. For the 6.5x55mm Swedish Mauser (140 grain), this distance is 23 yards. Aim for the bull's-eye. The bullet will leave your rifle barrel 1½ inches below your line of sight. It should then rise at this short range and impact the bull's-eye. Shoot three times, waiting a few minutes between each shot. After three shots, wait for an extended time and open the action to keep the gun from heating up. The average impact is the center of the triangle formed by your three bullet holes. Adjust your rifle scope to correct your average impact. Repeat as necessary until you consistently hit the bull's-eye.

**LONG-RANGE SHOOTING FOR FINAL ADJUSTMENTS.** For fine-tuning your scope, shooting at a range of 100 yards is very adequate. Simply repeat the short-range process using 3-shot groups and keeping the gun cool. At long range you may not be able to actually see the bull's-eye through your scope. Use the black squares in the corners of the target as guides for your crosshairs. The horizontal crosshair should go between the top and bottom squares. The vertical crosshair should go between the squares on each side. **Always aim at the bull's-eye**, but at 100 yards, the bullet should not hit the bull's-eye. The 6.5x55mm Swedish Mauser (140 grain) target shows that at 100 yards the bullet impacts about 2¾ inches above the bull's-eye. Adjust your rifle scope to correct your average impact. Repeat as necessary until you consistently hit the 100-yard mark on the target.

You're done! Each particular target graphically shows where your bullet will now be at the other distances. The yardage at which the bullet impacts three inches below the bull's-eye is the Maximum Point-Blank Range for that cartridge and bullet weight.

- Muzzle Velocity .....Average bullet speed for common factory ammunition
- Bullet Energy..... Kinetic energy for that bullet weight at that speed
- Knockdown Power..... Product of the bullet's momentum and its cross-sectional area
- Gun Recoil..... Index of the 'kick' that the gun delivers to the shooter

