

# The *ups* and the *downs*



Tim Pilbeam heads to the Welsh hills to test the theories surrounding uphill and downhill shots, and discovers that at responsible ranges, the estimation is easier than you think

When hunting in mountainous terrain, shooting at steep angles, some of the most common questions are: Is the technique the same for uphill and downhill, and what is the effect on the point of impact? I read about the subject with interest, finding a theory on why angled shots always hit high. It was based on the projectile's path in relation to the pull of gravity, which works perpendicular to the horizontal line, and it's the horizontal distance travelled by the bullet that is significant rather than the linear distance travelled.

When experienced stalkers Chris and Matt joined me for two days' rifle shooting, and to discuss this tricky matter, Matt tried to explain why a bullet being shot downhill should have a different point of impact to one being shot uphill. This was down to the simple fact that it should go faster down than up thanks to gravity. I understood his logic, but we would have to find out for ourselves.

Within the 5,000 acres of hills and steep scree slopes of the Steel Challenge, at WMS in Wales, Andrew Venables is able to provide 45-degree targets at 150-200 yards, and targets at 20-30 degrees out

to ranges of 500+ yards. Andrew set us up at the top of a hill with a variety of steel targets below us in front of a lake, to show the bullet impact or 'signature' in the event of a miss.

Before trying to shoot, we had to calculate the angle of the shot. When standing at the top of this steep hill, we all thought it was about 40 degrees. Andrew demonstrated a simple way to work it out. With the arm horizontally out in front of the body, roll over the hand 180 degrees downwards, as many times until it lines up with the bottom of the hill or target. Every flip of the hand is worth about five degrees, and in this case we counted nearly six turns, making a 25-30 degree slope. Most shots over 20 degrees, unless you are able to shoot off a rock or small knoll, are very hard to take, as the body slides down the slope.

These first targets were 175 yards away, but what effect does the angle of the shot have on our calibres? Chris and Matt were shooting their custom-built 6.5x55s with fast 120-grain bullets, zeroed at 200 yards. I was shooting my short-barrelled .308





## Tim's tips: Angles



with 150-grain bullets (2,600fps) zeroed at 150 yards. We all thought we should aim a little low to take into account the angle. To our surprise, there was little or no difference to shooting at a flat target.

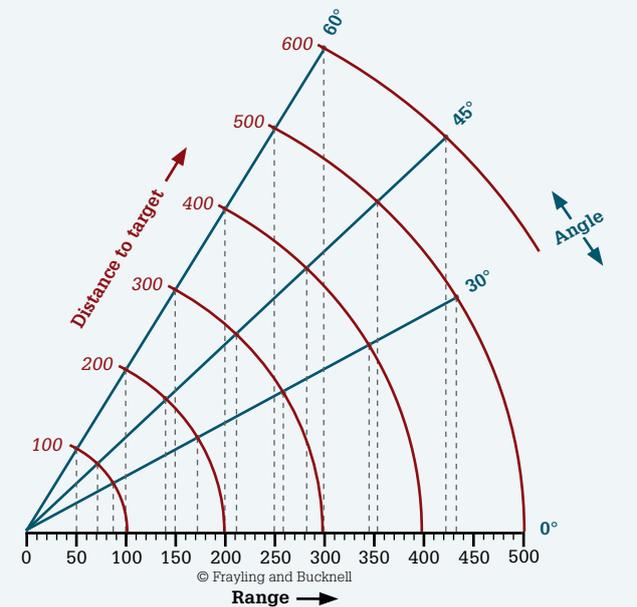
This was surprising, but perhaps we needed to go extreme. There were more targets further across the valley at 450 yards. After a quick assessment of the angle, we agreed on 18-20 degrees. I had copied Robert Bucknell's 'effect of elevation on range' chart from his brilliant book *Foxing with Lamp and Rifle* (copyright Frayling and Bucknell). It explains what changes to point of aim are required at different distances. If the angle to this target was 30 degrees at 450 yards, the shooting range would be equivalent to a 400-yard shot, or 10 per cent less than the actual distance stated by the rangefinder. As we are dealing with a 20-degree slope, we will be about 7 per cent less than 450 yards, which is 30 yards. In terms of bullet drop and aim on the target, 30 yards less equates to three inches higher, so either adjust the scope or aim off accordingly.

Shooting downhill at longer ranges proved the theory, so what about shooting uphill? Trying to find a safe location to shoot uphill at long range is not easy, as the sky is not the safest of backstops. Off we trekked to another part of Steel Challenge to practise on similar terrain to Scotland, at distances similar to those in the control of red deer.

Matt and Chris made use of the fence to support the rifles, ready for the 225-yard uphill target. The hill was a good 30 degrees; the target was a four-foot white rock within a large outcrop of granite. At this angle there were problems gaining a stable shooting position and trying to estimate where the wind was coming from. But without any adjustment to elevation, both chaps were able to place shots within a 3-4in group.

So what of the theory? If you are an everyday stalker, shooting deer up to 225 yards, what adjustments does the 'nut behind the butt' have

### The effects of elevation on range



At Angle:	Correct Distance by:	
60°	x 1/2 or 50% or x 0.5	to give Range
45°	x 7/10 or 70% or x 0.7	
30°	x 7/8 or 90% or x 0.9	

to do to make sure his shot is placed perfectly for a quick kill? The answer is: none!

As ever, the knowledge and vast experience of Andrew Venables helps sum this up quite clearly. In his words, the facts are:

- 1 If the rifle is a medium-calibre deer rifle in the 2,400-2,850fps and 100-165 grain bullet range, and zeroed to shoot 3-5cm high at 100 yards (approx 150-yard zero), and the scope is between one and two inches above the bore line, then you don't have a problem out to 225 yards and 45-degree incline. The bullet is never going to go more than about two inches high or low on the trajectory whether fired up, down or flat. If the chest-shot kill zone is about six inches in diameter, it's going down.
- 2 If the shot is 225-325 yards, wind is your biggest issue, followed by elevation and trajectory. Up to a 25-degree slope, don't worry about trajectory above and beyond normal holdover, the differences are very small and wind and wobble will be more significant.
- 3 If it's further than 225 yards away, more than 35 degrees downhill (which is very steep) and there is any wind about, just don't take the shot. Either get closer, or tip your cap and find something less problematic to hunt.

I know it is dangerous to generalise, but that's it. True, at ranges beyond 250 yards aiming down or up very steep slopes, there is a need to start calculating the change of point of impact. But how many sporting riflemen shoot beyond these distances?

If your deer is less than 225 yards away, no matter what angle the shot is, then there is no extra adjustment to worry about. So control the breathing, concentrate on the animal and slowly squeeze the trigger. Simple. ■

