## FAQ of the Month: Why do competitive centrefire rifle shooters sometimes blow primers when shooting in the rain?

Blown primers and swollen case heads are something that practically all competitive shooters have experienced when shooting in the rain, myself included. I had assumed that the damage to the wet cases was due to excessive pressures. It is a reasonable explanation because excessive pressures will cause these same effects under dry conditions.

However if you calculate the weight of a raindrop that might get down the barrel or a bead of water that might sit on the bullet, it is less than 0.1 grains. Not significant compared to the weight of the 185 grain 308 bullet. The volume displaced by a small amount of water on the case wall is also insignificant.

A little research on the subject provides an alternative explanation: the water on the case (not the bullet) acts as a lubricant which prevents the case from gripping the chamber wall. To understand why this matters consider the picture of a 308 cartridge in the barrel shown below. The case head is not supported by the chamber and it must contain the internal pressure of the charge on its own. The bolt pushes the case into the chamber and locks in place with a small tolerance fit, but it does not contain the pressure.

What happens during firing is the pressure in the case rises as the powder burns and the case expands creating a friction force between the case and the inner chamber surface at levels up to 90,000 lbs when dry. This force holds the case in position as it is much greater than the 4500 lbs needed to prevent the case from moving back against the bolt face. However, when the case is lubricated, the case can slide backward against the bolt face which extends the unsupported length of the case head and allows the brass of the case wall to flow towards the head. The result is case head swelling and the associated expansion of the primer pocket, leading to primers blowing out of the case.

Case lube or solvent can also cause this problem so one needs to be careful that the case and chamber are kept as dry as possible. If you can't keep your ammunition dry, then you need to reduce pressure level to avoid problems.

Lubricated cases can also produce erratic muzzle velocity even when the pressure is low enough to avoid case head swelling. The reason for this is not known with certainty but a possible explanation is that when the pin strikes the primer, the case moves forward (depending on available headspace) leading to a weak primer strike and lower muzzle velocity (about 20 fps for 308).

Submitted by Gordon Holloway