Dear Colleagues

**Releasing a shot from a dead still rifle to produce the smallest group**

**The Problem:**at the 2018 Canberra Queen’s many shooters appeared unable to hold their rifles dead still in order to produce the smallest group. Some had been in state teams and yet, had never been shown how to do this. Others were simply unable to see themselves shooting, which led to groups wider than the bullseye. Very often the group was split into 2 to 4 sub-groups, each about 1 MOA across, but centred anywhere in the bullseye and inner rings.

It was sad to see that the sub-groups were small enough to fit into the V-bull (TR) or X-ring (F Class). The shooter knows that if he/she could overcome the causes of change of the natural point of aim, then it should be possible to group entirely within the V-bull or X-ring. Most shooters found an improved body position felt strange, while some shooters (RH) appeared to have a need to push their right leg out to the right. Pushing the right leg out sideways or bending it upwards, led to tensing of muscles in the middle and lower parts of the body. This makes it very difficult to re-centre the natural point of aim to the V-bull or X-ring.

The most serious difficulty experienced by most was an inability to support the rifle dead still, with no trace of movement. This must exist for a shooter to release a shot without generating a bodily tremor. The rifle must be dead still when the shooter starts the trigger pull quickly, then in a second stage, pulls the trigger much more slowly while thinking about where the pull has reached. Altogether the shooter takes no longer to pull the trigger and only adds 2 or 3 seconds onto the second slow phase, until it releases as a surprise. This is done using a single- or two-stage trigger. Shots released this way group within the V-bull or X-ring, whereas if a tremor is generated, the group surrounds the 2 MOA bullseye (TR) or 1 MOA 6-ring (F Class).

**Discussion:**when rifle shooting commenced with Queen Victoria’s challenge in 1859 to the British Empire, for this to become a highly-valued sporting activity, physicists (e.g. James Clerk Maxwell), medical doctors (e.g. Arthur Conan Doyle), many forensic scientists and other professionals (e.g. Rudyard Kipling) set about researching the techniques that each shooter needed to master.

One of the first techniques to be resolved was the use of a sling for the shooter to support the weight of the forward arm and rifle, so that the muzzle was dead still at the moment when a projectile was released. The position most favoured for supporting the rifle dead still was with the weight supported entirely upon the forward arm, with the total weight balanced solely on that elbow as pivot.

This enabled recoil to be absorbed by the shoulder alone. It was found by these 19th century researchers that any additional contact with the rifle, particularly by the hand at the forward sling swivel, would result in a high-left to low-right group. Until 1890 (thereafter at Bisley), researchers at Wimbledon reported in publications (sourced from the Internet), that the number of contacts of the body with the rifle had to be minimized. If this did not happen unwanted group shapes would occur, e.g. if the thumb absorbs recoil at the rear of the action. In particular, it was reported that the natural point of aim could be expected to change whenever part of the body moved during the period of a shoot. Medical researchers advised from their knowledge of physiology, that to bring the natural point of aim sideways required a sideways movement of the left foot (of a RH shooter) by as little as a cm or so. Likewise, a forward or backward movement of the navel would position the natural point of aim downward or upward, respectively. In addition, the right leg (of a RH shooter) should remain completely still and approximately in line (i.e. parallel) with the rifle barrel. From these critically important findings, shooters were advised to ensure that no muscle groups should be moved during the course of a shoot, otherwise change of the natural point of aim must be expected. Several sub-groups suggested that there had been frequent changes of a shooter’s position during a shoot.

However, some shooters were in the habit of balancing the weight of the supporting arm and rifle on both elbows, instead of just the forward arm. This practice is used to the present day, by shooters who dismantle the aimed rifle then reassemble it for each shot. There is a lot to be said for this because if the sling around the upper arm moves down as a result of recoil, then it needs to be replaced. If movement occurs with change of sling tension, then the group can be expected to change vertically, e.g. with odd shots above or below. Some shooters do this with great skill and produce excellent groups.

In the latter part of the 20th century, a practice emanated from Camp Perry, USA, where RH shooters began bending their right leg upward. This caused tension in muscles of the lower body and provided some protection against sundry muscular movements of that part of the body, which leads to changes of the natural point of aim. However, although the left leg and part of the pelvic girdle are also locked, they may still move without the shooter being aware. Upon the shooter detecting a change in the natural point of aim, correction of the body position required both sides of the partly-raised pelvic girdle to be moved, not just the foot.

**Practice:**many RH shooters today support the rifle dead still, with the left elbow placed exactly under the stock. The stock is placed upon the web of the thumb, not across the palm of the hand. The hand is not allowed to be bent at the wrist, which creates considerable pain. Positioning on one elbow prevents the barrel from being waved around at the countryside while reloading. This minimizes the risk of small movements of the supporting elbow. The right leg is positioned straight, parallel with the barrel and is not allowed to move. Adjustment of the natural point of aim is achieved through very small adjustments only of the left foot and the navel. The natural point of aim for every shot is monitored while raising the rifle into the aim position, leading to adjustment as soon as the aim is found to be anywhere but at the centre of the aiming mark.

From physiological knowledge the forward elbow is placed where it will be able to bear the total weight without causing muscles of the upper left arm and shoulder to become tensed. This occurs if the forward elbow is simply forced sideways under the rifle. The RH shooter first assumes the prone position, then forces the left elbow out in front, then places it onto the ground under an imaginary line between the eye and the target. The elbow is not moved from that moment. The butt is then raised to the shoulder using the thumb as a shoe-horn to position it tightly at exactly the required position. If the butt is not as close-fitting as this, then the it will need to be lengthened. Upon looking through the sight system, the rifle will be found to be aimed at the sky at high left. The left foot is then moved a cm or so until the foresight is brought to the right in line with the target. The navel is then moved forward to bring the foresight down onto the target. The rifle is then at the natural point of aim, which must be monitored for each shot and if necessary, readjusted. Ensuring the foresight is dead still also requires a conscious command to muscles of the supporting arm to become limp. That is, only the skeletal structure or bones are used to support the rifle dead still.

**Conclusion:**a TR shooter may position the forward elbow and rifle so that it is dead still and easily groups within the 1.0 MOA V-bull. With practice, the group is soon found to be only 0.5 MOA, i.e. within the X-ring. This degree of control of the rifle has been achieved by Olympic smallbore shooters since the 1960s, so there is no reason why this should not be done today in Target Rifle shooting. Note that the F Class shooter who uses this quick and long two-stage trigger pull technique, relies upon a dead still rifle to produce a 0.5 MOA group. Other F Class shooters use a much lighter trigger pull to enable the body to avoid tremors by not thinking about the imminent noise and recoil.

Best regards

Geoff