Dear Colleagues

**Control of rifle movements that widen groups beyond the V-bull and 6-ring**

**The Problem:** as a team coach, the writer has often been concerned at the movement which can be seen at the end of a barrel, yet a bullseye or inner is scored. The week before a team’s match, the writer has often shown a TR shooter how to set up a shooting position, which does not result in such visible movements of the barrel. Hence, a coach is not only concerned with wind changes indicated by the flags, but management of the size of the group. This really pays off when a shooter walks off the firing point with a 50.8 or 50.10, instead of a 48.3.

Of the many errors made by shooters which can be observed by the coach, inability to control rifle movement is perhaps the most common. This article describes the control of  movements of a rifle which prevent most shooters from scoring 50.10 (TR) or 60.10 (F Class).

**Discussion:** a shooter experiences movements of the rifle as a result of:

* weight of the arm and rifle being supported by arm muscle tissue under tension (TR)
* shot-release at any time during the imagined second stage of the trigger, controlled through a perfectly still image of the aiming mark in the centre of the foresight ring or scope element (TR, F Class)
* the mind not being occupied for the entire period, in estimating progress during shot-release during the imagined second stage (TR, F Class).

There are F Class shooters who believe that the rifle rest is used to prevent unwanted movements of the rifle. A small number of shooters have elected to shoot with the lightest allowable trigger weight, in the belief that it will overcome some effects of rifle movements. Releasing shots by pinching the trigger with the thumb behind the trigger guard, has enabled shooters to achieve some pleasing scores. For both these techniques shooters have found on other days that they achieve terrible groups. Despite this, every shooter should pursue such techniques to help their minds focus entirely upon experimentally proven techniques.

Rifle supported with arm muscle tissues under tension:  TR shooters have been told repeatedly that the forward elbow needs to be completely under the rifle, instead of 2 to 10 cm to one side. Many believe without experimental evidence, that supporting the rifle with the fulcrum off to one side, has no effect upon movement of the rifle. A session on a Scatt machine may be enough to convince these shooters that the elbow needs to be directly under the rifle. A shooter’s trigonometry lessons at school, may remind many that if the elbow is positioned at the side, then a sideways force component from arm muscles is also required to support the vertical weight of the arm and rifle.

Shot release during the imagined second-stage of the trigger, with reliance upon a dead-still aiming mark in the centre of the ring or scope element:this is the critical period of rifle movement which must be controlled successfully, so that both TR and F Class shooters may group within the V-bull and X-ring, respectively. Many F Class shooters choose this discipline because supporting the rifle upon a rest appears to enable the shooter to avoid having to hold the rifle absolutely dead still. This is WRONG. Both F Class and TR shooters need to ensure the rifle is absolutely dead still as a result of their trigger-release technique.

TR shooters need to adopt a technique for holding the rifle dead still. Then both TR and F Class shooters need to overcome movement of the rifle which occurs during shot-release in the imagined trigger second stage. Imagined applies to a trigger which only has a single stage. The shooter needs to apply pressure until the trigger begins to bite. Then, without the rifle moving, release occurs during this imagined second stage. Many rifles are otherwise designed with a second stage. Most F Class shooters known to the writer are well aware that during the imagined or actual second stage, trigger movement can move the scope element from the target! This must be prevented.

**Observations:** the TR shooter first positions the rifle so that no movement occurs due to arm muscle tension. The shooter is advised by the coach that for this to occur, the forward elbow must be directly under the rifle. It is clear that gravity applies a downward force, straight through the elbow as fulcrum. If the elbow is not exactly under the rifle, then this force will to some extent be absorbed by other arm muscle tissues. Many TR shooters try to achieve this position by forcing the elbow sideways under the rifle. In doing this, most experience pain because the wrist is bent. For others, the elbow gradually moves to the left when shooting, changing the size and shape of the group.

To set the forward elbow directly under the rifle, upper arm muscles that would oppose this must first be overcome. In the prone position, the forward elbow is raised in the air and lowered to a point directly under an imagined dotted line between the eye and target. This brings about repositioning of back muscles behind the shoulder. If the elbow is simply forced sideways under the rifle, then the back muscles will not facilitate the elbow positioned at 90 degrees to the target. When this happens, the shooter incurs tension in upper arm muscles, resulting in pain and unwanted tension.

Hence, first placing the elbow forward into the air, then down between the eyes and target, automatically sets the exact elbow position and the height of the rifle. These important components of the natural point of aim are then established by initially aiming the rifle, keeping the forward elbow in the same position (and never moving it). The rifle will be found pointing high-left at the sky. The left foot is then moved a cm or so to the left, which brings the foresight to point at the sky above the target. The aim is then brought down onto the target by moving the navel forward a cm or so. Positioning the elbows relative to the target and its height above horizontal, is therefore critically important for the natural point of aim.

The sling tension should now be set by aiming and suddenly allowing muscles of the forward arm to go limp. If the foresight drops, then take up the sling tension one notch, until no drop occurs. The shooter should then shift the combined weight of shoulder and head upon the forward arm, so that it becomes the point of balance for the shooter and the aimed rifle. This enables the barrel to remain dead still, not waving around at the sky and targets when reloading. The forward elbow needs to remain absolutely still during a complete shoot, without creeping a few mm as a result of recoil and reloading.

It will be found when the forward arm is allowed to go limp, that this will enable the rifle to become dead still, mainly because the elbow is exactly under the weight of the rifle. Far fewer arm muscles are utilised. Shooting is also painless because the wrist is straight, not bent. Most importantly, there is no creeping of the elbow to the left side.

Occupying the mind during the imagined second stage (TR, F Class):when estimating the fraction of release during the imagined second stage, this task occupies the mind right through to the point of release. It is the well-known follow-through. Some TR shooters have found using this technique that they are even able to group within the 0.5 MOA X-ring.

Both TR and F Class shooters need to ensure that the mind observes the dead-still aiming mark in the centre of the ring or scope element, i.e. during the whole period until the point of shot-release. If the mind is not fully occupied in this period, then it may transfer its attention to the task to occur next, i.e. to unload or to look at the electronic screen. When this happens, the rifle and resulting group wander. Wandering prior to shot-release expands the group.

It has to be remembered that despite all of the foregoing, it is in fact impossible for either type of shooter to release a shot from a perfectly still rifle. However, shooters are definitely able to group within 1.0 MOA V-bull (TR) or the 0.5 MOA X-ring (F Class).

**Conclusion:** supporting the dead-still rifle (TR) and then releasing a shot during the dead-still imagined second stage of the trigger (TR, F-Class), are the two most important criteria for producing the smallest group. It appears upon observing rifle shooters that very few have been taught these techniques. These steps must be performed correctly before being concerned about other critically important techniques, such as monitoring and adjustment of the natural point of aim for every shot, ensuring that the forward hand and rear thumb absorb the minimum of recoil, returning the loading hand to the pistol grip with the same tension for every shot and ensuring the shooter’s cheek does not transmit tension sideways, to or from the cheek-piece.

Best regards

Geoff