Dear Colleagues

**Causes and cures for shots around a V-bull or X-ring group**

**The Problem:**many shooters who set out to group within the V-bull or X-ring, experience widening of the group and splitting into sub-groups measuring from 0.2 to 0.6 MOA. A lot of time is spent speculating about ways to have sub-groups form on top of one another, to produce a 1 MOA group in the centre of the V-bull (TR) or a 0.5 MOA group in the centre of the X-ring. It appears to many that whatever they do, the above type of shot pattern occurs repeatedly, as if there is a common denominator.

Whereas the TR shooter incurs group widening due to small movements of various parts of the body in contact with the rifle, many F Class shooters produce the similar groups, when only one hand is in contact with the rifle.

This article describes the approach and techniques employed by shooters to overcome group widening and splitting. Shots around a V-bull or X-ring group are among the most common occurrences, which could well benefit from a program of documentation and research.

**Discussion:**a previous article contained descriptions of many factors which need to be performed uniformly for every shot of a shoot. Many of the techniques require the shooter to perform well-known procedures, such as adjusting the body position so that bones of the forearm support the rifle vertically. This replaces the widespread and more difficult practice of using arm muscles of a sloping forearm to support the rifle vertically! A further technique is to return the natural point of aim to the V-bull or X-ring, which can change as a result of unnoticed movements of parts of the body, e.g. different positions of the hand on the pistol grip. These considerations are of value to both TR and F Class shooters.

There are also less obvious factors which occur within the body and mind, which the shooter needs to anticipate. They occur even though no indication is received which shows when they are working against the formation of a single small group. The following are examples of such factors:

(Target Rifle)

* a small forward-sloping area of the mound, which causes a shooter’s position to change through movement of arm muscles to produce a more comfortable elbow position (leads to elevation shots and even significant changes of the natural point of aim)
* comfort-seeking muscular rearrangements that offset minor discomforts of the pelvic girdle, legs and feet (leads to change of the natural point of aim, i.e. a new group which does not respond well to centralizing sight adjustment)
* unwanted tensing of arm muscles to complement sling tension, which positions bones of the arm that primarily support the rifle (leads to a sub-group above or below the V-bull)
* gradual changing of tension of the sling as it slips down the upper arm (leads to a wider group and sub-groups above and below the aiming mark)
* the weight of the rifle and forward arm should be balanced solely upon the forward elbow, instead of both elbows (when reloading, the elbow of the loading arm is moved and replaced without changing its position on the mound, leading to shots outside the V-bull group; this contrasts with movements of the forward elbow and waving around of the barrel due to many more movements when the rifle is balanced on both elbows)
* poor focusing upon the foresight ring, upon allowing change of the primary focus on the foresight to the overall target (leads to a wider group and unexplained shots)

(Target Rifle and F Class)

* wandering attention of the mind while slowly pulling the second stage of the trigger (leads to a wider group or unexplained shots out of the group).

**Practical:** there are some rifle ranges where all targets are higher than the 300x mound, which require shooters to position themselves to aim uphill. Scores along the mound may suffer until someone alerts everyone to change their shooting position and aim above the horizontal. The locals may say nothing. More commonly, a firing point may contain small forward-sloping sections, where a shooter is required to establish his/her body position. The solution to firing on a sloping section of mound is to simply adjust the natural point of aim, i.e. upon sliding the navel backward by a cm or so, until the foresight is raised up to the level of the target. If the slope is sideways, then the left foot is moved sideways a cm or so.

Unwanted tensing of arm muscles is an automatic reaction from the brain, when the sling is tightened against bones and arm muscles. The sling is meant to replace the need for muscle use which varies considerably. This will result in small sub-groups above and/or below the V-bull, widening a group from 1.0 to about 2.0 MOA. The solution is for the shooter’s mind to command arm muscles to become limp. The rifle should then be tested to see how still it can be supported with the sling holding only the bones. The sling will usually need to be tightened a notch for the foresight to become dead still when shooting with limp arm muscles.

Progressive changing of the position of the sling around the upper arm occurs as a result of recoil. This can limit reloading at the shoulder because the group, under changing sling tension, will be accompanied by shots above and below the group (due to use of arm muscles). There is no difficulty for a RH shooter upon reloading to insert the right hand across the chest and under the rifle, making a rapid adjustment of the sling. At the same time the right hand should ensure the position of the sling provides a rest for the front of the forearm. This prevents the hand from moving forward along the stock. The writer has practised these movements over many years and found that the rifle can be reloaded 3 or 4 times at the shoulder, after which the sling needs to be adjusted while the butt is on the mound. No stray shots usually occur if readjustment occurs within this number of shots.

In any event, it is suggested that the natural point of aim should be routinely checkedfor every shot. This is done on reloading and raising the rifle, with a half-closed eye following the foresight to indicate where the rifle will tend to aim. The adjustment will require a small sideways movement of the left foot, or sliding the navel forward or backward a cm or so.

Focusing on the foresight rather than the target will lead to a small group. However, if aiming is prolonged (small enough to induce eye-strain) the ability to focus upon the foresight will be reduced. This will result in a wider group. The solution is then to reduce the aiming time, slow enough for the release of a shot that avoids generating a tremor.

Wandering attention of the mind must be prevented while aiming. This can occur when holding the rifle dead still and pulling the trigger at a carefully controlled rate. The mind has a tendency to wander off onto the next task which must occur, e.g. to see where the shot hit the target, to open the bolt and reload. It may cease to createfollow-through. The shooter may follow how far the second trigger pull has progressed, while the rifle is kept dead still and the trigger is pulled at the required rate. If a gap in concentration occurs, then the rifle may not be dead still and/or the rate of trigger pull may change, resulting in the generation of a tremor.

**Conclusion:**shooters are otherwise aware of the need to manage the following techniques for every shot in a shoot. It is suggested that a shooter should:

* ensure the forearm is underneath the stock and vertical to the elbow (position the elbow under an imaginary dotted line between the eye and target) (TR)
* move the total weight of the forward part of the body onto the forward elbow (raising the other elbow a small amount should hardly affect the aim) (TR)
* the butt is placed against the shoulder with such tension that it requires the thumb of the loading hand to position the butt, as if using a shoe-horn (TR and F Class)
* the arm muscles must be consciously directed to become limp, so that only the skeletal structure supports the rifle (notarm muscle tissue) (TR)
* ensure the sling supports the rifle with some tension around the forearm,notat the wrist or the hand (TR)
* for almost every shot use the loading hand to adjust placement of the sling to keep the forearm in position along the rifle stock (aided by the Bisley twist) (TR)
* focus the eye on the foresight or scope element rather than the target (TR, F Class)
* use a dummy round before a shoot, to ascertain the degree of care required to release a shot without a tremor being seen to move the foresight or scope element (TR, F Class)
* use the dummy round again to confirm the shooter's memory of how the trigger feels on attaining the degree of care (TR, F Class)
* for every shot, routinely aim with the eye half-closed to see where the rifle is aimed as a result of the shooter's body position; adjust the natural point of aim by moving the left foot a cm or so, then bring the navel forward or to the rear a cm or so (TR)
* adjust leg positions by having both legs straight, one anchoring the rifle through being parallel to the barrel and the left leg only, being required for sideways adjustment of the natural point of aim (TR)
* before a shoot, test sling tension by coming onto aim, suddenly allowing the muscles of the arm to go limp and if the foresight drops, then tighten the sling) (TR)
* confirm wrist tension does not affect the rifle, by ensuring the hand is in direct line with the wrist and is not bent (TR)
* anchor the three main palm muscles of the hand with limited tension against the pistol grip (two nearest the wrist and the one behind the index finger) (TR, F Class)
* ensure there is maximum feeling on the palm of the hand, to ensure the stock does not move across from the thumb muscle to the centre of the palm, i.e. could require shooting without a glove (TR)
* position the fingers on the pistol grip, with no lateral or forward-directed tensions (TR, F Class)
* place the trigger at the first joint of the trigger finger (TR, F Class)
* ensure the absence of tension of the thumb at the pistol grip (TR, F Class)
* keep the mind concentrated upon progress of the second-stage of trigger pull while holding the rifle dead still, i.e. establish follow-through and avoid lapses of concentration (TR, F Class)

For the writer these techniques were a routine, while watching tell-tale flags that indicated when to not fire, wait and recommence pulling the second stage of the trigger to release the next shot.

Best regards

Geoff