Dear Colleagues

**A group should result from a rifle balanced on a single elbow without muscular tension**

**Problem:**nearly all TR shooters can be observed supporting the weight of their rifle and arm with the forward elbow not directly underneath the rifle.

Upon reloading, the position of the elbow will often move a few mm. This in turn affects the ability to support the rifle dead still. That is, upon the vertical support changing to a slightly different angle, resulting tensions from arm muscles also change. Hence, instead of relying entirely upon the sling and skeletal structure, to provide all the tension required for the rifle to be held dead still, muscles are brought into use while others are relaxed. The effect is a moving foresight picture which the shooter automatically corrects. If the correction is not made in time, then a shot is observed being released somewhere other than at the aiming mark. As well, if the need for a correction of the sight picture is not seen, because it happens very close to the point of release, then inadequate follow-through can lead to a shot well out of a group.

Shooters are often unaware of the likely effect on a group which can result from movements of the pivot elbow. This should be uppermost in the mind. The shooter should then be fully aware of:

* initially adjusting the position of the elbow so that it is exactly under the rifle
* changes in a group due to the position of the forward elbow
* changes in a group due to the timing of a movement of the elbow.

**Discussion:**a rifle shooter advised on the need for the forward elbow to be directly underneath the rifle, may become convinced that his/her elbow position is sufficiently under the rifle for it to be dead still. On occasion when a shooter is reminded of the elbow not exactly underneath, he/she may try to pull the elbow in sideways. This leads directly to changes in the natural point of aim. However, when setting up the body position, the shooter places the forward elbow well out in front (before raising the butt to the shoulder), then establishes the natural point of aim at the centre of the target, the pivot elbow will be found to be exactly under the rifle. In this position the rifle is then found to be dead still, i.e. with no perceptible movement. The group that results from the rifle in this position is then the smallest the shooter is able to achieve. As well, when reloading at the shoulder, the shooter is able to do so without waving the rifle around the countryside. The shooter is able to use fingertip control to open and close the bolt, requiring minimal force of the loading hand. This can be helped if the bolt and lugs are dry-lubricated with graphite or molybdenum disulphide.

A rifle shooter who does not position the forward elbow directly under the rifle will not be able to balance the rifle upon the elbow as pivot. The sling is used to replace the tension otherwise provided by arm muscles. If arm muscles are used then characteristic changes will occur when supporting the rifle. In the extreme situation, where arm muscles are used exclusively to support the weight of the rifle, then the foresight will be seen to haphazardly move up and down while releasing shots.

A shooter whose rifle is not balanced upon the single elbow and experiences poor follow-through, may be able to see the slight changes that occur in the sight picture. The most damaging will be those changes that occur closest to the release of a shot, i.e. when the mind has failed to notice a significant change resulting from muscular movement (where follow-through is needed).

**Practical:**observations by the writer (from the Hexa System and photos of Kongsberg screens) of groups achieved in several hundred weekend club shoots have enabled correlations to be made of group shapes and sizes that result from technique difficulties due to:

* insufficient sling tension
* the rifle only partly balanced upon the elbow of the supporting arm.

While experiencing insufficient sling tension, a shooter will not be aware of arm muscles being brought into action to compliment the tension not received from the sling. However, a characteristic of arm muscles that provide a short period of required tension, is a loss of tension without warning. This causes the rifle being supported to be held at the required height, then suddenly dropping to a low level. The shooter will observe the sight picture changing, where the rifle is clearly aimed at the aiming mark, with shots released below.

When the shooter becomes aware of muscular failure, he/she automatically applies a correction which raises the rifle to a higher aiming position. This is then momentarily dropped back to the desired aim at the aiming mark.

If the shooter completely fails to notice such changes in the final fraction of a second before shot release, then a shot may be released either: above, below or at any unwanted position around the aiming mark.

Upon observing large numbers of these technique experiences, it has been found that a shooter:

* who sets up the rifle balanced on the elbow as pivot, with the sling set to exactly the tension to overcome any unwanted use of arm muscle tension, will tend to produce a characteristic group of shots within the 1.0 MOA V-bull or even within the 0.5 MOA X-ring
* who experiences insufficient sling tension, tends to produce a characteristic group of shots in the centre of the bullseye, above and below it (when the available muscular tension is as required, greater or less)
* whose elbow is not directly underneath the rifle, tends to produce a group:
* spread across the whole bullseye, with shots just outside the perimeter, or
* containing several sub-groups of 0.2-0.4 MOA across the bullseye and outside it, or
* spread across the whole bullseye, with wide shots well outside the perimeter.

Every shooter, whether TR or F Class, has a need to ensure that a group is not affected by inadequate trigger- release technique. That is, the shooter needs to release each shot using the degree of care found using a dummy round, to release the action without a small tremor observed in the foresight. Some F Class shooters appear to have no difficulty releasing shots this way and as a result, produce a group that is round and easily fits within the X-ring.

The writer has for many years ensured that the required degree of care and follow-through technique were performed correctly: by initially pulling the trigger fast, then when close to the point of release, concentrating the mind on pulling as slowly as possible until release occurs as a surprise. This latter technique is recommended in conjunction with the rifle exactly balanced on the elbow as pivot. When a coach sees the muzzle waving around during reloading, it is then time to point out to the shooter that his/her wide groups result from the resulting minute movements of the forward elbow

**Conclusion:**a TR group may be small enough to fit within the centre of the V-bull, round and with no sign of splitting into sub-groups, i.e. if the rifle is balanced entirely upon the forward elbow with support from adequate sling tension. This occurs if trigger-release occurs with the required degree of care and follow-through and the mind focussed solely upon achieving the slowest possible trigger pull right up to the moment of release.

Best regards

Geoff