great way to practice wind reading; the .22 LR round drifts a lot!

When evaluating ammunition, I typically test rimfire loads at 50 yards for accuracy and use a chronograph to calculate muzzle velocity and ES figures. For accuracy testing, I always single-load ammunition to the chamber by hand to eliminate damage to the soft-lead bullet's profile, which can occur when chambering ammo from a magazine. Usually, I get the best accuracy from a subsonic load. Then, I search for the load with the best ES figure. Don't ignore supersonic ammunition, though! If you have an accurate supersonic load, take it out to 100 yards and see how it shoots beyond the transition through the sound barrier. In fact, test them all to see which performs the best in your gun. For long-range shooting, weighing the cartridges to get them all the same weight can provide decreased elevation variances; weight doesn't make as much of a difference for typical .22 LR shooting. After this test, it's up to you as to how much time you want to spend measuring other ammunition parameters as described in "Consistency," my March 2023 column. Typically, shooting match-grade ammunition provides better results. Hence, with a good-shooting rifle and load, repeatable hits on a 6-inch target set at 200 yards is achievable. Wind will be your nemesis.

The quality of ammunition matters more when shooting at ranges beyond 50 yards where "match grade" proves its worth.

The only trajectory information that can be found on .22 LR goes to 100 yards. I usually use the online ballistic solver found at jbm.com. Beyond trial-and-error, having a good idea of where to start for scope come-ups saves time and money. Atmospheric conditions are also a consideration, so a weather meter that gives temperature and pressure is essentially required for accurate trajectory calculations. My weather meter is a Kestrel (kestrelballistics.com). A supersonic load goes subsonic around 45 to 50 yards. At 300 yards, about 85 percent of the flight is subsonic, which can be seen in the Cd vs Mach number curve from **Figure 3**. Realizing that most of the .22's flight is subsonic, we need a drag function that will match the Cd curve as close as possible — especially subsonic. The GI (i.e., the Ingalls drag function that's available in the JBM solver) matches better than about any other drag function I could find. **Figure 4** shows a 40-grain .22 LR bullet's Cd versus Mach number and several popular drag functions. My own shooting experience has demonstrated that a GI BC of .120 is accurate. This varies a little depending on the specific bullet shape.

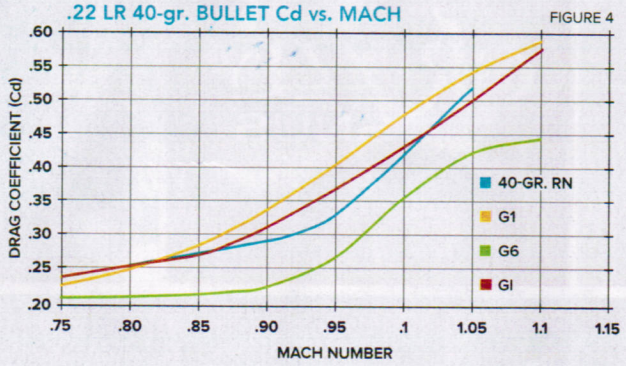
I calculated the BCs from the Cd data results using a GI BC of .120; G1 of .126; and G6 of .087. Again, I use the GI BC with the JBM solver, which has given me accurate results. I would stick with either the GI or G1 BC for trajectory calculations. **Table 2** shows the 300-yard sea-level trajectory for supersonic and subsonic 40-grain loads with a GI BC of .120 and a 100-yard zero.

TO BE CONTINUED ...

Part 2 of this topic details long-range rimfire shooting even further. Next, I will focus on equipment, including rifles and scopes. We will also examine my recent results from testing several currently manufactured .22 LR options.

.22 LR 40-gr. BULLET Cd vs. MACH

FIGURE 4



.22 LR 40-GRAIN RN SEA LEVEL TRAJECTORY

TABLE 2

RANGE (YDS)	ELEVATION (MOA)		WINDRIFT (MOA)	
(FPS)	1,250	1,050	1,250	1,050
50	5.2	7.2	2.8	2.1
100	0.0	0.0	5.3	4.1
150	-7.2	-9.2	7.5	6.0
200	-15.6	-19.6	9.5	7.9
250	-25.1	-31.2	11.5	9.8
300	-35.5	-43.8	13.4	11.7