Accurate Varmint Loads

Fine Tuning Handloads

By John Haviland

Hitting a prairie dog across the plains or a coyote the moment before it disappears over a far ridge requires good handloads as much as good marksmanship. Accurate handloads start at the loading bench with case preparation, powder and bullet selection, cartridge assembly and shooting – to select the best load for a given rifle.

Case Preparation

Handloaders are a finicky bunch and tend to fixate on trivial matters, particularly case preparation. Fastidious advice suggests that cases with uniform primer pockets and flash holes provide the best accuracy. No doubt, that's true; however, today's brass is very uniform in dimension. A batch of .243 Winchester cases trued up with a Redding flash hole deburring tool and a Redding primer pocket uniformer tool showed the Winchester brand cases were very consistent to begin with. The flash hole tool is designed to remove internal burrs that might obstruct primer flame. Two turns of the tool's cutter head removed a miniscule amount of brass from around the .243 flash holes. The primer pocket tool cuts primer pockets to a uniform depth square with the case head. Again, two turns of the tool's cutter barely scraped the bottom of the pockets to bring them to correct depth. These two accuracy steps fall under the heading of "it doesn't hurt anything, so go ahead if it makes you feel meticulous."

Cases do vary somewhat in neck wall thickness, and turning them to a uniform diameter is time well spent. Most of the batch of .243 cases varied only .0015 inch in neck wall thickness, with a few up to .004 inch. Some lots of 7mm and .30-caliber magnum cases I've measured varied .005 inch. Turning those necks to a consistent thickness helps seat bullets straighter in the case necks and with the center of the bore.

A handloader who has done all his homework can provide very accurate cartridges for most varmint rifles. Trying new powders might help varmint rifle accuracy. This .243 Winchester group was shot with Hornady 75-grain V-MAX bullets and SUPERFORMANCE powder.

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When turning necks, peel off only the thick side. Removing more brass than that will thin the necks too much, and a sizing die will fail to reduce the necks enough to tightly hold a bullet. Necks should be cut completely around their circumference only to fit a custom chamber.

Trimming cases to the correct length is a necessity. Too long a neck creates the hazard of the case mouth jamming in the throat and pinching the bullet when the cartridge is fired. This can cause pressures to go through the roof, and perhaps parts of your rifle. Necks trimmed to the same length also provide a more even bullet release.

How the burr of brass on the case mouth, left from trimming, is removed is one factor in building an accurate load. The curl of brass on the outside must be completely removed or the case will sit crookedly in the chamber, and that's not good. The lip of brass on the inside of the mouth must also be cut off. This bevel cut should be the same all around the inside of the rim and straight with the mouth. This angle allows a bullet base to easily enter the case mouth, reducing the force required to seat bullets, both of which contribute to straight bullet seating. An RCBS Trim Pro 3-Way Cutter, installed on a case trimmer, trims case necks, deburrs the outside and chamfers the inside of the mouths in one step.

A little experiment was conducted to determine if conditioning primer pockets and flash holes and turning necks is worth the work. I loaded 10 plain .243 Winchester cases with 38.0 grains of Vihtavuori N140 and

Seating depth can influence accuracy. Finding a sweet spot – how far short a bullet should be from the rifling – often requires experimentation.

Sierra 70-grain HPBT Match bullets. The same load went in 10 other cases with primer pockets and flash holes worked over and necks cut to a uniform thickness. The plain cases shot five-shot groups of .25 inch and .61 inch at 100 yards from a Cooper Firearms Model 22. The prepared cases shot five-shot groups of .69 and .82 inch. There was really no difference in accuracy between plain and meticulously prepared cases.

Case Sizing

Handloaders have three case sizing options: full-length, partial and neck sizing. Cases pushed fully into a sizing die have their body narrowed in diameter, shoulder setback and neck completely sized. This generous amount of sizing produces accurate ammunition and is best when cartridges will be fired in more than one rifle. However, shoulder setback is often excessive with full-length sizing. An old 7mm Remington Magnum sizing die I have sets shoulders back .017 inch. That much siz-

When turning necks, more thinning than necessary might remove too much brass and ruin the case. The bright spot on the neck of the case at right shows where the thick side of the neck was removed. It is pictured with an unaltered case.

A chamfer on the inside of the case mouth allows a bullet to seat with less force and straightly in the case neck.

Turning primer pockets and flash holes on cases removed very little brass, and John's testing revealed that it's not necessary.

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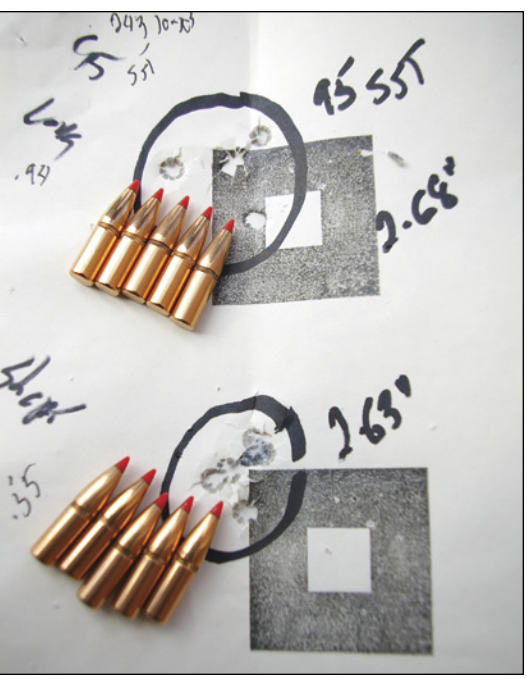
ing and stretching resulted in cases splitting in front of the belt after firing three times.

Partial sizing reduces shoulder setback and slightly sizes the case body. To partially size a case, set a full-length sizing die a turn or two from contacting the press's shellholder. The exact setting depends on how much shoulder setback is desired. I bump shoulders back on fired cases .002 inch, measured with a Hornady L-N-L Headspace Gauge. That limited sizing provides a glove fit of a cartridge in the chamber while assuring positive chambering and long case life.

Sizing that reduces only neck diameter provides the tightest fit of the case with the chamber and bullet with the bore. However, neck-sized brass springs back less each time it is fired. If a neck-sized case has expanded to the point any extra pressure on the bolt handle is required to chamber the cartridge, tension is placed on the receiver, and the bullet from that cartridge is guaranteed to fly wide. After being fired three times or so, neck-sized cases require partial sizing so they freely enter the chamber.



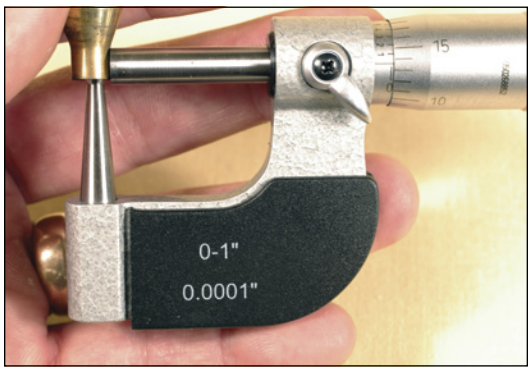
The top group was fired with Hornady 95-grain SST bullets seated in .243 Winchester cases just short of contacting the rifling in a Cooper Arms Model 22. The bottom group was shot with the same bullets seated to a shorter cartridge overall length. Deeper seating produced better results.

Powder and Bullet Selection

A varmint rifle should shoot respectable groups with any suitable powder. Perhaps one propellant produces groups that are not quite as tight as those shot with another powder, but those groups should still be reasonably tight and show no signs of stringing. If they're not, the rifle's receiver or barrel is most likely improperly bedded.

Five different powders were tried when I was searching for an accurate load with Nosler 70-grain Ballistic Tips to shoot in my Cooper Model 22 .243 Winchester. The powders were picked on the suggestions of various handloading manuals. Five-shot groups varied from .35 inch with VV-N160 to .73 inch with Big Game. Velocities from all five powders ranged from 3,300 to 3,450 fps. Big Game provided the highest velocity at 3,450 fps, with an extreme velocity spread of 53 fps for five shots. VV-N160 was close behind with a velocity of 3,340 fps and a very low extreme spread of 13 fps. So I had the enviable problem of deciding among several powders.

The charge weights of all five powders nearly filled a .243 case, so when the Nosler bullet was seated, it nearly or slightly compressed the powders. That kept the powder columns locked in position to provide a more even burn to reduce velocity spread. Say I loaded my .243 with Berger 88-grain Match bullets and a powder that produced an average velocity of 3,200 fps with an extreme velocity spread of 80 fps. At 200 yards the vertical dispersion of bullets would be only .3 inch at the high and low velocities, but the vertical spread will have grown to 3.0 inches at 500 yards. By choosing a powder like VV-N160 that achieves



Consistent neck wall thickness can influence accuracy, though most cases have uniform neck walls.

a low velocity spread, the vertical scatter is next to nothing, and handloads are that much more precise.

Some bullet brands, styles and calibers are potentially more accurate than others, but to condemn any bullet on the market as inaccurate is way off the mark. Finding an accurate bullet for a specific rifle may require shooting several different weights and styles.

Cartridge Construction

Bullets seated to the correct depth and sitting straightly in a case offer the biggest gains in accuracy. After experimenting with various bullet seating depths in a .223 Remington, .22-250 Remington and .243 Winchester, I found there was a sweet spot where accuracy was best with specific bullets in those particular rifles. The only way to determine that agreeable spot is to test it. All rifles have different amounts of wear in the leade, or beginning of the rifling, and their chambers are cut with reamers of slightly different dimensions. Cartridges that fit and shoot accurately in one .223 might well shoot poorly or even jam the bullet into the rifling of another .223.

I shot the three rifles with bullets seated at various depths to determine what cartridge overall loaded length (OAL) shot the best in the rifles. The Cooper Model 22 .22-250 Remington has a long and worn leade, so OAL is 2.576 inches for Sierra 55-grain BlitzKings to touch the beginning of the rifling. That length is more than .2 inch longer than the 2.350-inch maximum OAL for the .22-250. As the accompany-

Cartridge Overall Length Accuracy Results

rifle	caliber	bullet (*grains*)	powder	charge (*grains*)	primer	overall loaded length (*inches*)	average velocity (*fps*)	group (*inches*)
Sisk Rifles	.223 Remington	50 Berger Match	W-748	27.0	WSR	2.300	3,046	1.12
						2.970	3,048	.83
						2.260	3,046	.92
						2.200	3,016	.88
						2.175	3,120	1.72
Cooper Model 22	.22-250 Remington	55 Sierra BlitzKing	Big Game	37.5	WLR	2.576	3,430	1.27
						2.546	3,436	.67
						2.450	3,391	1.96
						2.350	3,322	2.72
Cooper Model 22	.243 Winchester	95 Hornady SST	H-4350	42.0	WLR	2.680	2,943	.94
						2.630	2,873	.55

Notes: All five-shot groups were fired at 100 yards. Winchester cases were used throughout.

Be Alert – Publisher cannot accept responsibility for errors in published load data.

ing table shows, the Cooper .22-250 certainly had a OAL sweet spot of 2.546 inches. The deeper bullets were seated from that spot, the worse they shot.

The Sisk Rifles .223 is based on a short-action Remington Model 700. This handy, little rifle is used mainly for hunting coyotes and is continually loaded and unloaded, so an OAL that puts bullets into contact with the rifling is impractical because a bullet might remain stuck in the bore when the rifle is unloaded. An OAL of 2.300 inches set Berger 50-grain Match bullets up against the rifling in the Sisk .223. Accuracy at that depth was so-so. The rifle shot much tighter five-shot groups when the bullets were backed off the rifling .03 to .10 inch. Accuracy went downhill significantly with the bullets backed off the rifling .125 inch. No doubt that long jump allowed the bullets to enter the rifling somewhat crookedly.

Hornady 95-grain SST bullets were seated .03 inch from touching the rifling in the Cooper .243 Winchester and at the 2.63-inch OAL stated for the bullet in the Hornady reloading manual. Surprisingly, the shorter OAL shot a tighter group. Even more unexpected was 70 fps higher velocity with the bullets only .05 inch closer to the rifling.

Seating bullets an exact distance from the rifling is for naught if bullets enter the rifling crookedly. Twenty .243 cartridges were loaded for the Cooper with 38.0 grains of VV-N140 and Sierra 70-grain HPBT Match bullets, 10 of which had bullet runouts of .002 inch or less and 10 with .005 and up to .010 inch runout. The straight bullets produced two, five-shot groups that averaged .43 inch at 100 yards. The two groups shot with the crooked bullets measured more than twice that at 1.03 inches.

To help seat bullets concentrically in cases, keep sizing and seating dies and shellholders clean. A buildup of grime causes cases to enter dies crookedly and bullets off-center in seating stems. Squaring a seating die with the shellholder also helps because alignment is improved between die and press. To align the shellholder and seating die, place a coin or two between the shellholder and die and raise the press ram to put a slight amount of pressure on the base of the die. That removes play from the threads on the press and die. With the pressure still in place, lower the die locking ring onto the press and tighten it.

After investing the time and technique to ensure handloads are the best, only your marksmanship can be blamed for missed shots. •