

Send your letters and comments to the Bevel Brothers
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by the Bevel Brothers

Stump the Experts

Bevel Down: It was during one of those spirited discussions in the booth at Friendship that this month's column was born. The creative juices were flowing from vessels of various descriptions when someone commented on how So-and-So brand percussion caps are hotter than they used to be. He said some guys want the old ones and some guys swear by the new ones.

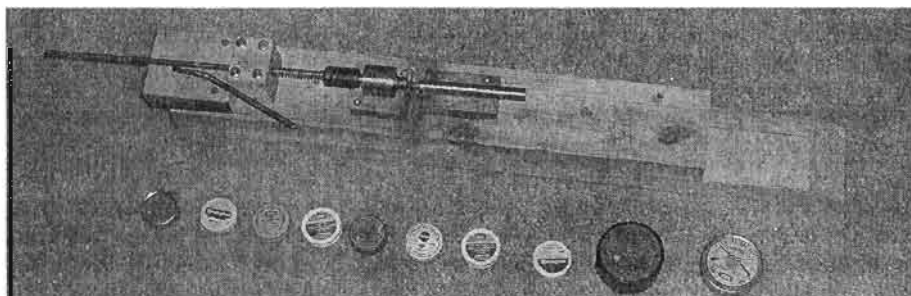
Once the hangers-on were out of ear-shot, so as not to offend, we started wondering out loud just how the heck anybody could tell if one cap is hotter than another anyway! Of course some are labeled "magnum," we know that. And we also admit that we hardcore flint shooters may have reduced sensitivity to the nuances of cap gun performance. But we also know an easy experiment when we see one, and this had an hour on Sunday afternoon written all over it.

Bevel Up: We were told that if you snap a cap on an unloaded gun stood upright with a wooden ramrod down the bore the rod will pop up a ways, and that hotter caps are clearly evident by the increased height of the pop. So all we had to do was start snapping caps and measuring rod travel and write everything down. Simple.

Bevel Down: Except we couldn't figure out how to do that accurately. By the time we hashed through and rejected several ideas we had already burned through our one-hour time budget. I was beginning to see how government contractors earn a living, except that these hours aren't billable.

Bevel Up: We made a couple of fairly elaborate false starts with a cheap .22 rifle barrel and an air gun barrel, but we'll spare you the details.

I finally figured out that the solution depended on using a pellet gun barrel



that could be loaded from the breech. I decided I would make a new, smooth bore, .177 caliber barrel with the nipple mounted inline into the breech; smooth-bore to reduce friction, and .177 to minimize pellet weight.

To make the barrel I had to buy a .180 inch chucking reamer to produce a nice smooth bore just a few thousandths smaller than the skirts of the pellets I had on hand (Meisterkugeln target wadcutters). The reamer was a little shorter than I wanted; a 4 1/2 inch barrel was all I could get out of it. I think that worked out for the best, though.

Bevel Up: This setup functioned as required! So off we went to Wisecres for a long day of testing.

We wanted to be as thorough as we could – we scrounged up eight different kinds of No. 11 caps and two different musket caps. Obviously there are more than two kinds of musket caps on the market, but you have to draw the line somewhere. Our main purpose with the musket caps was to see if they really are hotter, as the deer hunters say.

Anyway, we set up the chronograph two feet in front of the zip gun and shot the pellets only an inch above the screens. The pellets had to be started very carefully to keep them square with the bore. If they went in too cockeyed the skirts would deform and we didn't think that was very good. It worked best to start them straight in the muzzle with

my fingers and then seat them flush with the muzzle with a flat piece of hard plastic I could line up accurately. The "ram-rod" was a short wooden dowel with a little nail through it to act as a stop when it touched the muzzle – that way every pellet was seated to the same depth, just a fraction ahead of the face of the nipple.

You can see the results for yourself in the chart, but let me describe more fully what the different caps are. They are on the chart in no particular order, by the way. Remington Black Powder is the current production caps; you usually see them hanging in bubble packs. Old Remington refers to those white tins with the big red dot in the middle; DuPont is on the label, too. They date back to the 60's, I think. Newer Remington have a green semi-circle in the bottom half of the top label and are around ten years old. RWS 1075 green label is their current production, RWS red label are only a few years old, but I don't think they're made any more. The CCI Standard and Magnums are both current production; the Old CCI are from the late 80's or early 90's and come in a "sage-y-beige" colored tin (as described by our sister, Bevel Jennifer). Both types of musket caps are current production. And just for grins, we mooched some real old caps (Eleys from the 1860's) off of Dick Chubb down the street from us on Commercial Row to see if they still would go off.

Cap Gun Pellet Velocities

	Old Remington Black Powder	Remington (foil lined)	RWS 1075 Green Label	CCI Magnum	Old CCI	Newer Remington	RWS 1075 Red Label	CCI Standard	RWS Musket	CCI Musket
Velocities in fps:	323	177	117	190	118	327	236	315	188	355
	172	195	77	206	185	296	288	306	395	157
	142	250	132	113	41	270	285	60	358	149
	167	221	122	350	27	254	322	258	419	163
	198	164	104	197	53	253	249	243	192	320
	132	69	93	218	185	88	175	252	342	455
	145	160	89	212	65	245	328	224	406	183
	183	155	142	246	125	99	204	132	396	125
	184	116	302	150	40	74	271	208	220	175
	155	148	92	203	81	290	240	137	135	457
Average Velocity										
Standard Deviation	180	165	127	209	92	210	260	214	305	254
	52	48	62	59	56	90	46	77	103	124

Bevel Down: Maybe a quick review of "standard deviation" is advisable, too. What it tells us is how much dispersion there is from the average value of a bunch of measurements or "data points." The less dispersion, the more consistent one particular thing is than another, like between brands of caps. Smaller standard deviations indicate

less dispersion. The other thing standard deviations do is give you a level of confidence in what to expect from future measurements – like the next box of caps you buy.

In the chart we see that the Remington Black Powder caps produced velocities with a standard deviation of 52 fps. The statistics guys know

then that if caps follow a normal distribution, about 68% of all of the Remington Black Powder caps should produce velocities within one standard deviation, or 52 fps on either side of the average, 180 fps, or between 128 and 232 fps. In general, about 95% should land within two standard deviations, or between 77 and 273 fps.

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Now there really is a lot more to it than that, but we're not statisticians and nobody is going to get the wrong dose of blood pressure medicine if we're wrong, so that's good enough. What standard deviations give us is a way to compare these different brands of caps to see which ones seem to be more consistent from shot to shot.

When we thought this experiment up we figured the average velocity of each shot would tell us which brands of caps are "hotter" than others, but it may only tell us which are "gassier" than others. *Does the speed and volume of fulminate gasses equate with the temperature of the flame/explosion and how efficiently it will ignite powder?* I would think so, but since the Magnum CCI caps produce lower velocities than the Standards, I don't know. We had heard that the new RWS Green Labels are hotter than the Red Labels, but they're not, according to this test. In the scientific community that's what's known as a "head scratcher." And how about those musket caps? The RWS musket caps aren't all that much hotter than the Red Labels of the same brand.

Bevel Up: So what we have is, I think, a pretty clear winner with the RWS Red Label caps. Trouble is, I don't think they're made any more. You can see the individual results in the table.

The old Elys aren't included in the table because we only had a few, but we were both surprised to see that the 150-year old caps mostly were still pretty good, too. Of course, caps that old are no doubt corrosive and could easily ruin a bore, so we recommend that only Paul Griffith and a couple of his cap gun chunk shooting friends use them in their guns.

Bevel Down: We wondered what a guy is supposed to do if he doesn't have a supply of Red Labels stashed somewhere. You can't make caps hotter, but maybe you can make them more consistent. We wondered if it would be possible to weigh each cap and sort out the light ones and the heavy ones

and just keep the middles, like we do with cast balls. It seems logical that heavy caps will have more fulminate and the light ones less, but it's also possible that the copper cup maybe wasn't trimmed just right, too.

I tried it, though, and ended up with this:

#11 Percussion Cap Weights (grs.)

Newer	RWS 1075
Remington	Red Label
2.3	1.7
2.1	1.9
2.2	1.7
2.2	1.8
2.2	1.7
2.1	1.7
2.2	1.7
2.2	1.8
2.2	1.7
2.2	1.7

The variations in weight run about the same for both brands I weighed, which doesn't account in any way for the variance in recorded performance (standard deviations) between them. It's probably just as important for you to know that I really think that trying to differentiate be-

tween these tiny little objects with their even tinier variations is beyond the capabilities of your average reloading scale. I weighed several caps several times and could see slight differences each time. The results you see are the result of some rounding and interpolation because the scale just couldn't be adjusted finely and consistently enough.

I will say that I am certain there is a fairly wide distribution of cap weights, relatively speaking, within a given tin. There was a clear difference between the lightest and heaviest caps of around two tenths of a grain. I just can't tell you exactly how much. Obviously, the next step would be to sort out the lights and heavies and see if there is a clear difference in performance between the two groups, but I don't think my scale is up to the task such that I could feel confident with the outcome.

Bevel Up: And the biggest question that still remains is whether or not little differences in caps actually turns into differences at the target. Everything has some effect on the outcome, but how much? And how much is too much? Hmmm... **MB**

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