

223 Remington

The little mouse that can roar



From left to right: 77gr mag length, 80gr Amax, 90gr SMK, 90gr Berger VLD

Overview

The section on cartridges has been something I've been trying to figure out how to write for sometime. I didn't know if I could speak about cartridges for a specific discipline or cartridges in general. Instead I have come to realize that just focusing on specific cartridges may be more beneficial and offer some more insight. So with this in mind the first article is going to focus on a project that has worked very well for me and that is the 223 Remington as a prone cartridge as I've dealt with it in my 223 Palma rifle. This article will look at the reason for going to this cartridge I had, a brief history of it. Then it focus on the specifics such as brass, barrel, primer, powder, bullets, and ballistics.

Reason

I am a rather logically driven person when it comes to cartridges and rifles. If I setup a target rifle there has to be an envelope that it will fill. When I started out shooting I shot AR match rifles but slowly started to switch over to bolt guns for the prone rifles. My 243 prone rifle was and still is awesome for mid-range (third article in the series will deal with this cartridge). However barrel life isn't horrible, mild recoil, great accuracy, but you have an awful lot of horsepower that maybe isn't needed for club matches. Also it doesn't allow you to learn to read the wind as well as you can shoot through a lot of stuff. To help with the barrel life on the 243 I started shooting the 308 Palma rifle for mid-range. Again a very accurate cartridge, easy to load for, better barrel life than the 243. The main issues again for me were trying to control round counts on a barrel as this is the primary Long Range Palma rifle and also component useage. With all of the mid-range matches one can shoot in a season you can burn through a good amount of powder in a 308. Plus while the recoil isn't that bad it is more than the 243, for mid-range I like to stay in position so something lighter recoiling would be nice. Like with the 280 Remington (2nd article in the series) I decided to look at the brass I had laying around and without much thought the idea of a 223 Palma rifle came to be. I knew of a couple other shooters who do or have shot them so I decided to give it a go.

Cartridge History

The 223 came into Highpower shooting with the intrusion of the AR-15. Initially bullets were limited to the 69gr SMK but as time progressed more options became available. The 223/AR15 is probably the most frequently seen rifle in across the course and one could say it is probably the most dominant cartridge/rifle combination in the sport based upon numbers seen and the number of matches nation wide this cartridge/rifle combination will win. Top shooters do shoot other cartridges but in the hands of good shooters especially now with scopes being legal this combination has shown it is a force. For an example look at the results of the 2016 Across the Course Championships where there were

multiple 223/AR's in the top 10 of the NRA National Championship.

For prone shooting the 223 specifically in the AR-15 it was not as successful. The USAMU after dropping their M14s switched to the M16/AR-15. Their success in LR was not what it was with the M14s and led to the eventual adoption of the M110. This lack of success on their part I would say kind of kept the 223 as a footnote in prone shooting, especially for long range. Other shooters stuck by their traditional bolt gun cartridges as not wanting to “handicap” themselves in going smaller. Many of these reasons will be talked about later.

This is probably where it would have stopped however as with most cases civilians played around figuring out what you need to get the cartridge to work and now you are starting to see more and more 223 prone rifles. Will it ever be the #1 cartridge seen on a mid-range or long range firing line? No. Will it replace the 308 as the top Palma cartridge? No, probably not. But more people are shooting them for the same reasons I decided to go to it.

Barrel

In course shooting you see mostly barrels from 1:8 to 1:7 and all the iterations inbetween. When the AMU and others decided to shoot the 223 for Long Range Sierra came out with a 90gr SMK. Since a 1:7 was used for across the course many/all of them went with a 1:6.5 for the 90gr bullet. While I myself have not had any experience with a 1:6.5 barrel this is where I surmise the issues started. My theory is the the first generation of 90gr SMKs weren't that good and then they were being spun to fast. If you spin a bad bullet fast they aren't going to shoot well. With this in mind I decided to go with a 1:7 twist. I primarily was going to shoot 80s but wanted the ability to play with and maybe shoot 90s. Since my barrel length was going to be longer thus higher velocities I also didn't want to exacerbate any bullet/RPM issues that the 90s had in the 6.5 barrels of the service rifles. I double checked the stability numbers on the bullets I figured I would shoot in this rifle and they all came out ok.

Bullet	Stability Factor (sg)
77gr SMK/Nosler	2.32 @ 2900fps
80gr Amax	1.992 @ 2900fps
80gr Berger VLD	1.75 @ 2900fps
90gr SMK	1.66 @ 2800fps
90gr Berger BT	1.39 @ 2800fps
90gr Berger VLD	1.37 @ 2800fps

As far as barrel length I have started going to 32" barrels on all of my prone guns so decided to go with this length of barrel. Quickload has always been pretty much dead on for my velocities once I enter the correct parameters. However in the case of the 32" tube the velocities I've shown don't match what QL predicts with a 32" tube and more correctly mirrors that of a 28" barrel. There are a couple of others issues that could be affecting this aside from the barrel length. However just focusing on the barrel length it is hard to say if all the powder is being burned at 28" and it is slowing down the last 4" or if it is being burned at 30" and slowing down the last 2" or somewhere inbetween. All I can say is this is the one rifle/cartridge that the program doesn't predict as well. However my second barrel is a 32" barrel, reason being the longer sight radius really helps and once I get something working I don't chage it.

As far as grooves my first barrel is a 5R, the second barrel is a 6R. The first is a Bartlein the second is a Obermeyer. The Bartlein shot great and there is not reason to think the Obermeyer won't. I generally shoot 5R's but Boots wasn't able to do a 5R in the .22cal blank, and the 2 6mm's he made me were also 6Rs. The one 6R 6mm barrel that is installed on my brothers rifle is performing just like my 5R. So with this in mind I don't think it really matters which way you go. In my 260 course rifle I did notice a pressure difference when I went from a 4 groove to a 5 so for this reason I won't shoot 4's anymore.

Chamber

This is the other area where I think the early 223 shooters I think were making an error. For the reamer I called Dave Kiff at Pacific Tool & Guage. The chamber I went to has a 1.5 degree leade. In conversation with the 280 reamer a couple years prior he stated that if the leade is to sharp it won't shoot. I can't find any information on the reamers used by the AMU and others who couldn't get them to work but this could have been a problem. The freebore is .110 thousandths. Dave said this is the freebore you want for a 80/sometimes 90 gun. If I wanted a straight 90gr gun you want to go with .169" freebore. With my 110 chamber all of the bullets are jumping 0.010".

Bullets

Primarily the bullets I decided to shoot and have shot in this rifle for mid-range are the 80gr Amax or the Berger 80gr VLD. The reason for choosing these bullets was quite simple they have the highest BC of the 80gr bullet line and can be driven with the most velocity. The 82gr Berger, 80.5gr Fullbore, or 85gr Barnes have either lower BC's or can't be driven as fast. While BC is king, if BC's are close enough (couple hundreths or maybe a tenth) velocity can equal things out. However I will say a good friend of mine is shooting Berger 82's out of his rifle and they shoot very nicely for him. I have played with 77gr Nosler CC's that bullet has a very long bearing surface and shows pressure at the same powder charge as the 80gr Amax, so it wasn't worth messing with IMHO.

For long range I was going to shoot the 80gr Berger VLDs and they showed promise, however after some testing and shooting in matches with 90gr SMKs and 90gr Berger VLDs those are the way to go for Long Range in this cartridge in my opinion.

Bullet wise you want to stay with a bullet that has a BC of the 155gr SMK or better. The 80s I shoot are close to the BC of a 175gr SMK. The 90gr SMK is inbetween a 175gr SMK and a 185gr Berger, and the 90gr VLD is the same as a 185gr Berger. Mind you all of this is with way less recoil.

Now since we have talked about using a 1:7 twist barrel according to Berger you will be loosing

some BC with the 90gr VLD (especially in colder temperatures) as it isn't completely stabilized to a Sg of 1.5 which is now where they say you want it to be to optimize BC. But even with this it still will have a higher BC than the 90gr SM.

Brass

I've had a lot of lucky with LC brass in any of the cartridges I shoot, except 243 where I just use commercial. The same goes with the 223 as a prone rifle. I really like my LC brass. Current lot I'm shooting is some LC-91 brass and I've started using some LC-12. When I've measured the capacities they are very consistant.

	LC-91	LC-12	Nosler
Average Weight	91.69gr	92.45gr	96.1gr
Weight SD	0.48gr	0.31gr	0.26gr
Average Volume	30.96gr	31.06gr	30.58gr
Volume SD	0.34gr	0.097gr	0.047gr

I don't do a lot of chrono of the loads but when I have chronod the LC brass loads I get SD's of 10-15 fps. Which is fine for mid range and seems to not be an issue at 800 or 900 yards. However when you get to 1000yds the small capacity of the 223 is an issue and a little inconsistantcy is magnified. If you're planning on shooting the little gun at 1k you may want to consider going with commercial brass.

Lapua is known to be top notch stuff, however a couple shooters I know have dones tests and said you need to have your brass within 1gr difference. I don't like to weigh and sort brass, so to elivate this problem I just bought Nosler brass. Unlike Lapua it comes to you already weight sorted within 1gr. So far it seems to be nice brass and has lasted several firings. The nosler brass loads generally are about 3 fps less in SD than the equivalent load in LC cases. IMHO at 1k for big matches, yes it is worth it, however generally speaking you are fine with LC brass. However with all that being said the Nosler brass isn't that much better than the LC-12 I measured so it may just all be mathematical.

As far as prep, I use to prep my brass, then I quit, but as I've become a better shooter and talking with the F-Open guys that are very anal about prepping I've started doing it again. I've always turned the necks on the prone cartridges. All brass including Lapua has variations in neck thickness, if you don't hold hard you don't notice it. However if you hold hard the difference in thickness affects your neck tension. Given the fact that the 223 is a smaller case and the little errors add up, I would highly suggest turning the necks if you are shooting it for LR, mid-range you don't have to but it helps. Consistant neck tension is probably the most important thing about brass and turning necks helps to ensure this.

The other thing I've started doing again is the primer pockets and the flash holes. Like I said I quit but after Dwayne told me they noticed differences in their F-Open rifles I figured what the heck it won't hurt.

Powder

A 223 will eat a lot of powders and you have a lot of choices. However I've only used/tested with 3 powders and IMHO these are the 3 best powders for the cartridge, Varget, IMR4895, and N140. I have loads with all 3 of these powders that I've worked up and they're all about identical performance wise, currently I'm shooting Varget. However IMHO the powder to use in 223 is N140. It is way cooler burning and will give you better barrel life. Some have had good luck with N150 however I feel it is a bit to slow of burning and since I was molly coated I couldn't get enough in the case t get the velocity I wanted.

Powder	Barrel Life (80gr at 2950fps)
Varget	2912 rounds
IMR-4895	3563 rounds
N-140	4455 rounds
N-150	3985 rounds

Also VV powders tend to be very consistent unlike Varget which has a big change from lot to lot sometimes. However it is more expensive. Another powder I have not tried but will sometime is MR2000, it supposedly works very nice with the 90gr bullets in 223. Either way choose the powder you can find and go with it. With the above setup you want a powder that can safely get you to 2950s if not faster with the 80s, and mid 2800s with the 90s.

Molly

I love molly on any of the cartridges I shoot. However 223 might not be a good choice with 80s. Shooters shooting the bullets naked in 32" barrels are getting around 3050 to 3100fps, molly coated at 25.4gr of Varget I'm getting 2940fps. I can see the node where they are shooting at but with molly I need 27.6 to get there and while I can pack enough in the case it is hard to get there. Same with the 90s I can get mid 2800s and some people claim low 2900s. However they are using a different powder. So the molly may be helping with the 90s somewhat, but I'm not real sure.

Load data

Ok first let me say these are loads worked up in my chamber with my brass, it doesn't mean it will safely work in your rifle.

Secondly I do an Audette Ladder test to find the two that appear to be on the node. Then I'll shoot a group with each of those and whichever one groups the best that is what I go with. I don't play a lot with seating depth if the load is grouping under 1/2 moa (1/3 moa is generally what I go for) that works and I go with it.

Now as I've found with other cartridges if you find a charge with a bullet it will generally work with other bullets. For me this has been 25.4gr of Varget (remember I'm molly coated). Either 80 shot well with this charge giving me a velocity of around 2940fps. That same charge also worked with the 90gr SMKs giving me a velocity of around 2820fps. Now when I switched jugs (different lot) I had to

back the charge off .2gr (remember why I said I was going to N140). IMR4895 was at 25gr as was the N140 charge.

Impressions

Since I've been shooting the 223 for mid-range I've been very pleased with it. I've shot multiple cleans with 50-67% X counts with this rifle at 300, 500, and 600 yards. Recoil is like shooting a smallbore rifle with only slightly more noise. The rifle sights (either scope or irons) will settle back down on the target just like a smallbore rifle will. For club matches this is the rifle I shoot, I don't feel under gunned and like I said it gives me good practice reading conditions. Regionals it is a toss-up between the 223 or the 243 and depends on what the wind is doing. In regional competition I have been on the line shooting against 6BR and 308/155 palma rifles. The little rifle shot inside the 155s and was shooting right with if not inside the 6BR. For Nationals I will bring out the 243 just because there is more on the line and I want all the help I can get. At ranges like Atterbury or Perry where it is wide open and you can see the wind you aren't going to get hurt. The only time you may is at ranges like Cincy or Oak Ridge where you have some areas where the wind does some quirky stuff and if you're not seeing it, the cartridge won't shoot through it where as a 243 would.

For Long Range I've started playing with it some more. What I've noticed is at 800 for sure and 900 somewhat I still get the same X count as I can with a 308 palma rifle. At 1000yds though not so much. However that being said this was when I was shooting it at Malvern which can be a quirky range. In non-match conditions at Atterbury I've done some testing with it and the rifle was holding much better vertical.

I don't ever think the 223 Palma rifle will surpass the 308 Palma gun as the primary rifle for Palma matches. However for Fullbore matches where the 308 has a weight limit of 156gr the 223 rifle is my rifle of choice, along with mid-range matches.