

" SMOKE SIGNALS "
Blackpowder Muzzleloading
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Muzzleloading Round Ball Ballistics

I was purely delighted when my first store-bought muzzleloader kept five shots inside a 6 inch group at 100 yards, and that was from a benchrest. Today I would find out what to fix or throw it away, I have changed my opinion about the ability of a muzzleloader to group, from a benchrest a muzzleloader will produce groups of two inches at 100 yards. Most mathematical problems involving muzzle accuracy are so complicated that I never enjoyed them or wanted to use them, but I realize that there are some hunters or target shooters who are interested in how much accuracy a muzzleloader has. Entire volumes have been devoted to the subject of blackpowder ballistics such a book would be for some pretty dry reading. This article is intended to be the short version.

There are a number of variables that affect the ballistics and accuracy of muzzleloaders, air drag, altitude, atmospheric and wind conditions just to name a few. In fact two shooters with identical firearms, shooting identical loads behind the same type of bullet will likely come up with different results.

Extremely important to maintaining velocities with little variation from shot to shot often overlooked is seating pressure (same amount of pressure on the ramrod for each shot), it generally takes from 40 to 80 pounds of pressure on the ramrod to seat a ball properly, things such as rifling depth, tightness of patch and ball in the barrel, type of lube all determine the exact amount of pressure required. There is one shooter I know who has actually built into his ramrod a coil spring as a gauge for uniform seating.

Fouling is another factor that influences ballistics, a .50 caliber Hawken rifle with 80 grain charge of FFg behind a .015 thick patched .495 round ball produced velocities continuously rising between 1618 to 1652 f.p.s. the same firearm and load with cleaning between shots produced velocities between 1608 to 1614 f.p.s. after five shots. Efficiency of ignition can also affect velocities. A percussion firearm fired with one of the extra hot percussion caps will normally turn in slightly higher readings than the same arm relying on one of the percussion caps throwing a normal amount of flame.

Velocities obtained from different types of percussion caps using a 54 caliber Hawken rifle.

	CCI Caps	German Caps	Italian Caps
No. of shots	15	20	10
Lowest velocity	2024	2041	1992
Highest velocity	2091	2100	2074

The following tables are for reference only: Ball Path calculations based on (distance between the center line of the bore and line through the sight, results may vary.

Round Ball Loads and Ballistics

Ball Size (.445/127gr)		Muzzle	25	50	75	100
Range (yards)	Powder Charge	Velocity (FPS)				
Ball Path (in)	50gr. FFFg	1430	1186	1036	933	854
			0.25	0	-2.26	-7.10
Ball Path (in)	60gr. FFFg	1623	1363	1155	1018	918
			0.07	0	-1.69	-5.58
Ball Path (in)	70gr. FFFg	1825	1533	1308	1111	990
			0.04	0	-1.23	-4.31
Ball Path (in)	80gr. FFFg	1975	1621	1381	1170	1027
			0.01	0	-1.04	-3.77
Ball Path (in)	90gr. FFFg	2050	1711	1133	1237	1066
			0.05	0	-0.88	-3.30

Ball Size (.535/230gr)

Range (yards)		Muzzle	25	50	75	100
	Powder Charge	Velocity (FPS)				
	60gr. FFFg	1335	1130	1019	934	867
Ball Path (in)			-0.32	0	-2.41	-7.38
	70gr. FFFg	1550	1313	1141	1027	941
Ball Path (in)			-0.11	0	-1.78	-5.71
	80gr. FFFg	1620	1398	1216	1074	980
Ball Path (in)			-0.03	0	-1.51	-5.00
	90gr FFFg	1700	1485	1300	1131	1020
Ball Path (in)			-0.07	0	-1.27	-4.34
	100gr. FFFg	1750	1574	1375	1196	1062
Ball Path (in)			-0.02	0	-1.07	-3.77

Ball Size (.575/278gr)

Range (yards)		Muzzle	25	50	75	100
	Powder Charge	Velocity (FPS)				
	60gr. FFFg	1270	1131	1072	1022	980
Ball Path (in)			-0.32	0	-2.21	-6.59
	70gr. FFFg	1300	1215	1143	1083	1031
Ball Path (in)			-0.21	0	-1.87	-5.69
	80gr. (FFFg)	1460	1303	1218	1145	1085
Ball Path (in)			-0.12	0	-1.58	-5.00
	90gr. (FFFg)	1654	1485	1380	1285	1203
Ball Path (in)			-0.07	0	-1.11	-3.64
	100gr. FFFg	1685	1579	1466	1362	1270
Ball Path (in)			-0.01	0	-1.00	-3.13

In conclusion Blackpowder firearms are capable of the same general accuracy achieved by modern arms. Most shooters expect far too little by way of muzzleloader accuracy, not too much.

Accuracy potential is achieved through careful loading and loading consistency is as essential as good components. Muzzleloading without accuracy is just making smoke.

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