In the Nov./Dec. 2001 ASSRA Journal article: “The Importance of Case Length in Cast Bullet Accuracy”, the author stated that short cases yield less accuracy than cases close to maximum length with cast bullets. The mechanism proposed is that the unsupported bullet in the gap between case end and chamber end will be expanded by the firing pressure, then the expanded section will be swaged down as the bullet moves through the throat-and the expansion/swaging will be uneven and cause inaccuracy. This article opened up a potential accuracy-improving easy and inexpensive shortcut. The article did not include any supporting data, so I imagined that what was put forth was a hypothesis.

To test this hypothesis I needed a rifle that shot fixed ammunition at high enough pressures, with sufficient accuracy, and for which extra long cases could be made or found.

The only rifle available to me that met these criteria was a Savage Tactical rifle with synthetic stock in 300 Winchester Magnum, fitted with a Weaver 3-9X telescopic sight. I owned this rifle for about four years, and it was reasonably accurate with cast lead bullets at slower velocities, 1200-1500 fps.

(We are told, and I believe, that cases that are too long will jam bullet and case neck into the throat of the rifle and cause very high pressures on firing.)

Pressure must be sufficient to expand the bullet into the space left by the short case. Expansion of the bullet under the gas pressure on firing is sometimes called "obturation".

In a private communication with the author, he said “… obturation of lead-alloy bullets occurs at about 1500 psi times each Brinell hardness point, e.g., a Brinell hardness 10 bullet requires about 15,000 psi peak chamber pressure to achieve sufficient obturation to essentially fully seal the bore”

With wheel weights reported at 9-12 BHN, the pressure required to obturate would be 13,500 to 18,000 psi.

A pressure of greater than 18,000 psi was required. The Lyman Cast Bullet Handbook, third edition, shows a 187 grain 311334 bullet in the 300 WM with 17.5 grains of Unique at 1605 FPS and 26,400 psi. The load given below of a 208-grain bullet and 17 grains of Unique should produce at least this pressure, which exceeds the obturation threshold.

After several weeks of experimentation I found a load that shot accurately at higher velocity: The 311299 bullet was cast of newly melted wheel weights, weighing 208.5 +/-.5 grains, sized in a .314” die, lubed with the NRA alox-beeswax formula and gas checked (Hornady).

This bullet has three bands and two lube grooves along with the gas check shank. As loaded, the first band is out of the case with none/little of the first lube groove exposed.

17 grains of Unique was used with no filler, Remington L.P. #2 1/2 primers, LOA = 3.455”.

I loaded one case at the range, sizing the neck in a Lee sizer, expanding the neck in a Lyman “M” die and seating the bullet with the Lee loader.

I used this load and loading method for all groups shot in this test.

Extra long cases were made from Federal 300 H&H Magnum cases full-length sized in 300 WM dies and trimmed to about 2.660”.

The chamber would accept a case of 2.648”, .028” longer than the published case length and .033” longer than the trim-to length.

Being chicken, I trimmed the cases to 2.643”. After extensive firing, the cases measured 2.621" to 2.630”. What happened was that the tapered 300 H&H case had blown out to fill the chamber and shortened during firing.

The first test with short cases.

On March 13, 2002, using the load noted above and one R-P case measuring 2.605” long, I shot five 5 shot 100-yard groups that averaged 1.132":

The test with a long case made from a 300 H&H Magnum case

On March 21, 2002, using a case 2.630” long made from a 300 H&H Magnum case and the load noted above, I shot five 5 shot groups averaging 1.468".

After shooting, the 2.630” case was 2.626”/2.628” long, it had blown out and shortened.

The problem was that the 300 H&H cases were tapered, and a 300WM case formed from them and trimmed to just fit in the chamber, shortened after firing. I needed longer cases.

The test with a long case made from a 375 H&H Magnum case

I went to the Internet and asked for samples of 375 H&H Magnum cases, which don’t have the taper of the 300 H&H. Alston Jennings was kind enough to send some. I formed three of the cases to 300 Winchester Magnum, leaving the necks long.

On March 27, 2002, with one case formed to 300WM 2.642" long and the same load, I shot five 5 shot groups averaging 1.438"
After these 25 shots the case length was 2.646".

The test with the long 375 H&H Magnum case trimmed short
I then trimmed the case to 2.605" and shot five 5 shot groups averaging 1.036", same load as above.
After these 25 shots the case was 2.608" long vs. 2.605" before the shooting.

Lengths of 300 WM cases
"Book" case length 2.620"
"Book" trim to 2.610"
My rifle chamber length: 2.648"
Formed from 300 H&H, case length: 2.630" after firing, 2.626"/2.628"
Formed from 375 H&H, case length: 2.642" after firing, 2.648"
Formed from 375 H&H, case length: 2.605" after firing, 2.608"

Table of group sizes fired with 300 WM cases of different lengths, inches.

Date	13-Mar-02	21-Mar-02	27-Mar-02	27-Mar-02
Case Length	2.605"	2.630"	2.642"	2.605"
First	1.378	1.117	0.978	0.880
Second	0.821	1.073	1.497	1.627
Third	1.111	2.224	1.099	1.106
Fourth	0.986	1.653	1.399	0.785
Fifth	1.364	1.271	1.438	0.784
Average	1.132	1.468	1.282	1.036

All these groups were shot at a pace determined by the time required for reloading the one case. No wind flags were used, the rangemaster stopped the shooting after each 15 minutes of "hot line" for target change. The gun was cleaned once at the end of the day.
Comments and Conclusions
I don't like to use cases that are close to the maximum possible length. If the case lengthens slightly, then excessively high-pressures may be experienced, as the bullet and case neck are jammed into the leade/throat/ball seat.
The average group size for the 20 groups was 1.23". Six of 20 were under an inch.
Pressure was high enough, bullet hardness was low enough (new wheel weights) and the bullet had an exposed section outside the case about 1/8" long ready to expand or obturate. There were no called flyers in 100 record shots from the bench. There was one stranger in the third group shot on 3/21/02.
I see no accuracy improvement using longer cases. The hypothesis failed this test.
One test doesn't establish the fact, but I have seen no data supporting the hypothesis that longer cases improve accuracy in soft cast bullet shooting. If longer cases do produce better accuracy, I want to know it.
I would welcome any other data on either side of the issue.
I have worked with a Savage 12BVSS in 223, forming brass from 222 Magnum cases because the chamber/brass on hand combination resulted in a gap between the end of the case and the end of the chamber. I was not able to detect an improvement in accuracy.
I've been working with my Martini bench rifle and a M54 Winchester rifle, both in 30/30, both with "long" chambers. Using Buffalo Arms "long" 38/55 brass, I've formed 30/30 brass about right for the chamber.
I was not able to detect an improvement in accuracy with longer cases in either of these guns. I'm still trying.
At high pressure and velocity I have been able to shoot cast bullets and have a ring of lead left in the chamber. It looks like the bullet expanded into the gap between the case neck and the step at the end of the chamber, and then the resulting ring was sheared off.