

## TECHNICAL NOTE

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### Pellet Patterns Produced by Remington Multirange Duplex Shotshells

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**ABSTRACT:** Remington and Federal ammunition manufacturers now offer shotshells that contain more than one pellet size. The purpose of these shotshells is to provide a brush-cutting, multirange capability for the hunter. Remington Multirange Duplex™ shotshells containing No. 2 and No. 6 birdshot were fired from a 12-gauge shotgun at paper targets at ranges of 3.0, 6.1, 9.1, and 12.2 m (10, 20, 30, and 40 ft, respectively). The sizes of the shot patterns produced by the Duplex shotshells (determined as the square root of the area of the smallest rectangle that would just enclose the shot pattern) were compared with patterns fired at the same ranges using Remington No. 2 and No. 6 birdshot cartridges. The sizes of the pellet patterns produced by the Duplex shotshells were similar to those produced by the No. 6 birdshot shotshells at the same ranges. Examination of the pellet patterns produced by the Duplex shotshells revealed that the patterns consisted of No. 6 birdshot patterns superimposed on smaller No. 2 birdshot patterns.

**KEYWORDS:** forensic science, ballistics, patterns, ammunition

Both Remington and Federal ammunition manufacturers now offer shotshells containing more than one size of pellet. Remington's Multirange Duplex™ shotshells contain two pellet sizes, with approximately one third of the load (by weight) being the larger size. These shotshells are currently offered in the following combinations: BB/No. 2, BB/No. 4, No. 1/No. 3, No. 2/No. 4, and No. 2/No. 6. The stated purpose of these loads is to provide the hunter with a dense, uniform pattern at normal ranges, while the larger pellets penetrate brush and are more effective at longer ranges. The larger pellets are loaded in front of the smaller pellets so that the larger pellets can cut away brush.

This research was undertaken to establish a comparison of pellet patterns made by these shotshells.

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### Materials and Methods

Patterns were fired using three types of 12-gauge, 70-mm (2¾ in.), shotshells: Remington Premier Magnum No. 2 birdshot (Lot No. CJ09G526), Remington Multirange Duplex 2×6 (containing No. 2 and No. 6 birdshot) (Lot No. BL05L526), and Remington Premier Magnum No. 6 birdshot (Lot No. M02M899). These types of shotshells are suitable for comparison because, in addition to being made by the same manufacturer, they (a) contain the same type and amount of powder, (b) use the same Power-Piston® one-piece wad, (c) contain a nominal 1½ oz (43 g) of copper-plated lead shot, and (d) contain the same granulated polypropylene shot buffer. Figure 1 shows the components of the Duplex 2×6 shotshell.

Five rounds of each type of shotshell were fired at ranges of 3.0, 6.1, 9.1, and 12.2 m (10, 20, 30, and 40 ft, respectively) into paper targets using a Sears Model 200 12-gauge pump-action shotgun (Serial No. P264871). The shotgun's barrel had previously been shortened by a professional gunsmith from 76.3 to 46.4 cm (30 to 18¼ in.). The sizes of the patterns were determined by calculating the square root of the area (*A*) of the smallest rectangle that completely enclosed the pellet pattern [1]. Holes produced by wads were not considered parts of the pellet patterns. The means and standard deviations of *A* were calculated using standard statistical methods.

### Results and Discussion

The sizes of the pellet patterns fired with the three different types of shotshell are given in Table 1. The mean values of the sizes of patterns are shown in Fig. 2 as a function of the range of fire. It is clear that the pellet patterns produced by the Duplex shotshells were similar in size to those produced by the shotshells containing No. 6 birdshot alone. An independent *t*-test [2] was applied to the data in Table 1. Not surprisingly, the *t*-test showed that, at all ranges of fire, the sizes of the patterns produced by the No. 2 birdshot shotshells were drawn from sample populations different from the sizes of the patterns produced by No. 6 birdshot or Duplex 2×6 shotshells (confidence level >95%). The sizes of the pellet patterns produced by Duplex 2×6 shotshells fired at ranges of 6.1 and 9.1 m (20 and 30 ft) were also determined to be drawn from different sample populations than the sizes of the patterns produced by No. 6 birdshot shotshells fired at the same ranges (confidence level >95%).

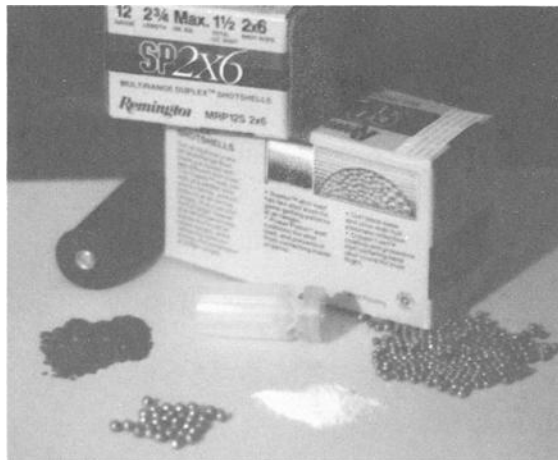


FIG. 1—Components of Remington Multirange Duplex shotshell.

TABLE 1—*Sizes of pellet patterns produced by Remington No. 2 birdshot, Duplex 2×6, and No. 6 birdshot 12-gauge shotshells as a function of range.*

Range, m	Pattern Size, cm		
	No. 2 Birdshot	Duplex 2×6	No. 6 Birdshot
3.0	10.1	13.4	15.9
	10.0	15.7	14.9
	11.6	13.6	13.1
	14.0	17.4	15.5
	11.4	13.5	12.9
Mean	11.4	14.7	14.5
SD	1.6	1.8	1.4
6.1	22.3	24.3	29.3
	19.5	24.1	25.4
	22.6	24.4	28.7
	20.8	25.1	29.9
	21.0	27.0	25.0
Mean	21.3	25.0	27.7
SD	1.3	1.2	2.3
9.1	33.2	41.0	43.7
	34.4	39.5	41.3
	31.1	43.7	44.5
	34.7	39.7	45.4
	36.0	42.5	46.6
Mean	33.9	41.3	44.3
SD	1.9	1.8	2.0
12.2	50.1	58.1	60.5
	50.5	54.2	58.6
	46.3	61.2	64.4
	49.1	66.9	57.1
	48.1	55.7	61.5
Mean	48.8	59.2	60.4
SD	1.7	5.0	2.8

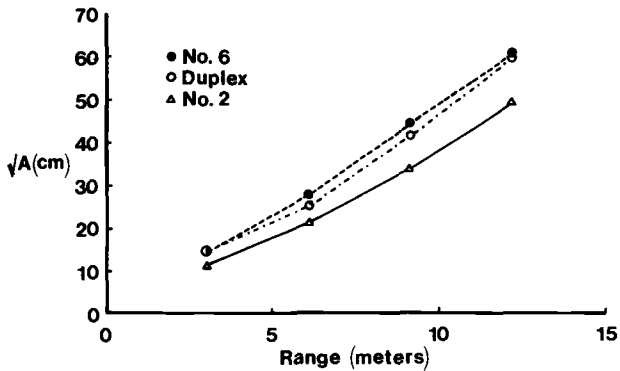


FIG. 2—*Sizes of pellet patterns produced by Remington No. 6 birdshot, Duplex, and No. 2 birdshot shotshells as a function of the range of fire.*

When the test-fired patterns produced by the Duplex 2×6 shotshells were carefully examined, it became apparent that the outlying pellet holes were made by No. 6 birdshot. In other words, the overall pellet patterns consisted of a large pattern made by the No. 6 birdshot, superimposed on a smaller pattern made by the No. 2 birdshot. This accounts for the similarity between the patterns produced by the Duplex shotshells and the No. 6 birdshot shotshells.

### Summary

When the sizes of the pellet patterns made by 12-gauge Remington Multirange Duplex 2×6 shotshells were compared with the sizes of those produced by Remington Premier Magnum No. 2 birdshot shotshells and Remington Premier Magnum No. 6 birdshot shotshells, the Duplex shotshells were found to produce patterns similar to those made by the No. 6 birdshot shotshells. The pellet patterns made by the Duplex shotshells consisted of a No. 6 birdshot pattern superimposed on a smaller No. 2 birdshot pattern.

### Acknowledgments

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### References

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