by Jeff Stevenson

There's nothing new about 1/4 cc straws

SOME A.I. breeding companies either have or are initiating a transition from 1/2 cc straws to the smaller 1/4 cc straws and marketing this smaller package size as "new technology" with the expectation of greater conception rates. The 1/4 cc straw is nothing "new."

Stevenson

When glass ampules were replaced by the French straw in the early 1970s, the U.S. A.I. industry thoroughly researched the benefits of both the 1/4 and 1/2 cc straw. Although organizations in Europe and later Canada chose to use the 1/4 cc straw, the U.S. and most countries in Latin America opted for 1/2 cc straws.

Differences exist . . .

Three obvious differences exist:

1. The 1/4 cc straw uses less extender and less storage space, thus reducing production, storage, and shipping costs more than the 1/2 cc straw.

2. The larger 1/2 cc straw is more user-friendly because it is easier to handle and easier to read, in addition to less breakage during storage than the 1/4 cc straw.

3. The 1/4 cc straw responds more quickly to changes in temperature than the 1/2 cc straw.

Select Sires has conducted extensive in-house research with the two straw sizes. When the freezing rate is "too slow," the 1/4 cc straw may have a slight advantage. But, in larger capacity freezing tanks specifically engineered for faster freezing rates, the 1/4 cc straw has no advantage in postthaw sperm survival compared with the 1/2 cc straw.

Because the 1/4 cc straw allows for faster freezing rate as a result of its larger surface-to-volume ratio, the 1/4 cc straw is also more sensitive to thermal insult during straw retrieval and potential cold shock after thawing.

Berndston and colleagues reported their comparisons between the 1/4 and 1/2 cc straw at the 6th National Association of Animal Breeders Conference in 1976. Effects of thermal insult were mimicked by retrieving straws from liquid nitrogen storage and then exposing them to room temperature (68°F) for 15 seconds, 30 seconds, or 1, 2, or 4 minutes. The temperature inside the 1/4 straws rose much more quickly than inside the 1/2 cc straws.

When these straws were then plunged back into liquid nitrogen and later thawed to determine post-thaw sperm motility, sperm in the 1/4 cc straws had reduced postthaw motility compared with the 1/2 cc straws. These facts indicate that inseminators must exercise greater caution to protect sperm in 1/4 cc straws against thermal insults that may occur before and after thawing semen.

Fertility measured . . .

Potential differences in fertility of semen packaged in 1/4 or 1/2 cc straws have been examined during the last 40 years. The weighted average of these studies representing nearly 1 million inseminations indicates the 1/4 cc straw may raise fertility by less than 1 percent (see table)! Most of these studies were conducted in Europe by highly skilled professional A.I. technicians.

One study, however, conducted in Germany has U.S. application in which nonreturn rates of cows inseminated with semen packaged in 1/4 versus 1/2 cc straws were compared between "good" and "poor" technicians. Although nonreturn rates of "good" technicians were similar between straw sizes, nonreturn rates among "poor" technicians were greater for semen packaged in 1/2 than 1/4 cc straws (see table).

The results were interpreted to indicate that 1/4 cc straws are more sensitive to improper semen handling by "poor" technicians. Since the 1970s, this variation in A.I. technician ability has long been recognized as a limitation to the 1/4 cc straw.

Recent work revealed . . .

Those A.I. organizations switching to 1/4 cc straws cite a study conducted by one A.I. organization in which 1/4 cc versus 1/2 cc straws were compared.

The study was designed to compare fertility of straw sizes across 12 different sires in four large heifer-raising operations. Unfortunately, in the final analysis of the data, the 1/2 cc straw treatment also contained straws of semen from other bulls representing "nonexperimental sires" that were only processed in 1/2 cc straws, but not in 1/4 cc straws. This "nonexperimental" semen accounted for 55 percent of the data analyzed and potentially biased the results.

Therefore, the 1.5 percent difference in favor of the 1/4 cc straws could just as well represented differences in sire fertility and not differences in straw size.

The bottom line . . .

The 1/4 cc straw is nothing "new." It has been thoroughly studied and compared with the 1/2 cc straw during the last 40 years. Fertility differences are miniscule between the two packaging sizes. Much more important factors affect A.I. breeding conception rates than straw size. Focus on those factors that affect your herd A.I. breeding success that include, but are not limited to, sire and cow fertility, accuracy of heat detection, timing of insemination, compliance to breeding protocols, health, and nutrition of your cows. Happy A.I. breeding!

The author is professor of animal sciences at Kansas State University, Manhattan.

Fertility comparison of semen in 1/4 versus 1/2 cc French straws

Group	Straw size 1/4 cc	1/2 cc	Reference
	% nonreturn rate (no.)		
	76.7 (3,361)	74.4 (3,341)	Milk Marketing Board, 1968
	69.8 (32,185)	69.1 (29,531)	Cassou, 1969
	64.2 (4,759)	63.0 (5,069)	Malmberg and Dryendahl, 1969
	68.8 (348,486)	68.0 (274,582)	Cassou, 1972
"Good" technicians	71.3 (2,266)	70.4 (2,119)	Kupferschmied, 1972
"Poor" technicians	66.2 (1,071)	69.9 (1,071)	
	65.0 (9,356)	66.0 (17,229)	Select Sires, 1972 (unpublished)
	71.9 (705)	71.4 (560)	MacPherson et al., 1974
Study 1: 20 M sperm	69.1 (2,770)	67.8 (3,000)	Kroetsch, 1992
Study 1: 30 M sperm	68.3 (2,286)	65.6 (3,035)	Kroetsch, 1992
Study 2	65.9 (5,797)	65.7 (6,048)	Kroetsch, 1992
	63.6 (679)	62.0 (681)	Johnson et al., 1995
	31.3 (3,229)	31.1 (3,373)	ABS, 2003 (unpublished)
	68.7 (2,521)	67.2 (8,694)	Kaproth et al., 2005
	25.0 (≅1,100)	24.4 (≅1,100)	Schenk and Everett, 2007
Weighted average	**63.1 (420,569)**	**62.3 (359,438)**	

Graziers to meet

Meeting: Mid Atlantic Dairy Grazing Conference and Organic Field Day

Dates: October 8 and 9, 2008

Location: Shenandoah Valley Produce Auction, 2839 Lumber Mill Road, Dayton, VA 22821

Topics: Pasture walks, CLA's and Omega-3's, unpasteurized milk, soils, and pasture ecology

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