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## Export sales of U.S. beef semen increased faster than domestic semen sales

### Abstract

The use of artificial insemination (AI) in the dairy industry grew tremendously in the 1940s and has since become the industry norm. Adoption of AI in the beef industry has been much slower largely due to the more extensive nature of beef production systems. Improvements in protocols to synchronize estrus and ovulation now allow beef producers to achieve high pregnancy rates to AI with no heat detection and value-driven marketing programs have provided more incentive for use of high-accuracy genetics. The 2007 USDA National Animal Health Monitoring Surveillance survey reports the proportion of beef operations that use AI is only 7.6%. However, adoption of AI in herds of 200 head or greater was 19.8% compared to 5.6% and 8.4% for herd sizes of 1 to 49 and 50 to 99 head, respectively, indicating larger operations are more likely to adopt this technology. Little information is available concerning changes in semen use over time in the beef industry and what this may reflect about the adoption of AI by beef producers. The purpose of this study was to examine trends in domestic, custom frozen, and export sales of semen over time and how these trends relate to beef feeder calf prices and cow inventories.

### Keywords

Kansas Agricultural Experiment Station contribution; no. 11-171-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 1047; Cattlemen's Day, 2011; Beef; Domestic semen; Artificial insemination (AI); Sales

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# Export Sales of U.S. Beef Semen Increased Faster than Domestic Semen Sales

*S.K. Johnson and K.C. Dhuyvetter*

## Introduction

The use of artificial insemination (AI) in the dairy industry grew tremendously in the 1940s and has since become the industry norm. Adoption of AI in the beef industry has been much slower largely due to the more extensive nature of beef production systems. Improvements in protocols to synchronize estrus and ovulation now allow beef producers to achieve high pregnancy rates to AI with no heat detection and value-driven marketing programs have provided more incentive for use of high-accuracy genetics. The 2007 USDA National Animal Health Monitoring Surveillance survey reports the proportion of beef operations that use AI is only 7.6%. However, adoption of AI in herds of 200 head or greater was 19.8% compared to 5.6% and 8.4% for herd sizes of 1 to 49 and 50 to 99 head, respectively, indicating larger operations are more likely to adopt this technology.

Little information is available concerning changes in semen use over time in the beef industry and what this may reflect about the adoption of AI by beef producers. The purpose of this study was to examine trends in domestic, custom frozen, and export sales of semen over time and how these trends relate to beef feeder calf prices and cow inventories.

## Experimental Procedures

Data from 1979 to 2009 on domestic, custom frozen, and export semen sales were obtained from the National Association of Animal Breeders website. We used USDA January 1 beef cow inventory records and 500- to 600-lb steer calf prices from Oklahoma City, OK, as reported by the Livestock Marketing Information Center. We estimated simple correlations between domestic semen sales, export semen sales, custom frozen semen, and calf prices. We utilized multiple regression models including calf prices and cow inventory values to describe domestic semen sales, custom frozen semen sales, and export semen sales.

## Results and Discussion

Domestic semen use by breed (Figure 1) reflects the current dominance of the Angus breed in semen sales. Angus semen sales were consistently 37 to 42% of the total from 1979 until 1989, after which they steadily increased until reaching a plateau of about 75% of the market in 2005. The number of Angus registrations reported by the Purebred Livestock Council and the American Angus Association over the same time period was highly correlated (0.87) with domestic Angus semen sales. The proportion of Angus registrations recorded as AI-sired calves was 52.1% in FY 2009. During the time that sales of Angus semen have increased, sales of Hereford (polled and horned) and Continental (Charolais, Limousin, and Simmental) breeds have decreased both as a percentage of total sales and in absolute value.

Domestic beef semen sales are highly correlated to calf prices (Figure 2). Domestic beef semen sales and 500- to 600-lb October steer prices from Oklahoma City, OK, have a correlation coefficient of 0.70 from 1979 to 2009, which increases to 0.82 when evaluated between calf prices lagged one year and semen sales (e.g., 2009 semen sales vs. 2008 calf price). After accounting for average October steer calf price and January 1 beef cow inventory numbers, domestic semen sales have increased ( $P < 0.01$ ) since 1979 at the rate of 6,547 units per year (Table 1). The regression model of calf price, cow inventory number, and a year trend variable explains 80% of the variation in domestic sales of semen in the last 31 years (1979 to 2009).

Figure 3 shows the units of custom frozen, exported, and domestically sold semen. The correlation between calf price and units of custom frozen semen (0.67) is lower than for domestic semen sales (0.70). A model that accounts for year, October calf prices, and beef cow inventory numbers explains 93% of the variation in units of custom frozen semen (Table 1). Custom frozen semen sales have increased ( $P < 0.01$ ) since 1979 at the rate of 76,338 units per year. Custom collected semen often goes into storage and is never used, but the relative amount used or exported is unknown. Cow inventory and calf price are not significant factors in explaining semen export sales. Export sales of semen have increased at a rate of 38,536 units per year since 1979.

## Implications

This analysis provides a perspective on industry use of genetics available via AI and adoption of AI as a technology in the beef industry. The market share of Angus semen for domestic use has increased significantly over the last 30 years whereas sale of semen from Continental breeds and Herefords have declined. Domestic use of semen is highly correlated with calf prices and has shown a modest upward trend since 1979. Historically, the domestic market has been considerably larger than the export market for semen sales; however, the sales growth rate of semen for export has been much greater than for domestic sales. The number of units of semen exported surpassed the number of units sold domestically for the first time in 2008 and again in 2009.

**Table 1. Parameter estimates of units of semen sales and custom frozen semen models<sup>a</sup>**

Independent variables	Dependent variable		
	Domestic sales <sup>a</sup>	Export sales <sup>a</sup>	Custom frozen <sup>a</sup>
Year	6,546.7 (0.034)	38,535.8 (<0.001)	76,337.5 (<0.001)
Beef cow inventory, thousand head	46.88 (<0.001)	32.79 (0.155)	220.40 (<0.001)
Calf price, \$/cwt	9,002.2 (<0.001)	211.4 (0.931)	10,635.2 (<0.001)
R <sup>2b</sup>	0.80	0.80	0.93

<sup>a</sup> Values in parentheses are P-values indicating significance of variable's difference from zero.

<sup>b</sup> R<sup>2</sup> value indicates proportion of variation explained by all the variables in the model.

REPRODUCTION

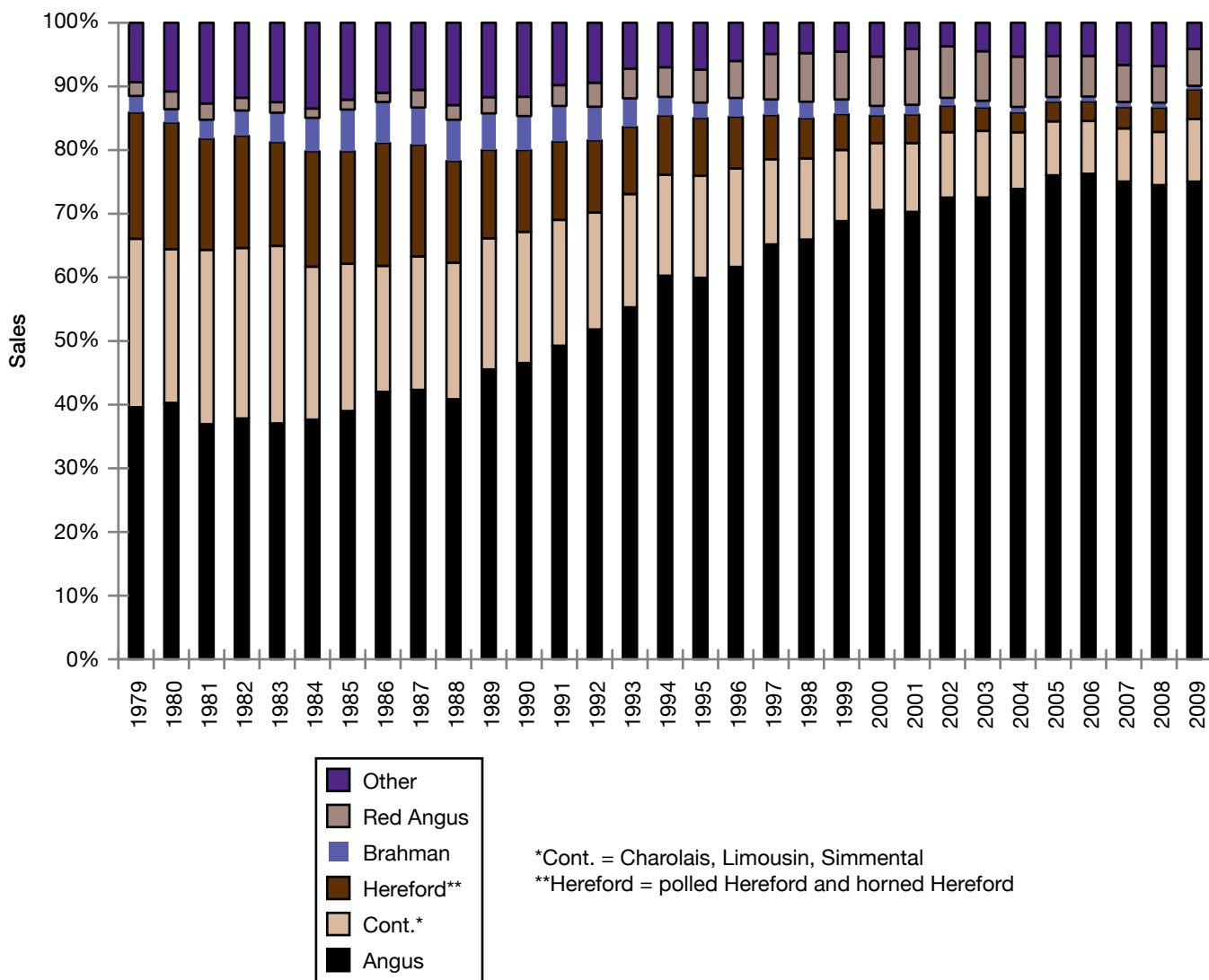


Figure 1. Proportion of domestic semen sales by breed.

## REPRODUCTION

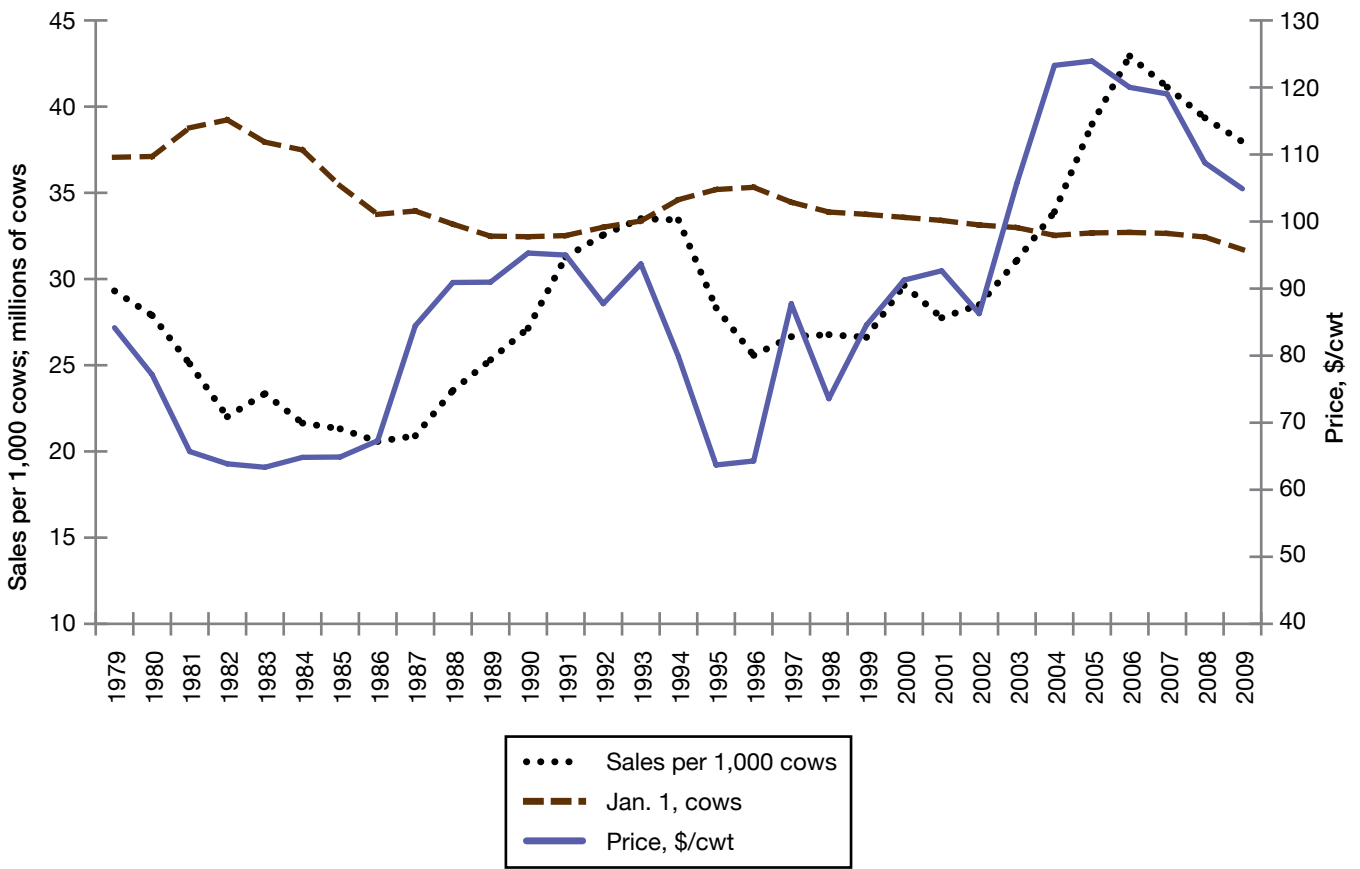


Figure 2. Domestic semen sales per 1,000 cows, January 1 beef cow inventory, and 500- to 600-lb calf price.

REPRODUCTION

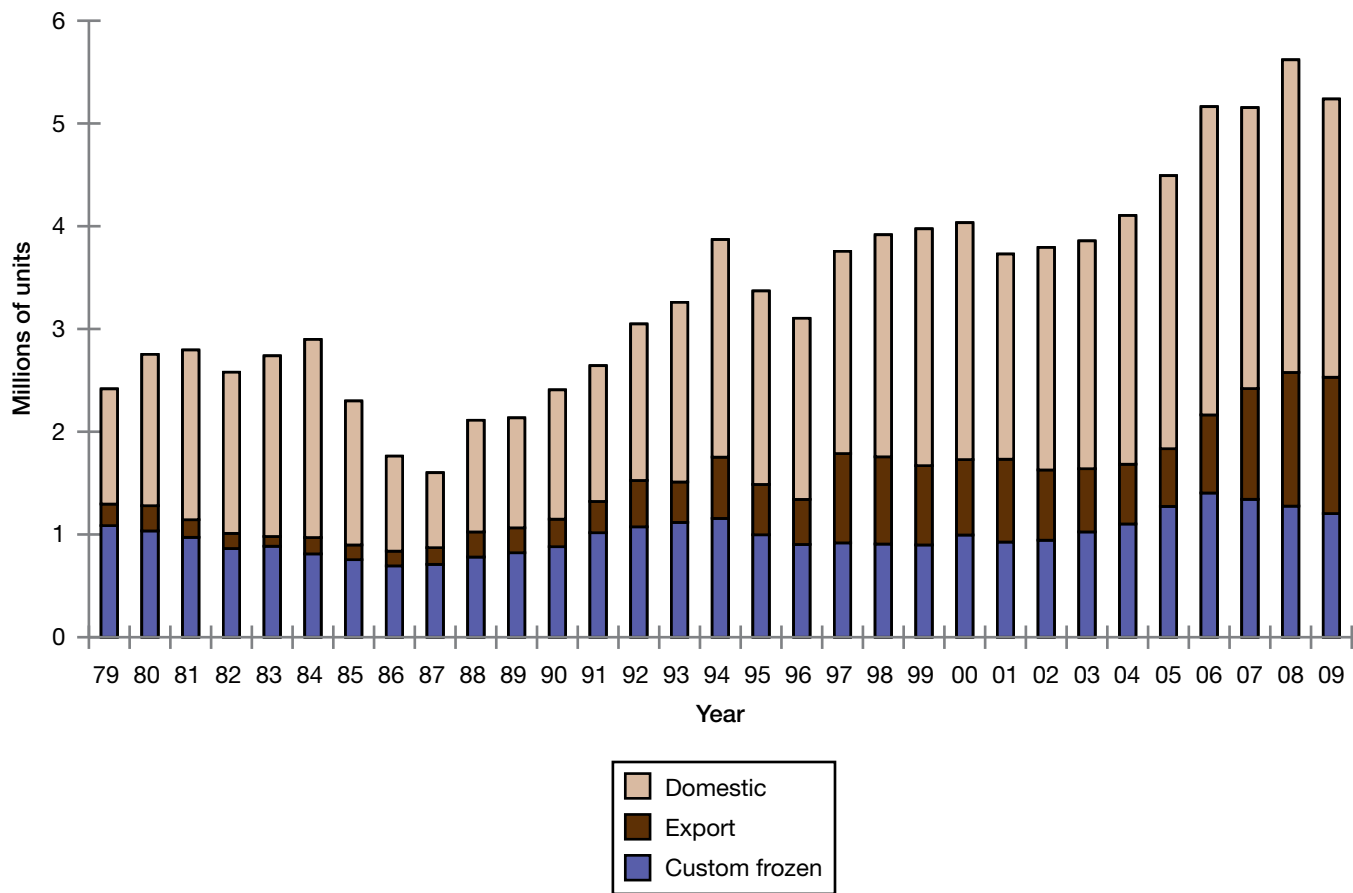


Figure 3. Units of semen custom frozen, exported, or sold domestically.