Estimating Beef Demand Differentiated By Quality Grade

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Missouri-sourced calves at Irsik and Doll Feed Yard.

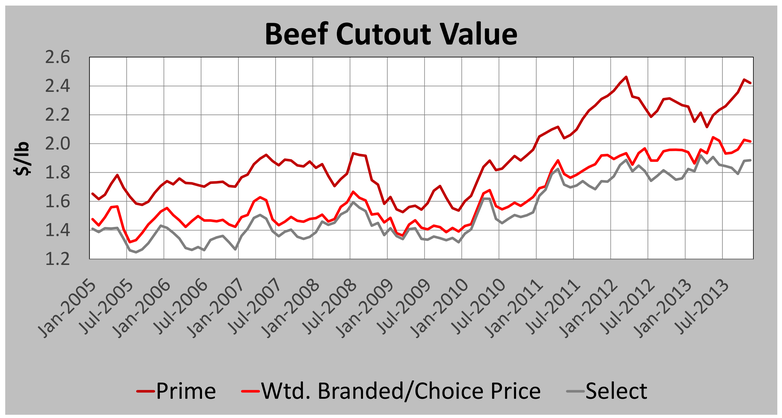
Motivation

The U.S. cattle inventory was at 87.7 million head at the beginning of 2014, the lowest inventory since 1951. Cattle producers have downsized their herds in recent years due to increased incidence of drought and high feed prices.

A tight U.S. beef supply coupled with a strong demand for beef are driving beef prices to record highs. Given these conditions, cattle producers will be looking to rebuild their herds in the near future. The beef industry's rebuilding strategy should reflect consumer desires in order to sustain beef demand.

Recent literature suggests a strong consumer focus on beef quality. Quality can embody many factors, but is most often described as the beef sensory characteristics such as flavor, color, tenderness, and juiciness. These characteristics contribute to the consumer's beef eating experience and are largely determined by USDA beef quality grades.

Estimating beef demand differentiated by quality grade will help determine the best rebuilding focus for the future of the beef industry.



Data

The dataset runs from January 2005 to December 2013, including monthly cutout values and quantity data (in loads of boxed beef) for each beef quality grade, obtained from Agricultural Marketing Service (AMS) boxed beef reports. Monthly pork cutout values and wholesale chicken prices were gathered from Economic Research Service. Monthly income is represented by real personal consumption expenditures information.

Because the AMS Branded category consists of Choice Branded boxed beef, Branded and Choice data were combined using a weighted average.

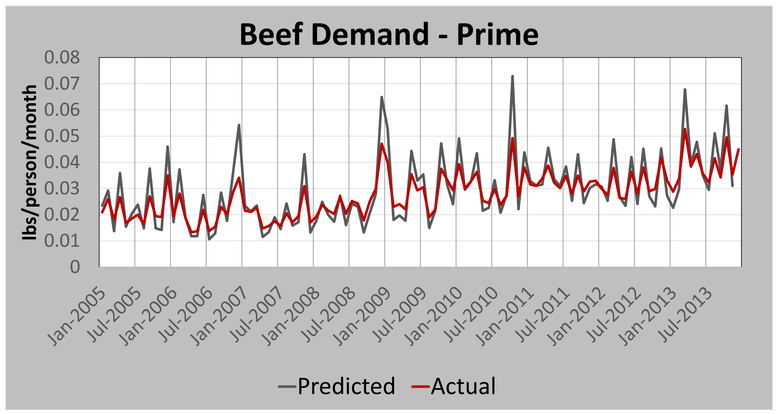
The U.S. government shutdown in October of 2013 resulted in incomplete boxed beef data for this time period. Therefore, the October 2013 observation was ignored.

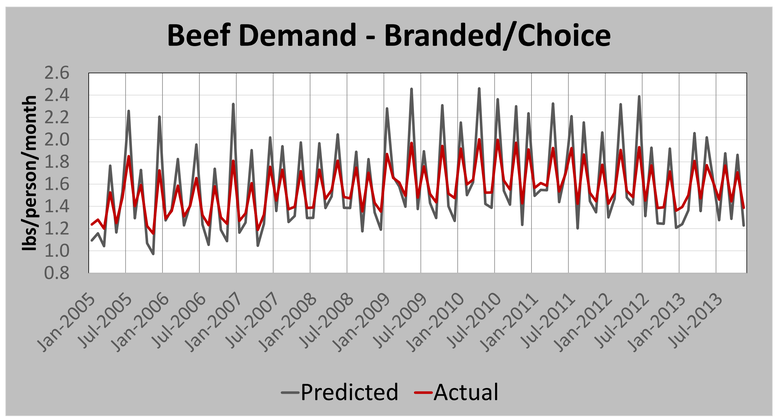
Methods

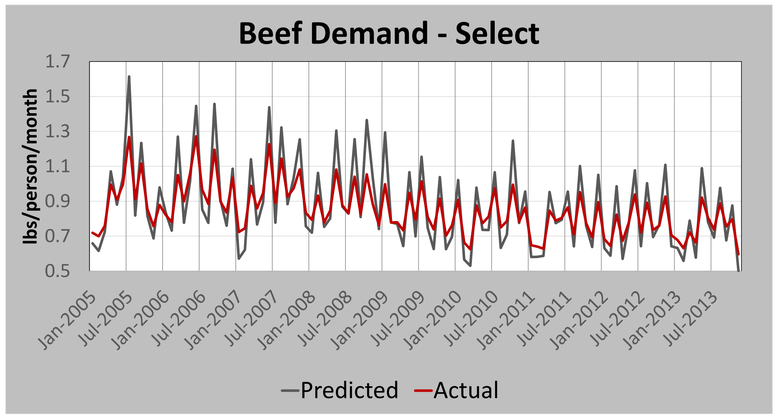
Estimates of own-price, cross-price, and income elasticities for Prime, Branded/Choice, and Select beef categories were estimated utilizing a log-log linear regression model.

The independent variable, monthly beef demand by quality grade, was represented by number of loads of boxed beef. One load of boxed beef is approximately 40,000 lbs.

Actual and predicted values were converted from log form to lbs of boxed beef per person.







Regression Statistics			
	Prime	Branded/ Choice	Select
R Square	0.700	0.645	0.730
Adj. R Square	0.665	0.616	0.702
Durbin-Watson	2.368	2.860	2.631
Observations	108	108	108

	Prime Demand	Branded/Choice Demand	Select Demand
Intercept	**-1.58**	**-1.19**	**0.86**
	(-0.25)	(-0.29)	(0.20)
Prime Price	**-2.39**	**0.01**	**0.33**
	(-4.36)	(0.01)	(0.89)
Branded/Choice Price	**1.43**	**-1.10**	**0.53**
	(1.55)	(-1.94)	(0.91)
Select Price	**1.22**	**0.40**	**-1.77**
	(1.38)	(0.78)	(-3.35)
Pork Price	**0.18**	**0.22**	**0.14**
	(0.86)	(1.90)	(1.04)
Chicken Price	**0.03**	**0.00**	**0.13**
	(0.13)	(0.00)	(0.97)
Income	**1.64**	**0.58**	**1.30**
	(0.91)	(0.49)	(1.08)
Trend	**0.16**	**0.07**	**-0.04**
	(6.47)	(4.30)	(-2.60)

T-statistics listed in parentheses.

Results

Prime own-price is most elastic followed by Select own-price and finally, Branded/Choice own-price.

The regression results show positive elasticities for all cross-prices across all beef quality categories. Pork and chicken elasticities are most significant in the Select beef demand model.

Prime beef demand is most sensitive to changes in income followed by Select and then Choice beef demand.

A logarithmic trend applied from 2007 to 2013 is significant across each beef quality category. This trend suggests an additional factor increasing demand for Prime beef and decreasing demand for Select beef. This factor may be influenced by the shift from manual to camera-based beef grading systems.

Results from this study suggest demand is increasing for higher quality grades of beef. Given these results, improving quality grade may be an important focus as part of the beef industry's rebuilding strategy moving forward.