Health Information and Impacts on the Beef Industry

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Objective Analysis

for Informed

Decision Making

Introduction

The economic well being of cattle producers depends upon numerous factors, including consumer demand for beef, red meat and poultry supplies, marketing costs, international beef trade, and agribusiness concentration. Changes in consumer beef demand are transmitted through the marketing channel and affect meat packer demand and prices for slaughter cattle and feedlot demand and prices for feeder cattle. Since the mid 1970s, consumer demand for beef has declined due to changes in consumer preferences, demographics, and relative meat prices (Marsh 2003). Based on an estimated annual retail beef demand index, retail beef demand declined by about 47 percent from 1970 to 2004. However, more recently, from 1998 to 2005 the index increased by about 22 percent (LMIC).

Economists consider health issues to be major factors that impact consumer preferences and the demand for beef. One persistent health factor influencing consumer beef demand has been public information (based on medical studies) about the negative effects of red meat consumption on cholesterol blood serum levels and heart disease. The beef industry feels such information has been misleading, and has countered adverse public information through promotion and consumer education programs that emphasize the nutritional attributes of beef in household diets.

In a 2005 study, the impacts of health information on the U.S. beef industry were evaluated (Holzer). The role of health information was addressed through statistically estimating its effect on the retail demand for beef. The impacts of health information on prices, production, and revenues in the slaughter cattle and feeder cattle sectors were also statistically estimated.

Health Information

Studies have indicated that general health information plays a significant role in affecting nutrient demand in food product consumption (Holzer). Moreover, for consumers, cholesterol content in food products is a major component of general health information.

To estimate the effects of health information on food demand, economists have constructed cholesterol information indexes. These indexes proxy health information effects and serve as health variables in quantitative demand studies. They are theorized to reflect consumer preferences. One popular index is the Kim and Chern cholesterol information index, which is constructed using annual data. This index quantifies (standardizes) published information in terms of the number of articles discussing the relationship between red meat consumption and blood cholesterol serum levels. An increase in the index number indicates increased negative public information (i.e., more negative articles and/or less positive articles) concerning beef consumption and blood cholesterol levels. A decrease in the index number indicates fewer negative or more positive articles about cholesterol-red meat relationships.

From 1970 to 2001, the Kim and Chern cholesterol information index (KCI) increased by about 132 percent. Econometric food demand studies using this index have shown that increases in negative health publicity has adversely affected demand for red meat products in the United States and Japan.

Model

The effects of health information on the beef industry were estimated using a system's econometric model consisting of demand and supply equations (dynamically specified) at the retail beef, wholesale beef, slaughter cattle, and feeder cattle market levels. The KCI variable, an indicator of health information, was included as an explanatory variable in the model. The coefficients of the model (which relate changes in health information to beef prices and production) were estimated using annual data from 1970 to 2001. The statistical estimator was Three Stage Least Squares. The effects of health factors on slaughter cattle and feeder cattle demands and supplies depend upon aggregate consumer reaction to published health information and personal medical advice about beef and red meats. Impacts on the retail demand for beef are expected to affect prices and quantities in the slaughter and feeder cattle sectors, hence, revenues received by cow-calf producers and cattle feeders (finishers).

Results

The model results indicate that health information had a statistically significant impact (95 percent probability level) on the retail demand for beef. Retail beef demand was measured by an estimated annual beef demand index (LMIC; Marsh 2003). The results indicated that a one percent increase in health information (i.e, negative information reflected by an increase in the cholesterol information index) reduced retail beef demand by 0.32 percent. Moreover, the model reveals that public exposure and consumer reaction to health information reaches into the fed and feeder cattle livestock markets.

The economic impacts of health information on the slaughter and feeder cattle sectors are presented in Table 1. Estimated health effects are specific to demand prices and supplies of fed cattle, nonfed cattle (cull cows), and feeder cattle. The coefficients are presented in Table 1 and are interpreted as long- run elasticities or percentages. For example, Table 1 shows that a 1.0 percent increase in health information reduces fed cattle prices by 0.19 percent and fed cattle supply by 0.05 percent. Nonfed cattle prices are subsequently reduced by 0.30 percent and nonfed cattle supply is reduced by 0.21 percent. Likewise, a 1.0 percent increase in health information reduces feeder cattle prices by 0.11 percent and feeder cattle supply by 0.33 percent.

Table 1 also provides the effects on cattle sectors from general changes in consumer (retail) beef demand. This general change is the sum of all factors that account for long term changes in retail beef demand. For example, a 1 percent decrease in retail beef demand decreases fed cattle price by 0.58 percent and fed cattle production by 0.15 percent.

Though the estimated health information elasticities are relatively small (i.e., less than the absolute value of 1.0), they nevertheless infer changing economic incentives and long- term adjustments for firms in the livestock and meat marketing channel. Thus, increases in negative health information and reduced consumer demand (preferences) for beef result in reduced meat packer demand for slaughter cattle since the value of boxed beef has been reduced. Reduced returns in cattle finishing result in reduced feedlot demand for feeder cattle. The joint reduction in slaughter and feeder cattle prices result in smaller calf crops and fed cattle production due to decreased profit incentives to cow-calf producers and cattle finishers.

Table 1: Elasticity Coefficients of the Effects of Retail Beef Demand and Health Information on the Slaughter and Feeder Cattle Sectors

Sector	Price	Supply
Fed Cattle	0.584 (-0.188)	0.145 (-0.047)
Nonfed Cattle	0.943 (-0.304)	0.647 (-0.208)
Feeder Cattle	0.342 (-0.11)	1.026 (-0.33)

Note: Numbers in the table are elasticities. They represent percentage changes in prices and supplies in the cattle sectors due to 1 percent increases in the retail beef demand and cholesterol information indexes. The first numbers are with respect to changes in retail beef demand, and the numbers in parentheses are with respect to changes in health information.

Changes in retail beef demand and health information subsequently affect producer revenues in the beef marketing channel. At the farm level these producers include cattle finishers and cow-calf operators. The revenue effects can be estimated through comparative statics. For example, the coefficients of the statistical model can be used to calculate changes in cattle prices and quantities from some initial level when shocks occur in the market. Revenue changes (market price multiplied by quantity) from some initial level can then be calculated. The initial levels of beef prices, quantities, and revenues used in this study are the sample (1970-2001) averages.

Table 2 presents estimated annual revenue changes (2001 dollars) in the fed cattle, nonfed cattle, and feeder cattle sectors based on long term changes in retail beef demand and health information. Data show that the retail beef demand index decreased by 54.5 percent and the cholesterol information index (KCI) increased by 131.7 percent from 1970 to 2001. The increase in KCI indicates consumers were exposed to increasing amounts of negative information about the effects of beef consumption on blood cholesterol levels and heart disease.

Table 2 shows that increased negative health information about red meat since 1970 had an adverse impact on revenues in the beef sectors. The largest estimated impact occurred in the feeder cattle sector, decreasing annual cow-calf revenues by $200 million (0.5 percent of annual average revenues), followed by the fed cattle sector with an annual cattle-finishing revenue decrease of $170 million (0.4 percent of annual average revenues). The slaughter cow sector (producers marketing cull cows) experienced annual revenue declines of $30 million (0.1 percent of annual average revenues). These revenue- reduction estimates were calculated holding all other factors constant in the market. Thus, for example, estimated revenue declines would be partially offset if the effects of increasing foreign demand for U.S. beef products during the 1970-2001 period were taken into account.

Health effects on revenues in the livestock sectors were consistent with the revenue effects of the general decrease in retail beef demand from 1970 to 2001. For example, annual revenue declines with respect to the feeder cattle, fed cattle, and nonfed cattle sectors from the *overall* decrease in retail beef demand were $630 million, $510 million, and $100 million, respectively. The health variable (KCI) may also be capturing trends in other factors that determine consumer preferences such as food safety. Nevertheless, since 1970, public health information appears to have resulted in a decline of about 32 percent in beef revenues.

Table 2: Annual Changes in Cattle Revenues Due to Changes in Retail Beef Demand and Health Information, Million Dollars

Sector	Retail Beef → Demand	(down 54.5%)	Cholesterol → Information	(up 131.7%)
Fed Cattle	-510.00	(1.2)	-170.00	(0.4)
Nonfed Cattle	-100.00	(0.2)	-30.00	(0.1)
Feeder Cattle	-630.00	(1.4)	-200.00	(0.5)

Note: The numbers in the top rows are revenue deviations (changes) from their sample averages (1970-2001), in 2001 dollars. The numbers in parentheses are revenue changes as percentages of sample average revenues.

Conclusions

Consumers have become increasingly health conscious in terms of food nutrition. Information about cholesterol content and intake is an important component of their food consumption decisions. Increased negative publicity about the relationship between health/cholesterol and beef consumption, primarily from the medical profession and food nutrition community, has concerned beef producers. Results of the study reported here indicate that over 20 years of increased negative publicity reduced consumer beef demand. These health effects are manifest through changing consumer preferences. The beef market consequences were a reduction in slaughter cattle and feeder cattle revenues by about 1 percent per year.

LMIC data on the retail beef demand index indicates beef demand has increased by about 22 percent between 1998 and 2005. These data are suggestive. Other factors constant, if this positive trend was to continue, price benefits would accrue to beef producers.

Policy implications regarding beef demand and health information may be obtained from this study. For example, less contentious avenues for promoting retail beef demand (the effectiveness of the national Beef Check-Off Program is a source of recurring debate) may be through identifying positive health benefits of certain consumption levels of quality-type beef products. Given recent diet trends such as high-protein, low-carbohydrate programs, the emphasis on positive health benefits can be exploited. However, new information supporting this argument would perhaps be more effective in impacting consumer behavior if released through channels of authentic health studies. Releasing such information to the popular media directly from beef industry groups may be perceived as merely advertising, which could be less effective.

References

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