Analyzing the Welfare Impact of Mandatory Country of Origin Labeling On Producers and Consumers; The Case of U.S. Beef and Pork

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ABSTRACT

Mandatory Country of Origin Labeling (MCOOL) is a labeling law passed in 2008 Farm Bill by the US Congress which requires all food commodities to be labeled by their country of origin. Total cost assessed to the meat industry from the implementation of mandatory COOL has raised concerns for research into the estimation of how cost associated with mandatory COOL are shared across the supply chain and how the increased cost will be borne by producers and consumers. The research seeks to determine the welfare impacts of mandatory COOL on producers and consumers in the beef and pork sectors. Using Equilibrium Displacement Model, we estimate the consumer and producer surplus with existing cost estimates associated with mandatory COOL implementation. The empirical result shows that a 2% and 5% increase in demand for beef and pork is not sufficient to offset mandatory COOL cost.

Key words: Mandatory Country of Origin Labeling, Equilibrium Displacement Model

Introduction

Mandatory Country Of Origin Labeling (COOL) is one of the most contentious provisions in the Farm Security and Rural Investment (2002 Farm Bill). This legislation requires producers to inform the consumers about the origin of the products. Covered commodities of the mandatory COOL include: muscle cuts of beef (including veal) lamb, and pork; ground beef, ground lamb, and ground pork; farm-raised fish and shellfish; wild fish and shellfish, perishable agricultural commodities (fresh and frozen fruits and vegetables), and peanuts. The law excludes food items from mandatory COOL when a covered commodity is an "ingredient in a processed food item". The law does not apply to covered products sold in restaurants and other food service outlet (Jones, Somwaru, & Whitaker, 2009). Mandatory COOL was implemented for fish and shellfish in 2004. The regulations became effective in 2005. There was a delay in mandatory COOL for the remaining commodities. Congress responded to growing criticisms of the legislature by extending the comments period and allowing further debate on the mandatory COOL for the remaining commodities (Jones et al., 2009).

The final rule, Conservation, and Energy Act of 2008 (2008 Farm Act) revised the mandatory COOL provisions to include goat meat, poultry, macadamia nuts, ginseng and pecans. Mandatory COOL provisions were finally implemented on September 30, 2008. On January 15, 2009, United States Department of Agriculture's Agriculture Marketing Services (USDA/AMS) issued a final ruling for mandatory COOL. The policy became effective on March 16, 2009 (Jones et al., 2009).

The aim of this legislature was to benefit domestic consumers. The labeling will enable consumers to make informed consumption decisions because of the increased awareness of food safety and quality after the outbreak of mad cow disease. Proponents of mandatory COOL claimed there would be a demand increase of domestic agriculture commodities. They also argue that implementation of mandatory COOL will enhance food safety and quality. The opponents of mandatory COOL on the hand argued that the cost outweighs the benefits because of the complexity of the meat supply chain (Brester, Marsh, & Atwood, 2004).

Canada and Mexico, major supplies of live cattle and hogs, challenged US Country of Origin Labeling to the World Trade Organization (WTO) arguing that the policy has reduced exports of cattle and hogs to the U.S market thus violating WTO trade agreement: General Agreement on

Tariffs and Trade 1994, the Agreement on Technical Barriers of Trade and the Agreement on Rules of Origin. The WTO has mainly ruled in favor of Canada and Mexico. The USDA revised mandatory COOL requirement but to no avail. Canada and Mexico won the WTO ruling in 2015 and requested for about $3 billion in retaliatory tariffs against U.S. imported products. On December 7, 2015, Canada and Mexico were granted the permission to impose $1 billion retaliatory tariff on U.S. imported products.

Objectives

This study seeks to analyze the welfare impacts of mandatory COOL on the U.S. beef and pork industries.

The specific objectives developed to guide the study are:

1. To determine how the cost associated with implementing mandatory COOL is shared across the supply chain.

2. To analyze the producers' and consumers' welfare impacts of mandatory COOL under three scenarios: No demand change, a 2% and 5% increase in demand.

Literature Review

Country Of Origin Labeling

Title X of the farm Security and Rural Investment Act (10018 of the act) provided for an addition to the Agricultural Marketing Act of 1946, Subtitle D. This requires retailers to notify consumers at the final point of sale about the country of origin of the products. The covered products are lamb and pork, which include both muscle cuts and ground meat in September 30, 2004 (USDA/AMS 2003). The law also requires United States Department of Agriculture (USDA) to issue regulations to implement a mandatory COOL (USDA/AMS 2003). However, the law was delayed due to concerns of the possible repercussions of it on producers and consumers as well as small businesses. The final ruling was issued on January 19, 2009.

Advocates of mandatory COOL have argued that consumers would prefer meats from domestically raised animals, and numerous willingness-to-pay studies suggest these preferences

would drive premiums for U.S. meat over products from other countries (Gao & Schroeder, 2009). Umberger (2003) studied U.S. consumers' perception of COOL of beef products using a survey conducted from Chicago and Denver in 2002 and an experimental auction. The result shows that about 73% of consumers are willing to pay a premium of 11% for COOL of steak and 24% for hamburger and 19% premium for steak labeled "U.S.A. GUARANTEED".

Schupp and Gillespie (2001) conducted a survey to investigate Louisiana's consumers, processors, and producers' attitudes towards mandatory COOL of beef in 1991. The results of the survey show that, 93% of consumers supported mandatory labeling of both fresh and frozen beef in retail stores, 86% of the consumers rated U.S. beef to be of good quality than imported beef based on issues of safety of imported beef.

Opponents of mandatory COOL also contended that the cost adhering to mandatory COOL is too high. According to J. J. VanSickle (2008), fruits and vegetable producers are faced with high cost of record keeping and adhering to the legislation. Meyer (2008); Peel (2008), assert that beef and pork producers incur additional costs for tracking and separating live animals from different origins. However, some livestock producers are in favor of mandatory COOL because the costs incurred is dependent upon the region and type of livestock. But Meyer (2008), contends that implementing mandatory COOL in the beef and pork sectors would be challenging and very dear as compared to the poultry industry.

A number of researchers have estimated the additional cost burden on producers and consumers through the implementation of mandatory COOL. Sparks Company, Inc (2003) estimated that mandatory COOL would increase the annual cost of the beef industry about $1.6 billion and $452 million for pork industry. The United States Department of Agriculture also reported about $2 billion for the beef sector (USDA 2003). J. VanSickle, McEowen, Taylor, Harl, and Connor (2003) estimated that it would increase the cost of the beef industry from $36 million to $132 million and $25 million to $32 million for the pork industry. J. VanSickle et al. (2003) also estimated a record keeping cost associated with mandatory COOL between $69.86 million to 193.43 million. Hayes and Meyer (2003), also estimated that implementation of mandatory COOL would raise farm-level production to about $1billion that will result in about 7% decrease in retail pork demand.

Studies conducted on the welfare impacts focused on estimating the effects of mandatory COOL on the meats or livestock industry. It includes a study by Chung, Zhang, and Peel (2009). They analyzed the effects of mandatory COOL on the U.S. meat industry with imperfectly competitive processors. The study reveals that as the own price elasticity becomes more inelastic, consumers are inclined to bear the cost of mandatory COOL. However, producer surplus will increase as the domestic demand becomes more elastic.

Brester et al. (2004) and Lusk and Anderson (2004) reveal that producer surplus decreases due to the cost associated with COOL. They also indicated that 2% to 4.5% increase in aggregate demand for pork and beef would offset the cost associated with COOL to make the producers welfare neutral. Saak (2011) also indicated that COOL decreases the producers' welfare when relative inputs cost are volatile and varieties are similar in overall quality. They also showed that mandatory COOL might worsen the distortion in the allocation of the market shares across varieties. These studies were conducted prior to mandatory COOL's final ruling and relied on preliminary cost estimates. This present study uses pre-COOL and post-COOL cost estimates to analyze the welfare impacts of MCOOL.

Equilibrium Displacement Model

Equilibrium Displacement Models (EDM) developed by Richard Muth (1964), have a prominent place in applied economic analysis. The class of models defined as EDMs, is a set of comparative static results expressed in elasticity form (Wohlgenant, 2011). Muth (1964) was the first to express the reduced form for a system of supply and demand functions for a single product with two factors of production and exogenous supply or demand shifters in relative changes. Muth's framework was used to analyze the nutrient effects of food policies in developing countries(Perrin & Scobie, 1981). It was also used by Gardner (1975) to determine the implications for shifts in industry supply and on price spreads for food. Sumner and Wohlgenant (1985) used EDM to analyze the economic impacts of a cigarette tax increase on manufacturers and tobacco producers. Piggott, Piggott, and Wright (1995) used the model to determine the farm-level incremental changes to beef advertising. The study converted demand and supply shift equations into matrix form to determine the impact on the baseline prices and quantities due to an exogenous shock.

Brester et al. (2004) used the EDM to estimate the economic impacts of country of origin labeling in U.S. meat industry across four beef and cattle marketing levels. The study included the beef, pork and poultry sectors with cross-sector linkages to account for intra-sector effects. It incorporated multiple marketing levels for each sector. For example, the beef sector consisted of farm, slaughter, wholesale and retail marketing levels. To allow for variable input proportions, production quantities were permitted to vary across marketing levels. The modeling framework allows for consumer substitution among the beef, pork, and poultry through the use of cross price elasticities with the primary demand functions. International trade was also incorporated in the model assuming a global homogenous commodity. Exogenous supply shocks due to an increase in cost from the implementation of COOL are imposed on the beef and pork sectors at the retail levels. Poultry was not included in that study. Similar model constructs was used by Hanselka (2006) to analyze the economic impact of COOL in the U.S. beef industry.

Again EDM was used by Wohlgenant (1993) to study the distribution of gains from research and promotion in multi-stage production system in the U.S. The framework of the model helped the researcher examine how distribution of gains is affected by funds allocated between research and promotion. The model was extended to permit feedback effects that might come through interrelationships in demand.

Similarly, Lusk and Anderson (2004) applied the EDM to analyze the effects of COOL on meat producers and consumers. The modeling framework estimated how the cost associated with COOL will be distributed across the live stock and it effect on producers and consumers welfare. Their model was made up of horizontally linked beef, pork, and poultry demands at the retail level and vertically linked farm, wholesale, and retail sectors. The model also incorporates international trade to examine the effect of COOL on imported beef and pork.

Chung et al. (2009) developed a modeling framework similar to Muth (1964) to estimate the impact of cool on the meat production system and its trade relations. The framework includes equilibrium conditions at each of the production stage with considerations of trade and market conduct.

Methodology

As previously stated, the EDM was first introduced by Muth (1964) and has become popular in applied economics field. Economist and other professionals for example, employ the model to analyze the welfare impacts of government policies or interventions on producers and consumers. In a general structural equation system with no assumptions about functional form, the model is specified as

$$Q_i^R = D(P_i, X) \quad (1)$$

$$P_i^R = S(Q_i^R, Z) \quad (2)$$

$$Q_i^F = D(P_i, X) \quad (3)$$

$$P_i^F = S(Q_i^F, Z) \quad (4)$$

$$Q_i = P_i = Qe \quad (5)$$

Where

P_i^R = price of the ith meat at the retail level.

Q_i^R = quantity demanded of the ith meat at the retail level

Q_i^F = quantity demanded of the ith meat at the farm-level.

P_i^F = Price of the ith meat at the farm-level

X is a demand shifter

Z is a supply shifter

Qe is the equilibrium quantity

Price is expressed as a function of quantity because the beef industry of U.S. function as both oligopsony and oligopolistic market. The activity of a seller can affect the other sellers just as the

activity of the other sellers can affect that seller (Hanselka, 2006). According to a study by Henderson (2001), the pork industry has a profile of an oligopolistic market so the inverse supply function applies to the pork industry as well.

Econometric Derivation of the Model

From literature, one of the primary issues associated with mandatory COOL is how the cost is shared across the system. An equilibrium displacement model adapted from Wohlgenant (1993) and Lusk and Anderson (2004) is used to analyze the effects mandatory COOL on pork and beef producers and consumers. The equilibrium displaced model is derived from the set of demand and supply functions given in equation (1) – (5) by totally differentiating the equations. The model provides a simple way of incorporating the added cost of mandatory COOL to producers, processors and retailers and the potential increase in consumer demand. It incorporates elasticity of substitution between farm and marketing inputs(Lusk & Anderson, 2004). In this paper, a single sector model is used which ignores substitutability between meats at the retail level. It will help us to find how the increased cost is borne by the producers, processors and consumers. Several scenarios are analyzed to determine the corresponding welfare changes. The scenarios depend on the magnitude of the cost estimate and the one who bears the mandatory COOL cost. The EDM is specified as

$$\hat{Q}_i^R = \eta_{ii}(\hat{P}_i^R - \mu_i) \qquad (6)$$

$$\hat{P}_i^R = S_i\hat{P}_i^F - \Lambda_i \qquad (7)$$

$$\hat{Q}_i^F = -(1-S_i)\,\gamma_i\hat{P}_i^F - \gamma_i\Lambda_i - \hat{Q}_i^R \qquad (8)$$

$$\hat{P}_i^F = (1/\rho_i)\hat{Q}_i^F - \delta i \qquad (9)$$

Equation (6) represents retail meat demand in elasticity form, equation (7) is an inverse supply function assuming constant returns to scale in meat processing and retailing, equation (8) is a demand function at the farm level assuming constant returns to scale in meat processing and retailing and equation (9) represents the farm level inverse supply function for meat i. μ, Λ, and δ

are exogenous shocks to the system of equations. μ is the percentage change in the initial equilibrium price for the ith meat due to an exogenous demand shift. Λ represents exogenous shock expressed in percentage terms to farm supply and δ represents exogenous shock expressed in percentage terms to marketing. Λ and δ will be in relation to MCOOL. As in Lusk and Anderson (2004), the assumptions underlying this model are:

1. *The meat processing and retailing industries are characterized by constant returns to scale*
2. *The supply curve of the marketing inputs is perfectly elastic*
3. *The displacement of supply and demand curve is parallel*

The subscript R denotes retail prices and quantities, the subscripts F denotes farm prices and quantities while the subscripts i denote either beef or pork, depending upon which sector is analyzed. The terms Q_i^j are percentage change in quantity of the ith meat at the jth market level and P_i^j are percentage change in price of the ith meat at the jth market. η_{ii} is demand elasticities, the farmers share of the retail dollar for the ith meat is represented by S_i, γ_I is the elasticity of substitution meat the ith meat and marketing inputs and ρ_I is the supply elasticity of the ith meat.

For changes in the farm price and quantity, the following analytical solutions will be used

$$\hat{P}^{F*} = \frac{-\rho\delta - \Lambda(\eta + \gamma) - \mu\eta}{\rho + \gamma(1 - S) - \eta S} \qquad (10)$$

$$\hat{Q}^{F*} = \frac{-\rho[\mu\eta + \Lambda\eta + \Lambda\gamma + \delta(\eta S - \gamma(1 - S))]}{\rho + \gamma(1 - S) - \eta S} \qquad (11)$$

From these solutions, changes in producer surplus and consumer surplus are given as

$$\Delta PS = P^F Q^F (\hat{P}^{F*} + \delta)(1 + 0.5\hat{Q}^{F*}), \qquad (12)$$

$$\Delta CS = P^R Q^R (\hat{P}^{R*} - \mu)(1 + 0.5\hat{Q}^{R*}). \qquad (13)$$

Asterisks in equation (10) – (11) denote solutions from the system of equations.
These solutions can help analyze some key issues such as how much consumer demand needs to

increase to offset producer surplus loses due to mandatory COOL; mandatory COOL will introduces a cost to the production system which is represented in the system of equations as Λ and ρ. According to Lusk and Anderson (2004), to determine the increase in consumer demand, first, $(\hat{P}^{F*} + \delta)$ from equation (12) can be investigated to determine changes in producer surplus. We set the change in producer surplus (ΔPS) to zero, which means, producers don't benefit or are harmed by MCOOL. For the purpose of this study, increase in demand would not be estimated; 2% and 5% increase in demand for beef and pork would be used to estimate producer surplus and consumer surplus. From equation (10), we can solved for μ. The increase in consumer demand needed to make producer welfare neutral is

$$\mu = \frac{\delta\,(\gamma\,(1-S) - \eta S)}{\eta} - \frac{\Lambda\,(\eta + \gamma)}{\eta} \qquad (14)$$

A couple of issues can be addressed using equation (14). If $\gamma = 0$ and $\Lambda = 0$, then $\mu = -\delta S$, this means that if mandatory COOL increases producer costs by 1%, there should be a (0.01) S (100)% increase in retail demand to make producers welfare neutral.

The following intuition can be derived from equation (14); δ becomes more negative if producers cost increase. Retail demand must increase to offset mandatory COOL cost, Λ becomes more negative if packers and retailers cost increase, and consumer demand must increase to make producers welfare neutral. If $\Lambda = 0$ and $\delta < 0$ which implies the producer bears all the costs due to cool, and if γ increases, retail demand must increase to make producers welfare neutral and if packers and processors bear mandatory COOL costs, $\Lambda < 0$ and $\delta = 0$, and γ increases, consumer demand must increase to make producers welfare neutral.

Data and Estimation Procedure

Elasticity values are assigned to the parameters in the model to apply to the U.S. beef and pork industries. These values are carefully selected from previous studies. Table 1 represents the parameter elasticity values and farm revenue data for the beef and pork industries.

Table 1 Parameter Elasticity Values and Published Farm Revenue Data

Parameter	Definition	Value
η_{BB}	Own price elasticity of demand for beef	-0.56
η_{PP}	Own price elasticity of demand for pork	-0.69
S_B	Beef farmers share of the retail dollar	0.47
S_P	Pork farmers share of the retail dollar	0.29
γ_B	Elasticity of substitution between beef and marketing inputs	0.72
γ_P	Elasticity of substitution between pork and marketing inputs	0.35
ρ_B	Own price elasticity of supply for beef	0.15
ρ_P	Own price elasticity of supply for pork	0.4
$P^F_B Q^F_B$	Total farm revenue for beef	81,872,242,000
$P^F_P Q^F_P$	Total farm revenue for pork	26,463,259,000

We used – 0.56 for the own price elasticity for beef and -0.69 own price elasticity of demand for pork (Brester and Schroeder, 1995). Beef farmer share of the retail dollar and pork farmers share of the retail dollar is from USDA/ERS average annual data from 2004 – 2008. We also used already estimated elasticity of substitution between the ith meat and marketing inputs by Wohlgenant (1989). Own price elasticity of supply for beef used already estimated elasticity by Wohlgenant (1989). Data on the total farm revenues were collected from the USDA National Agricultural Statistics Service.

The remaining estimate needed to implement the model is the mandatory COOL cost. J. VanSickle et al. (2003) estimated that the recurring annual cost from mandatory COOL induced cost would be from about $36 million - $132 million for the beef sector. Dividing these values by the farm revenues reported in table 1, we obtained the lower bound cost estimates. The result shows that mandatory COOL would increase cost by 0.16%. For the upper bound cost estimates, the estimates by Sparks Companies, Inc. (2003) were used. They estimated that it would cost the beef sector about $1.620 million annual increase. Dividing this figure by the revenue estimate in Table 1, MCOOL would increase by 0.2%.

To obtain lower bound estimate for the pork industry, statistics reported by J. VanSickle et al. (2003) was used. They estimated that it would cost the sector an annual increase of $25 million - $32 million. Again, dividing these values by the pork revenue data reported in Table 1,

mandatory COOL would increase cost by 0.12%. For the upper bound estimate, statistics reported by Sparks Companies, Inc. (2003) was used. They estimated that it will cost the pork sector about $452 million. Dividing these figures by the revenue estimate in Table 1 for pork, mandatory COOL would increase cost by 1.7%.

Results and Discussions

We estimate the EDM for the beef and pork sectors and analyze the effects of mandatory COOL cost on producers and consumers' welfare in each sector. The results of these analyses are presented in Tables 2 and 3. Different scenarios of cost incidence are analyzed including: a) all cost borne by the producers, b) all cost borne by the processors or packers c) the cost is split equally among producers and processors, and d) the producers bearing one-fourth of the cost and the processors bearing the remaining three-fourths. For each of these scenarios, we examine three situations of no change in consumer demand, 2% and 5% increases in demand.

Table 2 presents the results for the pork industry. Consumer surplus is negative in all scenarios. But the instance where the cost was shared equally among the producers and processors, the consumer surplus and producer surplus are positive. In all the scenarios, it shows that the producers' welfare could increase but the aggregate welfare, that is, consumer surplus + producers' surplus is never made better off by the policy. In the first scenario, low cost estimates, producer surplus decreased from $ 1,179.85 to $1,078 and consumer surplus increased from $ -994.91 to $ 1,379.62 and decreased 1,379.62 to -954.65. In the Upper cost estimate, producers were worse off. The producer surplus decreased from $ 2,487.96 to $-12,115.09 and consumer surplus increased from $-1,509.45 to $ 4,240.10. From the scenario, it is apparent that consumers are not made better off even with the 2% increase in demand.

In the second scenario, with 5% increase in demand producer welfare keeps increasing as consumers are made to bear the increased cost associated with mandatory COOL. One striking observation from this scenario is that as the cost is shared among them, producers' welfare declines. For the low cost estimates, producer surplus decreased from $2,964.36 to $2,823.01 and consumer surplus increased from $ -2,469.63 to $ - 2,414.35. The incidence where producers bear all the cost increase, the result shows that producers shift the cost to the consumers that decrease their welfare. In the third scenario, with no demand increase, producers'

surplus declines as well as the consumer.

Table 3 presents the results of the beef sector. Estimates of cost increase due to mandatory COOL for the beef sector is higher than that of pork because the pork industry is more integrated than that of the beef. In the first scenario, considering a 2% increase in demand, the low cost estimate, producer surplus decreased from $3,392.28 to $-2,771.57 and consumer surplus decreased from to $-1,146.36 to $-2,036.38. For upper cost estimate, consumer surplus decreased from $-1,248.82 to $-9,854.72 and producer surplus increased from $-2,2727.59 to 4,491.86. In the second scenario, 5% demand increase was used to analyze the welfare gains of MCOOL on the two levels of cost. The producer surplus increased from $7,742.80 to $8,693.04. The situation where the cost was borne by producers, producer surplus was $-8,030.96 and consumer surplus was $-3,006.09. In the case where the cost was shared equally, both the producer and consumer welfare decreased and the consumer worse off since the cost will be sifted to the consumer at the final point of sale. In the third scenario, consumer demand is left unchanged. When all the mandatory COOL cost is borne by marketers, producer surplus increases to $626.34 and the consumer is made worse off. In the third scenario, no demand change was assumed. The producer surplus decrease when the demand for mandatory COOL products was unchanged. The aggregate producer welfare and consumer welfare is worsen even though studies have shown that the consumer is willing to pay a premium of up to 38% for hamburger and 58% for steak labeled U.S. certified(Loureiro & Umberger, 2003) .

Summary and Conclusions

This study employs an equilibrium displacement model to examine the impact of cost increase due to mandatory COOL on producer and consumer welfare in the U.S. beef and pork industry. The modeling framework developed for this model includes four equations for each meat products examined which allows cost to be passed throughout the market through the demand and supply elasticities which provides an understanding of how cost will be distributed among producers, processors/marketers and consumers.

Findings from the study are based on assumed elasticity values, demand shifters and COOL cost. The results show that with 2% increase in aggregate demand for pork, producer surplus increases. Producers are expected to lose up to $12,115.09 million annually. The producer

could benefit up to $10,,432.12 with a 5% increase in demand. The results for the beef sector shows that producer could lose up to $2,771.57 if the total cost associated with mandatory COOL is borne by marketers which will shifted to the consumer to bear it. The aggregate producer welfare is decreased. The producer would not be made better off with either the 2% or 5% increase in demand as estimated by Brester et al. (2004); Lusk and Anderson (2004) From the results the 5% increase in demand couldn't offset the producers costs.

Further, the results show that, producers may not benefit from the implementation of mandatory COOL. The law benefits neither the producers nor the consumers. There should be about 7% increase in demand to make producers welfare neutral. According to Peel (2008), a way to stir up the interest of consumers in order to increase the demand of domestic products is to run successful promotion and generic advertisement for local products. The promotion and advertisement can expand the demand and increase consumers' loyalty to U.S. mandatory COOL products since the success of the legislation is dependent on consumers' reaction to it.

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Appendix

List of Tables

Table 2 MCOOL EFFECT IN THE U.S. PORK INDUSTRY

Scenarios

	All Cost Borne by Producers	Cost Shared: 50/50	Cost Shared: 25/75	All Cost Borne by Marketers
		2% DEMAND CHANGE		
Low Cost Estimate (0.0016%)				
Change in Producer Surplus ($MILLION)	1,179.85	1,129.06	1,103.67	1078.28
Change in Consumer Surplus ($MILLION)	-994.91	1,379.62	-964.73	-954.65
Upper Cost Estimate (0.02)				
Change in Producer Surplus ($MILLION)	2,487.96	-4,877.35	-8,512.163	-12,115.09
Change in Consumer Surplus ($MILLION)	-1,509.45	1,379.62	2,813.433	4,240.10
		5% DEMAND CHANGE		
Low Cost Estimate				
Change in Producer Surplus ($MILLION)	2,964.36	2349.22	-2,887.29	2,823.01
Change in Consumer Demand ($MILLION)	-2,469.63	-2235.69	-2,439.52	-2,414.35
Upper Cost Estimate				
Change in Producer Surplus($MILLION)	-4,338.61	-3,110.54	-1,6507.45	-10,432.12
Change in Consumer Demand ($MILLION)	-3,007.77	-125.51	5,602.83	2,728.17

	NO DEMAND CHANGE			
Low Cost Estimate				
Change in Producer Surplus ($MILLION)	8.71	-41.68	-66.88	-92.07
Change in Consumer Demand ($MILLION)	-3.49	16.67	26.75	36.83
Upper Cost Estimate				
Change in Producer Surplus ($MILLION)	1,272.73	-6,036.68	-9,643.55	-13,218.52
Change in Consumer Surplus ($MILLION)	-502.27	2,391.32	3,827.39	5,256.33

Table 3 MCOOL EFFECT IN THE US BEEF INDUSTRY

	Scenarios			
	2% DEMAND CHANGE			
	All Cost Borne by Producers	Cost Shared: 50/50	Cost Shared: 25/75	All Cost Borne by Marketers
Low Cost Estimate (0.016%)				
Change in Producer Surplus ($MILLION)	3,392.28	-3,106.63	-2,939.20	-2,771.57
Change in Consumer Surplus ($MILLION)	-1,146.356	-2,085.67	-2,061.03	-2,036.38
Upper Cost Estimate (0.02%)				
Change in Producer Surplus ($MILLION)	2,727.59	127.87	2,293.98	4,491.86
Change in Consumer Surplus ($ MILLION)	-1,248.82	-1,616.34	-1,302.24	-9,854.72
	5% DEMAND CHANGE			
Low Cost Estimate				
Change in Producer Surplus ($MILLION)	8,693.04	-8,066.73	-7,904.87	-7,742.80
Change in Consumer Surplus ($ MILLION)	-1,146.36	-5,88.58	-5,165.44	-5,142.29

Upper Cost Estimate				
Change in Producer Surplus ($ MILLION)	-8,030.96	-4,962.79	-2,866.21	-737.87
Change in Consumer Surplus ($ MILLION)	-3,006.09	-4,756.49	-4,461.17	-4,163.17

NO DEMAND CHANGE

Low Cost Estimate				
Change in Producer Surplus ($MILLION)	-57.79	283.83	454.99	626.34
Change in Consumer Surplus ($ MILLION)	-8.67	42.55	68.12	93.84
Upper Cost Estimate				
Change in Producer Surplus ($ MILLION)	-724.23	-3,605.40	5,817.86	8,062.09
Change in Consumer Surplus ($ MILLION)	-108.51	536.71	863.3	-1,193.61