



The Economic Impact of mCOOL on the Beef and Pork Value Chains

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Legal Disclaimer

Decision Innovation Solutions, LLC (“DIS”) has prepared this analysis (the “Project”) for review and use. The Project consists of an estimate of the impacts on U.S. consumers of a reinstated mCOOL framework for beef and pork.

While DIS has made every attempt to obtain the most accurate data and include the most critical factors in preparing the Project, DIS makes no representation as to the accuracy or completeness of the data and factors used or in the interpretation of such data and factors included in the Project. The responsibility for the decisions made by you based on the Project, and the risk resulting from such decisions remains solely with you; therefore, you should review and use the Project with that in mind.

While the Project does include certain estimates and possible explanations for the impacts on U.S. consumers of a reinstated mCOOL framework for beef and pork it cannot be ascertained with certainty the extent to which these estimates are entirely accurate. The following factors, among others, may prevent complete accuracy of the estimation of the economic impact of mCOOL on the beef and pork value chains and explanations for the same:

- Inadvertent errors and omissions related to data collection, data summarization, and visual display of data.

Table 1. Acronyms

Acronym	Description
CGE	Computable General Equilibrium
COOL	Country of Origin Labeling
CPI	Consumer Price Index
DIS	Decision Innovation Solutions
EDM	Equilibrium Displacement Model
ERS	Economic Research Service
mCOOL	Mandatory Country of Origin Labeling
LMIC	Livestock Marketing Information Center
USDA	U.S. Department of Agriculture
WTO	World Trade Organization

1 Executive Summary

This study provided an updated economic assessment of mandatory Country of Origin Labeling (mCOOL) regulations by synthesizing and advancing the frameworks of three foundational papers (as detailed in Section 3.2). Utilizing updated production, market, consumption, and trade data, based on a five-year average from 2021 to 2025 and/or 2025 data, this study re-estimated the costs associated with implementing mCOOL and 5-year and 10-year cumulative total costs for the beef and pork industries under the 2013 mCOOL rule. The total cost was segregated into one-time capital expenditures (e.g., initial equipment and software setups, etc.) and recurring variable operating expenses (e.g., labor, tracking and label media, etc.). The capital expense only applied to the first-year implementation cost, and the variable expenses applied to all 10 years. Two scenarios were set up for different capital-variable expenses ratios in Year 1. Key takeaways include:

- Year 1 total costs under 2013 mCOOL rule would be **\$1.02 billion dollars** covering both beef (\$721.3 million dollars) and pork (\$295.5 million dollars) supply chains. Among the \$1.02 billion dollars:
 - Capital expenses range from 8% to 14% of total costs (\$81.9 million to \$145.9 million dollars, with midpoint of **\$113.9 million dollars**);
 - Variable expenses range from 86% to 92% of total costs (\$870.9 million to \$934.9 million dollars, with midpoint of **\$902.9 million dollars**)
- Cumulative 5-year implementation cost range from \$4.7 billion dollars to \$5 billion dollars, from the two scenarios, with midpoint of **\$4.8 billion dollars**.
- Cumulative 10-year implementation cost range from \$9.8 billion dollars to \$10.5 billion dollars, from the two scenarios, with midpoint of **\$10.1 billion dollars**.
- For all three time periods, first year, cumulative 5-year and cumulative 10-year, beef segments accounted for 70% of total costs, while the pork segments made up the remaining 30%.
- Under 2013 mCOOL rule, consumers would pay additional \$835.1 million and \$284.3 million (adjusted for inflation) per year for retail beef and pork purchases, respectively.

Updated estimates by origins, i.e., U.S. origin only and mixed origins, were calculated for the corresponding sectors under the 2009 mCOOL model, as outlined in the 2010 Informa report:

- For the beef industry, under the U.S. origin category, total supply chain costs could increase from \$83 million to \$210 million, a 150% increase from 2009 to 2025. Under the mixed origin category, total supply chain costs could increase 32% from \$1.1 billion to \$1.4 billion. These changes are mainly due to inflation and adaptation of allocations of imported feeder cattle to market segments. Under the assumption that modern beef supply chains—including feedlots, packers, and processors—possess significantly advanced traceability and segregation capabilities compared to 2009, the advancement of technology enables relatively seamless management of both domestic and imported cattle sources compared to nearly 2 decades ago.

- For the pork industry, under the U.S. origin category, the total cost could increase from \$23 million to \$41 million, an 80% increase from 2009 to 2025. This increase is mainly due to inflation and the increase in the proportion of hogs in integrated hog production systems and non-integrated large scale closed production systems. Under the mixed origin category, the total cost may remain at a similar level as was estimated in 2009. Based on our analysis, costs only increased 3% from \$175 million to \$181 million. This change is largely because fewer pork products are from commingled sources compared to 2009.

Additionally, this report re-evaluates the market shocks triggered by the 2009 and 2013 rules under modern market conditions. The 2009 rule imposed broad implementation costs across all vertical tiers of the supply chain. Conversely, the 2013 revisions targeted specific labeling requirements (i.e., mandated "born, raised, and slaughtered" tracking) and tightened commingling rules on muscle cuts, bypassing primary producers putting more pressure on the processor and retail levels for mCOOL compliance. To quantify these economic impacts on consumers, producers, and processors, the analysis operationalizes a series of multi-sector, structural equilibrium displacement models (EDMs). The framework modeled five beef supply chain levels and four pork supply chain levels, directly reflecting the unique vertical integration and structural depth of each livestock sector (shown in Table 2).

Under the 2013 mCOOL model, the implementation costs for animals (feeder cattle, slaughter cattle and slaughter hogs) estimated by USDA were essentially zero, and implementation costs for meat products (beef and pork) were decreased compared to the cost estimates from the 2009 model, especially for imported wholesale beef and imported wholesale pork.

For the beef industry, the implementation of mCOOL could have the biggest impact on retail beef compared to other segments of the supply chain, driving production costs upward by 0.073% to 1.209%. Imported wholesale beef followed as the next most impacted sector, posting a production cost increase between 0.039% and 0.653%. For the pork industry, the implementation of mCOOL could have the greatest impact on imported wholesale pork resulting in a production cost increase between 0.159% and 4.186%, followed by retail pork, driving production cost increase by 0.155% to 0.627%.

Table 2. EDM Implementation Costs and Supply Shifts under 2009 and 2013 mCOOL Rules with 2025 Data Inputs

	2009 mCOOL Implementation Costs	2009 mCOOL Supply Shift with 2025 Data Inputs	2013 mCOOL Implementation Costs	2013 mCOOL Supply Shift with 2025 Data Inputs
Beef				
Feeder Cattle	\$0.25/head	0.012%	0	0.000%
Slaughter Cattle	\$0.25 - \$0.75/head	0.013%	0	0.000%
Wholesale Beef	\$0.25-\$14.00/head	0.208%	\$7.16/head	0.031%
Imported Wholesale Beef	\$10.00-\$18.00/head	0.653%	\$7.16/head	0.039%
Retail Beef	\$0.031-\$0.159/lb	1.209%	\$0.05/lb	0.073%
Pork				
Slaughter hogs	\$0.05-\$0.375/head	0.061%	0	0.000%
Wholesale Pork	\$0.05-\$5.50/head	0.495%	\$1.79/head	0.154%
Imported Wholesale Pork	\$5.00-\$6.00/head	4.186%	\$1.79/head	0.159%
Retail Pork	\$0.000075-\$0.053/lb	0.627%	\$0.045/lb	0.155%

Source: Update of Cost Assessments for Country of Origin Labeling -- Beef and Pork (2009) report, by Informa (2010);
Economic Impacts of 2009 and 2013 U.S. Country of Origin Labeling Rules on U.S. Beef and Pork Markets by Glynn Tonsor, Ted Schroeder, and Joe Parcell (2015);
USDA 2013 Federal Register;
DIS Estimates



Regarding ground meat products, specifically ground beef and ground pork, the 2013 mCOOL revision rule retained a flexible, multi-country category label as in the 2009 mCOOL rule (e.g., "*Product of the U.S. and Country X(s)*"). Because ground beef formulations usually require a higher volume and/or a wider variety of origin inputs to satisfy specific lean-to-fat ratios, it is exposed to greater operational complexity and potentially higher implementation costs under mCOOL regulations. This is driven by the increased necessity of tracking and labeling multiple foreign supply chains, particularly for ground beef. Moreover, ground beef is one of the major components of the retail beef market which could lead to significantly higher costs imposed upon the beef industry.

Under our assumptions, implementation cost for ground beef production, using 2025 data, could range from \$202.1 million to \$687.9 million; for ground pork, the implementation cost could range from \$24,500 to \$17.3 million. If a new COOL rule for ground beef/pork would require identifying origin(s) for production stages, the implementation cost would increase.

This analysis captured the short-run cost shocks of implementation. Once standard operating procedures are fully established and integrated across the supply chain, learning-curve efficiencies are projected to yield slight cost reductions after the first few years of operation.

2 Introduction

Mandatory Country of Origin Labeling (mCOOL) for beef and pork was formally established in the 2002 Farm Bill, requiring retailers to specify where animals were born, raised, and slaughtered. The following table, which provides a concise implementation summary of mCOOL established in 2009, is from a January 26, 2015 report entitled “Economic Impacts of 2009 and 2013 U.S. Country-of-Origin Labeling Rules on U.S. Beef and Pork Markets” by Glynn Tonsor (K-State), Ted Schroeder (K-State), and Joe Parcell (University of Missouri).

Table 3. Historical Timeline of U.S. Country of Origin Labeling Laws and mCOOL

Exhibit 1.1 – Historical Timeline of U.S. Country of Origin Labeling Laws and MCOOL

Year	Action	Summary
1930	Tariff Act of 1930	Imported products must be labeled for the ultimate purchaser, or the last person who receives the imported product in its imported form. Significantly processed imports do not need to comply. Other exceptions are items that cannot be labeled; items that would be “economically prohibitive;” and “J List” items, including many agricultural commodities.
2002	Farm Security and Rural Investment Act of 2002 and 2002 Supplemental Appropriations Act	Two of the three legislative activities that triggered amending the Agricultural Marketing Act of 1946 and permitted USDA to mandate country of origin labeling.
10/30/2003	Proposed Rule – Mandatory Country of Origin Labeling for Beef, Lamb, Pork, Fish and Shellfish, Perishable Agricultural Commodities, and Peanuts	USDA introduced the mandatory COOL concept and provisions.
10/5/2004	Interim Final Rule – Mandatory Country of Origin Labeling of Fish and Shellfish	Before applying MCOOL to all covered commodities, USDA applied origin country and method of production labeling requirements to fish and shellfish.
2008	Food, Conservation and Energy Act of 2008	2008 farm bill is the third of three legislative actions that triggered amending the Agricultural Marketing Act of 1946 and moving forward with mandatory country of origin labeling.
8/1/2008	Interim Final Rule – Mandatory Country of Origin Labeling of Meat, Perishable Agricultural Commodities, Nuts, and Ginseng	USDA shares revised country of origin labeling provisions for all covered commodities but fish and shellfish.
1/15/2009	Final rule – Mandatory Country of Origin Labeling of Beef, Pork, Lamb, Chicken, Goat Meat, Wild and Farm-Raised Fish and Shellfish, Perishable Agricultural Commodities, Peanuts, Pecans, Ginseng and Macadamia Nuts	Final rule makes origin country labeling effective for all remaining covered commodities that require labeling.
2012	World Trade Organization case	World Trade Organization panel concludes that U.S. MCOOL violates an accord that states countries should treat imported and domestic goods similarly.
3/12/2013	Proposed Rule to Amend Labeling Provisions Under Country of Origin Labeling	USDA releases proposed rule for muscle cut commodities that alters mandatory origin country labeling requirements to provide more specific label information.
5/24/2013	Final rule for MCOOL on all covered commodities	Rule outlines the final updates to MCOOL that clarifies retailer definition, eliminates commingling flexibility, and requires production step origin country designations on muscle cut commodities.

mCOOL for beef and pork was repealed by Congress on December 18, 2015, as part of the Consolidated Appropriations Act of 2016. The repeal followed World Trade Organization (WTO) rulings that the labels discriminated against imported Canadian and Mexican livestock, authorizing over \$1 billion in retaliatory tariffs.

However, with the U.S. cattle herd historically small, supplies tight, and prices high, in early 2026, the U.S. government finalized an executive order to increase imports of Argentine beef by 80,000 metric tons, prompting renewed calls for mCOOL. Critics argue additional importation of Argentine beef allows imported meat to be blended with U.S. beef without clear labeling, while supporters argue it reduces consumer costs.

To better understand the impact of mCOOL under current market conditions and to prepare to better inform federal lawmakers as they debate whether to adopt mCOOL regulations for beef and pork again, the Meat Institute has asked Decision innovation Solutions (DIS) to develop and adapt methodology to estimate the impacts of a reinstated mCOOL framework on U.S. consumers. This report is a response to that request.

2.1 Rule Summary

Enacted in the 2002 Farm Bill and implemented in 2008, mCOOL was later revised in 2008 resulting in a final rule that became effective in 2009. In 2013, the rule was amended to require more specific labeling on products. Canada and Mexico later challenged mCOOL and the policy was later repealed by the U.S. Congress in 2015 for beef and pork via the Consolidated Appropriations Act of 2016. The congressional repeal amended regulations by removing requirements related to muscle cuts and ground beef and pork.

Before repeal, the 2009 mCOOL rule targeted muscle-cut beef and pork, and ground beef and pork for retail sale. This rule excluded processed products and food service, and initially, did not require animal identification further raising concerns of implementation costs. For processed food items, this includes any products that have undergone specific processing or have been combined with at least one other covered commodity or substantive food component (e.g., chocolate, breadings, etc.). Processing activities that alter the character of the covered commodity include cooking (frying, broiling, grilling, boiling, steaming, baking, or roasting), curing (e.g., salt or sugar curing, drying), smoking, and restructuring (emulsifying and extruding). Food service establishments (e.g., cafeterias, lunchrooms, institutions, etc.) are exempt as these establishments are considered to sell food directly to consumers as opposed to retail sale.

In 2013, the 2009 rule for beef, pork, and other covered commodities was repealed to require additional detail on the origin of products including the country of birth, raised, and slaughtered. This ruling eliminated the commingling flexibility for animals of different origins that was permitted under the 2009 rule and required processors and retailers to provide consumers with detailed production history of muscle cuts. As it pertained to ground beef and ground pork, the law required country of origin labeling to include all the countries of origin contained “therein or reasonably contained therein.”

3 Methodology

3.1 Data Acquisition

In the seventeen years since the adoption of mCOOL regulations in early 2009, production of cattle and hogs, market prices, consumption, and trade statistics have fluctuated extensively, especially considering the size of the cattle herd and associated live cattle and beef prices. To provide realistic context, this analysis modeled the economic implications of a hypothetical mCOOL reinstatement using updated 2021 to 2025 data including:

- **National Cattle Inventory, by Class**
 - https://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Cattle_Inventory/
- **National Hogs and Pigs Inventory, by Class**
 - <https://esmis.nal.usda.gov/publication/hogs-and-pigs>
- **Prices**
 - <https://esmis.nal.usda.gov/publication/agricultural-prices>
- **Additional USDA Statistics**, summarized by the Livestock Marketing Information Center (LMIC)
 - <https://lmic.info/price-production/>
- **Livestock, Dairy, and Poultry Outlook**
 - <https://www.ers.usda.gov/publications?series=LDPM>
- **Meat Price Spreads**
 - <https://www.ers.usda.gov/data-products/meat-price-spreads>
- **Consumer Price Index**
 - <https://www.bls.gov/news.release/cpi.t02.htm>
- **Trade Data**
 - <https://www.fas.usda.gov/data/trade>
 - <https://apps.fas.usda.gov/gats/default.aspx>

3.2 Blended Update of Three Selected Publications

The objective of this study is to provide an updated assessment of the readoption of mCOOL regulations under today's production, market, consumption, and trade conditions. A detailed summary of relevant literature can be found in the Appendix. In our research, there were three key publications related to mCOOL regulations which contain analytical methods and results:

- **Implementation of Country-of-Origin Labeling (COOL) in the Beef Industry**
 - Darrell S. Peel (2008)
- **Update of Cost Assessments for Country-of-Origin Labeling – Beef and Pork (2009)**
 - Informa Economics (2010)
- **Economic Impacts of 2009 and 2013 U.S. Country-of-Origin Labeling Rules on U.S. Beef and Pork Markets**
 - Tonsor, Schroeder, and Parcell (2015)

While the methodologies appear to be sound in all instances, they were utilized at different timeframes throughout mCOOL's lifespan (i.e., pre-adoption, mid-adoption, and at the latter end of adoption). As such, we did not intend to explicitly follow any one methodology in particular. Rather, we distilled the best methods of each analysis into an updated analysis, using updated data collected as presented in Section 3.1.

3.2.1 Implementation of Country-of-Origin Labeling (COOL) in the Beef Industry

In this 2008 article, Darrell S. Peel presented a concise table showing, at the time of publication, beef and cattle supplies, trade and what the understood COOL labels would be under about thirteen different labeling situations (Table 4, snipped from the 2008 paper). To understand how labeling would be applied in current beef/cattle supplies and trade and also in the pork/hog industry, we applied a similar framework and updated it with current statistics.

Table 4. Beef and Cattle Supplies, Trade and COOL Labels, from Peel's Paper, in 2008

Table 1. Beef and Cattle Supplies, Trade and COOL Labels

	2007 Supply	COOL Labels
All Cattle and Calves, Jan 1, 2008	96.67 Million Head	
Calf Crop	37.36 Million Head	Prod. of USA
Steer and Heifer Slaughter (FI)**	27.49 Million Head	Prod. of USA; or Prod. of USA and Canada; or Prod. of USA and Mexico*
Cow and Bull Slaughter (FI)**	6.23 Million Head	Prod. of USA; or Prod. USA and Canada*; or Prod. of USA and Mexico*
Cattle Imports, Total	2.49 Million Head	Prod. of USA and Canada*
Canada	1.40 Million Head –0.85 Slaughter –0.55 Feeders	
Mexico	1.09 Million Head	
Beef Production (FI)**	26.07 Billion Pounds	Prod. of USA; or Prod. of USA and Canada; or Prod. of USA and Mexico*
Beef Imports	3.05 Billion Pounds	Prod. Of Country X
Beef Exports	1.82 Billion Pounds	

*Meat from mixed origin animals and commingled product is labeled with the appropriate countries, which may be listed in any order. Only if an entire day's production consists of animals imported for slaughter does the foreign country have to be listed first, e.g. Product of Canada and USA. Also, only in the rare circumstance that a packer processed Mexican and Canadian cattle in the same day would the Product of USA, Canada, and Mexico label be appropriate.

** Federally Inspected.

3.2.2 Update of Cost Assessments for Country-of-Origin Labeling – Beef and Pork 2009

In June 2010, Informa Economics released this report with the objective to obtain an updated cost assessment regarding the costs associated with COOL provisions as revised and passed in the 2008 Farm Bill and brought into law on September 30, 2008. The analysis provided a side-by-side comparison of the current beef and pork supply chain costs compared to those estimated in 2003 by Sparks Companies (now Informa Economics). Two sets of supply chain COOL costs, as well as an aggregate cost, were provided for 2009. The first reflects COOL costs associated with supply chain configuration for the utilization of U.S. origin product only. The other identifies the system costs for those operations that have configured their businesses to utilize animals and products sourced from mixed origins. The 2003 and corresponding 2010 results are summarized in the following Table 5 and Table 6 (snipped from the 2010 Informa report).

Table 5. Beef Supply Chain COOL Cost Estimates, from Informa 2010 Report

Table 1 Beef Supply Chain COOL Cost Estimates

	2003 \$/head*	2009 US Only Origin \$/head	2009 Mixed Origin Animals/Products \$/head
Cow-calf Producer	4.88	.25	Not applicable
Feedlot/Backgrounder	3.75-5.75	.25	.50-1.00
Packer/Processor	15.00-18.00	.25	10.00-18.00
Retail distribution and Retail Store	23.00	.75	35.00-40.00
Total	46.63-51.63	1.50	45.50-59.00

* Costs reported in the Sparks April 2003 analysis.

Table 6. Pork Supply Chain COOL Cost Estimates, from Informa 2010 Report

Table 4 Pork Supply Chain COOL Cost Estimates

	2003 \$/head*	2007 Update \$/head	2009 US Origin Only \$/head	2009 Mixed Origin \$/head
Integrated Hog Production and Packer/Processor System (US only)	0.5	Same cost	Minimal 0-.10	Not applicable
Large Scale Closed Production System, Non-Integrated (US only) (farrow/wean/finish) ¹	0.75	Same cost	Minimal 0-.10	Not applicable
Small independent, Non-Integrated (US only) farrow/wean/finish)	1.50	Same cost	Minimal 0-.10	Not applicable
Small independent, Non-Integrated (Mixed origin farrow/wean/finish)	1.50	Same cost	Not applicable	0.25-.50
Non-Integrated (US only) Packer/Processor	2.00-6.00	5.00-6.00	Minimal 0-.10	Not applicable
Non-Integrated Mixed Origin Packer/Processor	2.00-6.00	5.00-6.00	Not applicable	5.00-6.00
Sow and Boars	2.00	None available	Minimal	Not applicable
Retail Distribution and Retail Store	2.75/hd ~ 7.5 cents/lb.	1.65-2.00/hd ~ 4.5 to 6.0 cents/lb.	.25/hd .007 cents per pound	1.65-2.00/hd ~ 4.5 to 6.0 cents/lb.
Total	3.25-10.25	2.15-9.50	.25-.35	6.90-8.50

*Costs reported in the Sparks April 2003 analysis

While the methodology used by Informa Economics to complete the analysis was undoubtedly robust, it was completed during the early years of mCOOL's implementation and therefore did not benefit from longer data series. We applied the cost estimates from 2009 and with current statistics to update cost segments under both beef/cattle and pork/hog industries.

3.2.3 Economic Impacts of 2009 and 2013 U.S. Country-of-Origin Labeling Rules on U.S. Beef and Pork Markets

Later, as prescribed by the 2014 Farm Bill, the Office of the Chief Economist at USDA commissioned work by Tonsor, Schroeder, and Parcell (mentioned previously), to conduct an analysis of its 2009 and 2013 mCOOL rules. This report was completed in 2015, the last year in which mCOOL was in force. The table below (listed as Table 7, snipped from the 2015 report) is a high-level summary comparing the percentage increases in costs for the 2009 mCOOL rule.

Table 7. Comparison of Percentage Increases in Costs for the 2009 COOL Rule

Table 2—Comparison of Percentage Increases in Costs for the 2009 COOL Rule		
	2009 Regulatory Impact Analysis	Tonsor, Schroeder, and Parcell
BEEF		
Farm Supply	Domestic & Imported: 1.30%	Feeder cattle: 0.033% Slaughter cattle: 0.023%
Processing	Domestic: 2.10% Imported: 2.10%	Wholesale: 0.374% Imported Wholesale: 1.175%
Retail	Domestic & Imported: 2.20%	1.741%
PORK		
Farm Supply	Domestic & Imported: 1.30%	0.061%
Processing	Domestic: 1.00% Imported: 1.00%	Wholesale: 0.500% Imported Wholesale: 4.23%
Retail	Domestic & Imported: 0.40%	0.697%
CHICKEN		
Farm Supply	Domestic: 0.00% Imported: 1.00%	N/A
Processing	Domestic & Imported: 1.10%	0.000%
Retail	Domestic & Imported: 0.40%	0.000%
Sources: <i>Federal Register</i> 74 (Appendix B); Tonsor, Schroeder, and Parcell (Appendix A).		

The report from which the above table was drawn is, given the authors and their respective backgrounds, robust and included significant detail on the methodology utilized to complete the analysis. Again, we adopted and adapted some portions of methodology from this study and updated with current data to add robustness to the final deliverables. Table 7 is shown as an example here, the 2015 USDA analysis by Tonsor, Schroeder, and Parcell was our primary reference for this update.

4 Results

4.1 Country-of-Origin Labeling in Beef and Pork Industry

To generalize and add robustness to our analysis, we used 5-year average data from 2021 to 2025 and the year of 2025 data in our analysis, mainly because of the drastic reduction of feeder cattle imported from Mexico in 2025.

The 2025 levels and 5-year average levels of cattle slaughter, beef production, cattle and beef trade and the corresponding labels under three different COOL requirements are shown in Table 8.

Table 8. 2025 and 5-Year Average Beef and Cattle Supplies, Trade and COOL Labels

		2025 Supply	2021-2025 5Y Average Supply	2009 mCOOL Rule	2013 mCOOL Rule	Current 2026 Rule (voluntarily)
Live Animals (in Heads)	Total Cattle Inventory (From Jan report)	86,472,200	89,569,160	--	--	--
	Calf Crop	32,895,600	33,917,700	Product of the U.S.	Born, Raised and Slaughtered in the U.S.	Product of the U.S. (if it is strictly born, raised and slaughtered inside the United States) OR No legal requirement to label.
	Steer and Heifer Slaughter (FI)	23,813,100	25,236,920	Product of the U.S. OR Product of the U.S. and Canada	Born in Canada/Mexico, Raised and Slaughtered in the U.S. OR	
	Cow and Bull Slaughter (FI)	5,439,100	6,681,880	OR Product of the U.S. and Mexico ³	Born and Raised in Canada/Mexico, Slaughtered in the U.S.	
	Cattle Imports Total	958,206	1,653,672	--	--	
	Cattle Imports from Canada Total	728,686	714,544	Product of the U.S. and Canada ³	--	
	Cattle Imports from Canada - Slaughter	571,109	540,325		Born and Raised in Canada, Slaughtered in the U.S.	
	Cattle Imports from Canada - Feeder Cattle	137,663	159,593		Born in Canada, Raised and Slaughtered in the U.S.	
	Cattle Imports from Canada - Other ¹	19,914	14,627		--	
	Cattle Imports from Mexico Total	229,520	939,128	Product of the U.S. and Mexico ³	--	
	Cattle Imports from Mexico - Slaughter	NA	NA		Born and Raised in Mexico, Slaughtered in the U.S.	
	Cattle Imports from Mexico - Feeder Cattle	228,194	935,440		Born in Mexico, Raised and Slaughtered in the U.S.	
	Cattle Imports from Mexico - Other ²	1,326	6,146		--	
Beef Production (FI ⁵ , in MT)		14,331,463	15,013,087	Product of the U.S. OR Product of the U.S. and Country X(s) ³	Born, Raised and Slaughtered in the U.S. OR Born in Country X(s), Raised and Slaughtered in the U.S. OR Born and Raised in Country X(s), Slaughtered in the U.S.	Product of the U.S. (if it is strictly born, raised slaughtered and processed inside the United States) OR No legal requirement to label.
Imported Beef Meat Products (in MT)	Imported Meat Products Total	1,775,643	1,317,812	Product of the U.S. and Country X(s) ³	Born in Country X(s), Raised and Slaughtered in the U.S.	
	Carcass	6,943	4,851		OR	
	Bone-in	154,252	136,651		Born and Raised in Country X(s), Slaughtered in the U.S. ⁴	
	Boneless	1,614,448	1,176,310			
Imported Beef Processed Products (in MT) ⁶		20,230	19,798	Exempt	Exempt	Exempt

1. Cattle Imports from Canada - Other includes breeding males and females cattle.
2. Cattle Imports from Mexico - Other includes breeding males, females cattle and roping stock.
3. Meat from mixed origin animals and commingled product is labeled with the appropriate countries, which may be listed in any order. Only if an entire day's production consists of animals imported for slaughter does the foreign country have to be listed first, e.g. Product of Canada and the U.S. Also, only in the rare circumstance that a packer processed Mexican and Canadian cattle in the same day would the Product of the U.S., Canada, and Mexico label be appropriate.
4. If the product is muscle cut, the valid label for product processed with 14 days. If the product is ground beef, list countries that have supplied raw materials processed at the facility within the past 60 days.
5. FI: Federally Inspected.
6. Data for imported beef processed product was from LMIC, the data are different from ERS, may due to the different data methodologies.
Data source: LMIC and AMS WA_LS635 report.

The 2025 levels and 5-year average levels of hog slaughter, pork production, hog and pork trade and the corresponding labels under three different COOL requirements are shown in Table 9.

Table 9. 2025 and 5-Year Average Pork and Hog Supplies, Trade and COOL Labels

		2025 Supply	2021-2025 5Y Average Supply	2009 mCOOL Rule	2013 mCOOL Rule	Current 2026 Rule (voluntarily)
Live Animals (in Heads)	Total Hog Inventory	75,544,700	75,353,600	--	--	--
	Breeding Hogs Inventory	5,952,400	6,066,740	Product of the U.S. OR Product of the U.S. and Country X ¹	Born in Country X(s), Raised and Slaughtered in the U.S. OR Born and Raised in Country X(s), Slaughtered in the U.S. ²	Product of the U.S. (if it is strictly born, raised slaughtered and processed inside the United States) OR No legal requirement to label.
	Market Hogs Inventory	69,592,300	69,286,860			
	Barrow/gilt Slaughter (FI)³	124,406,300	124,008,900			
	Sow Slaughter (FI)	2,975,600	3,097,760			
	Stag/boar Slaughter (FI)	248,700	289,120			
Pork Production (FI, in MT)		15,139,401	15,071,653			
Imported Pork Meat Products (in MT)		382,652	414,262			
Imported Pork Processed Products (in MT)⁴		109,465	107,879	Exempt	Exempt	Exempt
1. Meat from mixed origin animals and commingled product is labeled with the appropriate countries, which may be listed in any order. Only if an entire day's production consists of animals imported for slaughter does the foreign country have to be listed first, e.g. Product of Canada and the U.S. Also, only in the rare circumstance that a packer processed Mexican and Canadian cattle in the same day would the Product of the U.S., Canada, and Mexico label be appropriate. 2. If the product is muscle cut, the valid label for product processed with 14 days. If the product is ground pork, list countries that have supplied raw materials processed at the facility within the past 60 days. 3. Federally Inspected 4. Data for imported pork processed product was from LMIC, the data are different from ERS, may due to the different data methodologies. Data source: LMIC.						

4.2 Economic Analysis of mCOOL in Beef and Pork Industry

4.2.1 MCOOL Cost Implication in Beef and Pork Industry

Under the 2009 mCOOL rule, Informa studied two sets of supply chain mCOOL costs. The first reflects mCOOL costs associated with supply chain configuration for the utilization of U.S. origin product only. The other identifies the system costs for those operations that have configured their businesses to utilize animals and products sourced from mixed origins for both the beef and pork industries. Table 10 and Table 11 demonstrate that under the 2009 mCOOL, the additional supply chain cost by two situations for the beef industry, with 2009 data input and 2021-2025 5-year average data input, respectively. Calculations for the 5-year average were inflated using 2009 and 2025 consumer price index (CPI). The inflation factor was equal to 1.5 (calculated as 2025 CPI divided by 2009 CPI).

Under the U.S. origin category, the total cost increased by 150%, from \$83 million dollars to \$210 million dollars, using 2025 data inputs compared to 2009 inputs. The change is mainly due to inflation and the increase of beef products sold in retail stores, from \$62 million dollars to \$177 million dollars, and from 2 billion pounds to almost 4 billion pounds in volume.

Under the mixed origin category, the total cost increased by 32%, (used the midpoints of both 2009 and 2025 data inputs calculations) from \$1,079 million dollars to \$1,424 million dollars. This change is mainly due to inflation and how imported feeder cattle are allocated within the supply chains. With the assumption that modern beef supply chains—including feedlots, packers, and processors—possess significantly advanced traceability and segregation capabilities compared to 2009, enabling relatively seamless management of both domestic and imported cattle sources, the 1.1 million head of imported cattle in Table 11, could only lead to 2.61 million head of steers and heifers under the mixed origin category.

Table 10. mCOOL Cost Implications for Beef Industry by Value Chain Sector, with 2009 Data Inputs

Sector	2009 U.S.- Only Origin (\$/head)	2009 Mixed Origin Animals/Products (\$/head)	2009 U.S.- Only Origin (Variables)	2009 U.S.- Only Origin (Million \$)	2009 Mixed Origin Animals/Products (Variables)	2009 Mixed Origin Animals/Products (Million \$)
Cow-calf Producer	\$0.25	Not applicable	35.6 million head calf crop	\$8.90	Not applicable	Not applicable
Feedlot/backgrounder	\$0.25	\$0.50 - \$1.00	25.2 million head sold	\$6.30	1.27 million head sold	\$0.6-\$1.3
Packer/processor	\$0.25	\$10.00 - \$18.00	16.5 million head steer/heifer	\$4.10	10 million head steer/heifer	\$100-\$180
			6.6 million head cows/bulls at \$0.25/head	\$1.70	0.2 million head cows/bulls at \$1/head	\$0.20
Retail distribution and retail store	\$0.75	\$35.00 - \$40.00	2 billion pounds sold at \$0.031/lbs	\$62.00	5.9 billion pounds sold at \$0.148-0.169/lbs	\$875-\$1,000
Total	\$1.50	\$45.50 - \$59.00		\$83.00		\$975.8-\$1,181.5
Supply Chain Total		\$47.00 - \$60.50				\$1,058.8 - \$1,264.5

Source: Update of Cost Assessments for Country of Origin Labeling -- Beef and Pork (2009) report, by Informa (2010).



Table 11. mCOOL Cost Implications for Beef Industry by Value Chain Sector, with 2021-2025 5-Year Average Data Inputs

Sector	2009 U.S.- Only Origin (\$/head)	2009 Mixed Origin Animals/Products (\$/head)	2021-2025 5Y Average U.S.- Only Origin (Variables)	2021-2025 5Y Average U.S.- Only Origin (Million \$)	2021-2025 5Y Average Mixed Origin Animals/Products (Variables)	2021-2025 5Y Average Mixed Origin Animals/Products (Million \$)
Cow-calf Producer	\$0.25	Not applicable	33.9 million head calf crop	\$12.72	Not applicable	Not applicable
Feedlot/backgrounder	\$0.25	\$0.50 - \$1.00	26.03 million head sold	\$9.77	1.10 million head	\$0.83 - \$1.65
Packer/processor	\$0.25	\$10.00 - \$18.00	22.59 million head steers/heifers	\$8.47	2.61 million head steers/heifers	\$39.17 - \$70.50
			6.5 million head cows/bulls at \$0.25/head	\$2.44	0.18 million head cows/bulls at \$1/head	\$0.27
Retail distribution and retail store	\$0.75	\$35.00 - \$40.00	3.8 billion pounds sold at \$0.031/lbs	\$176.78	5.73 billion pounds sold at \$0.148-0.169/lbs	\$1272.60 - \$1453.18
Total	\$1.50	\$45.50 - \$59.00		\$210.17		\$1312.87 - \$1525.60
Supply Chain Total		\$47.00 - \$60.50				\$1523.04 - \$1735.77

Source: Update of Cost Assessments for Country of Origin Labeling -- Beef and Pork (2009) report, by Informa (2010).
DIS Estimates
Calculations for the 5Y average were deflated using 2025 Consumer Price Index. The deflation factor was equal to (321.943/214.537 = 1.5)



The values presented in the two “Variables” columns in Table 11, are discussed individually in the following bullet list:

- Under the 2021-2025 5-year Average U.S. only origin column:
 - *33.9 million head calf crop*: the 5-year average of calf crop from USDA January report.
 - *26.03 million head sold*: the 5-year average of cattle on feed and DIS estimated backgrounders.
 - *22.59 million head steers/heifers*: the 5-year average of FI slaughter steers and heifers (25.2 million head) minus the 2.61 million head steers/heifers under the mixed origin column.
 - *6.5 million head cows/bulls*: the 5-year average of FI slaughter cows and bulls (6.7 million head) minus the 5-year average of Canadian imported slaughter cows, bulls, breeding males and breeding females (0.18 million head).
 - *3.8 billion pounds sold*: total domestic beef supply was calculated as commercial production plus imports minus exports which leads to the total as 28.9 billion pounds. Then assumed 57% of the total domestic supply goes into food service, and 10% goes to processed products, leaving a retail supply of 9.54 billion pounds ($28.9 \times 0.43 - 28.9 \times 0.1 = 9.54$ billion pounds). Within the 9.54 billion pounds, 60% of it goes to mixed origin category. Then the remaining beef product for U.S. origin at retail store equal to $9.54 \times 0.4 = 3.8$ billion pounds.
- Under the 2021-2025 5-year Average Mixed origin Animals/Products column:
 - *1.10 million head sold*: the 5-year average of summation of Canadian and Mexican imported feeder cattle.
 - *2.61 million head steers/heifers*: assume the 1.10 million heads feeder cattle (from the last bullet point) could lead to 2.20 million heads of steers/heifers be mixed origin, plus, 75% of the 5-year average of Canadian imported cattle.
 - *0.18 million head cows/bulls*: the 5-year average of Canadian imported slaughter cows, bulls, breeding males and breeding females.
 - *5.73 billion pounds sold*: total supply from mixed origin cattle and import meat equals 5.57 billion pounds, with the calculation as $(2.61 + 0.18) \times 1,000,000 \times 1,387 \times 0.6 \times 0.9 \times 0.7 + 4.11$ billion pounds, where 1,387 was the 5-year average commercial live weight of cattle, 60% of live weight goes to carcass weight, 10% goes to export, and then 70% goes to retail, 4.11 million pounds was the 5-year average of total beef and veal imports. Then 57% of 5.57 billion pounds goes to food service, and with adjustment, the total retail from mixed origin and import meat equals $5.57 \text{ billion} \times 0.43 + 3.33 \text{ billion} = 5.73$ billion pounds.

Table 12 and Table 13 show the additional supply chain cost for two situations in the pork industry under the 2009 mCOOL rule, with 2009 data input and 2021-2025 5-year average data input, respectively. Calculations for the 5-year average were inflated using 2009 and 2025 CPI. The inflation factor was equal to 1.5.

Under the U.S. origin category, the total cost increased by 80%, (using the midpoints of both 2009 and 2025 data inputs calculations), from \$23 million dollars to \$41 million dollars, comparing 2025 data inputs to 2009 inputs. The increase is mainly due to inflation and the increase in hog numbers in integrated hog production system and non-integrated large scale closed production system from 36 million head to 47 million head and from 43 million head to 51 million head, respectively.

Under the mixed origin category, the total cost only increased by 3%, (used the midpoints of both 2009 and 2025 data inputs calculations) from \$175 million dollars to \$181 million dollars. This change is mainly due to inflation as less pork products were from commingled sources. As mentioned in the previous paragraph, more hogs were born, raise and slaughtered in U.S. only, which the additional supply chain cost for pork products under U.S. origin is much cheaper than the cost under the mixed origin category.

Table 12. mCOOL Cost Implications for Pork Industry by Production System and Sector, with 2009 Data Inputs

Sector	2009 U.S.- Only Origin (\$/head)	2009 Mixed Origin Animals/Products (\$/head)	2009 U.S.- Only Origin (Variables)	2009 U.S.- Only Origin (Million \$)	2009 Mixed Origin Animals/Products (Variables)	2009 Mixed Origin Animals/Products (Million \$)
Integrated hog production and packer/processor system (U.S. only)	Minimal\$0 - \$0.10	Not applicable	36 million hogs per year	\$0 - \$3.6	Not applicable	Not applicable
Large scale closed production system, non-integrated (U.S. only) (farrow/wean/finish)	Minimal \$0 - \$0.10	Not applicable	43 million head per year	\$0 - \$4.3	Not applicable	Not applicable
Small independent non-integrated production system (farrow/wean/finish)	Minimal \$0 - \$0.10	\$0.25-\$0.50	20 million head per year	\$0 - \$2.0	10 million head per year	\$2.5 - \$5.0
Non-integrated packer/processor	Minimal \$0 - \$0.10	\$5.00-\$6.00	61 million head per year	\$0 - \$6.1	12 million head per year	\$60 - \$72
Sows and boars	Minimal	Not applicable		Minimal		Not applicable
Retail distribution and retail store	\$0.25/head (0.007 Cents/lb.)	\$1.65-2.00/head (\$0.045-0.06/lb.)	2 billion pounds sold at 0.0075 cents per pound	\$15.00	2 billion pounds sold at 4.5 cents to 6 cents per pound	\$90.0 - \$120.0
Total	\$0.25 - \$0.35	\$6.90 - \$8.50		\$15.0 - \$31.0		\$152.5 - \$197.0
Supply Chain Total		\$7.15 - \$8.85				\$167.5 - \$228.0

Source: Update of Cost Assessments for Country of Origin Labeling -- Beef and Pork (2009) report, by Informa (2010).



Table 13. mCOOL Cost Implications for Pork Industry by Value Chain Sector, with 2021-2025 5-Year Average Data Inputs

Sector	2009 U.S.- Only Origin (\$/head)	2009 Mixed Origin Animals/Products (\$/head)	2021-2025 5Y Average U.S.- Only Origin (Variables)	2021-2025 5Y Average U.S.- Only Origin (Million \$)	2021-2025 5Y Average Mixed Origin Animals/Products (Variables)	2021-2025 5Y Average Mixed Origin Animals/Products (Million \$)
Integrated hog production and packer/processor system (U.S. only)	Minimal \$0 - \$0.10	Not applicable	47 million hogs per year	\$0 - \$7.1	Not applicable	Not applicable
Large scale closed production system, non-integrated (U.S. only) (farrow/wean/finish)	Minimal \$0 - \$0.10	Not applicable	51 million head per year	\$0 - \$7.7	Not applicable	Not applicable
Small independent non-integrated production system (farrow/wean/finish)	Minimal \$0 - \$0.10	\$0.25-\$0.50	10 million head per year	\$0 - \$1.5	9.6 million head per year	\$3.6 - \$7.2
Non-integrated packer/processor	Minimal \$0 - \$0.10	\$5.00-\$6.00	61 million head per year	\$0 - \$9.1	10 million head per year	\$75 - \$90
Sows and boars	Minimal	Not applicable		Minimal		Not applicable
Retail distribution and retail store	\$0.25/head (0.007 Cents/lb.)	\$1.65-2.00/head (\$0.045-0.06/lb.)	2.55 billion pounds sold at 0.0075 cents per pound	\$28.70	1.1 billion pounds sold at 4.5 cents to 6 cents per pound	\$71.4 - \$95.2
Total	\$0.25 - \$0.35	\$6.90 - \$8.50		\$28.7 - \$54.1		\$168.7 - \$192.4
Supply Chain Total		\$7.15 - \$8.85				\$222.8 - \$246.6

Source: Update of Cost Assessments for Country of Origin Labeling -- Beef and Pork (2009) report, by Informa (2010).
DIS Estimates

Calculations for the 5Y average were deflated using 2025 Consumer Price Index. The deflation factor was equal to $(321.943/214.537 = 1.5)$



The values presented in the two “Variables” columns in Table 13, are discussed individually in the following bullet list, (to provide a clearer explanation of the calculation procedure, flip the order of U.S. origin vs mixed origin):

- Under the 2021-2025 5-year Average Mixed origin Animals/Products column:
 - *9.6 million head per year*: double the 5-year average of Canadian imported feed pig.
 - *10 million head per year*: based on consultation with industry economists and with our best professional judgement.
 - *1.1 billion pounds sold*: it is composed of three parts:
 - The 5-year average carcass weight times sum of 5-year average of Canadian imported hogs, (27.48 billion / 128 million commercial hog slaughter) x (4.8 million feeder pig + 1.3 million slaughter barrow/gilt + 0.4 million slaughter sow/boar + 39 thousand breeding hogs) x 0.75 x 0.25 = 260.7 million pounds, account for 25% goes to export, and 75% goes to food service;
 - The 5-year average of pork imports, 1.18 billion pounds x 0.25 = 296.5 million pounds, with the assumption that 75% goes to food service;
 - Adjustment with additional 500 million pounds.
- Under the 2021-2025 5-year Average U.S. only origin column:
 - *47 million head per year*: 40% of the 5-year average of federal inspected hog slaughter minus the 5-year average of Canadian imported feeder pigs minus the 5-year average of Canadian imported slaughter barrow/gilt ((124 million – 4.8 million – 1.3 million slaughter barrow/gilt) x 0.4 = 47 million).

- *51 million head per year*: The 61 million head under non-integrated packer/processor variable minus the 10 million head under small independent non-integrated production system plus the 5-year average of Canadian imported slaughter sow/boar $(60.7 - 10.0) + 0.375 = 51.1$ million.
- *10 million head per year*: 8.5% of the 5-year average of federal inspected hog slaughter minus the 5-year average of Canadian imported feeder pigs minus the 5-year average of Canadian imported slaughter barrow/gilt $((124 \text{ million} - 4.8 \text{ million} - 1.3 \text{ million slaughter barrow/gilt}) \times 0.085 = 10 \text{ million})$.
- *61 million head per year*: 60% of the 5-year average of federal inspected hog slaughter minus the 5-year average of Canadian imported feeder pigs minus the 5-year average of Canadian imported slaughter barrow/gilt, then minus the 10 million head under non-integrated packer processor in mixed origin category $((124 \text{ million} - 4.8 \text{ million} - 1.3 \text{ million slaughter barrow/gilt}) \times 0.6 - 10 \text{ million} = 61 \text{ million})$.
- *2.55 billion pounds sold*: adjust the 5-year average commercial production by multiplying the ratio of U.S. origin commercial hog slaughter divided by total commercial hog slaughter $27.5 \text{ billion} \times [(128 - 4.8 - 1.3 - 0.4 \text{ million})/128 \text{ million}] = 26.1 \text{ billion pounds}$. Assume 25% goes to export, for the remaining 75% consumed domestically, 75% goes to food service, after adjust for food services use, 62% goes from wholesale to retail, $26.1 \text{ billion} \times 0.75 \times 0.25 \times 0.62 = 2.55 \text{ billion pounds}$. Then adjust with 500 million pounds subtraction.

4.2.2 Incorporation mCOOL Implementation Costs

In this part of the economic analysis, we combined two sets of cost estimates from our reference papers. One was from Informa 2010, shown in previous section 4.2.1, and the other was from USDA 2013 mCOOL Final Rule (*Federal Register*, 2013).

From the 2015 USDA analysis by Tonsor, Schroeder, and Parcell, the EDMs were used to study how mCOOL regulations impacted net returns across every tier of the beef and pork supply chains. Relying on updated implementation cost data from Informa (2010), showed in previous section 4.2.1, these implementation cost increases were introduced into the model equations as negative, exogenous shocks that shift the supply curves to the left. This supply contraction covered from primary producers and wholesale importers to processors and retailers, ultimately altering market prices and traded volumes as the marketplace establishes a new equilibrium. Under the initial baseline assumption, the implementation of mCOOL triggered no direct changes in consumer demand. To accurately parameterize these shocks, the live animal market segments (cow-calf, feedlot, beef processing, slaughter hog, and pork processing) were calculated as the proportion of net returns per head relative to the animal's average total value at that specific production stage, while the retail-level shocks were scaled proportionately to the final retail price.

To evaluate the incremental economic shocks introduced by the 2013 mCOOL rule, given that the 2009 rule was already established, the USDA estimated the cost increases in the 2013 *Federal Register*

regulations. The 2013 rule focused strictly on more specific labeling requirements (identifying where an animal was born, raised, and slaughtered) and stricter commingling allowances on muscle cuts. Therefore, the resulting cost increases mainly affected the processor and retail levels. At the processor stage, implementation costs rose by \$7.16 per head for cattle and \$1.76 per head for hogs, while retail costs increased by \$0.05 per pound for beef and \$0.045 per pound for pork.

Adjusted for inflation under the 2013 model, the mCOOL implementation cost for retail stands at \$0.07 per pound for beef and at \$0.063 per pound for pork. Assuming a standard retail gross profit margin of 25% on beef and pork products, this regulatory burden translates to an estimated extra cost of \$0.088 per pound and \$0.079 per pound on beef and pork products passed directly to the consumer, respectively. This implies that it would cost consumers \$835.1 million additionally for retail beef purchases and \$284.3 million additionally for retail pork purchases per year (calculated as the extra costs per pound times the corresponding 2021-2025 5-year average retail beef/pork from both U.S. origin only and mix origins).

4.2.2.1 Long-term Projection Cumulative mCOOL Implementation Cost

In this section, 5-year and 10-year cumulative mCOOL implementation costs were estimated. The estimations were calculated based on mCOOL implementation costs from the 2013 model (established in the the 2015 USDA analysis conducted by Tonsor, Schroeder, and Parcell report) and 2021-2025 five-year average animal head numbers/pounds for the corresponding beef and pork segments (details were discussed in Section 4.2.1). Since USDA only had single source of costs for the corresponding beef and pork segments, the 5-year average animal head numbers/pounds from the previous section were aggregated together from the U.S. origin only and the mixed origin categories.

Based on the Tonsor, Schroeder and Parcell report, percentage change in the relevant endogenous variables of the EDM associated with the 2013 model are shown in Table 14. The aggregated 5-year average animal head numbers/pounds, as the baseline (year0, shown in Table 15), were adjusted by these percentages to estimate the corresponding number for the next 10 years.

Table 14. Percentage Change in Endogenous Variables of the EDM Associated with the 2013 mCOOL Rule

	Year1	Year2	Year3	Year4	Year5	Year6	Year7	Year8	Year9	Year10
Beef										
Feeder Cattle	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	0.00%
Slaughter Cattle	-0.02%	-0.03%	-0.03%	-0.02%	-0.02%	-0.02%	-0.02%	-0.02%	-0.01%	-0.01%
Wholesale Beef	-0.07%	-0.06%	-0.05%	-0.04%	-0.03%	-0.03%	-0.03%	-0.03%	-0.02%	-0.02%
Imported Wholesale Beef	-0.05%	-0.04%	-0.03%	-0.03%	-0.03%	-0.02%	-0.02%	-0.02%	-0.02%	-0.02%
Retail Beef	-0.10%	-0.06%	-0.05%	-0.04%	-0.03%	-0.03%	-0.02%	-0.02%	-0.02%	-0.02%
Pork										
Slaughter hogs	-0.08%	-0.08%	-0.08%	-0.07%	-0.07%	-0.07%	-0.06%	-0.06%	-0.06%	-0.06%
Wholesale Pork	-0.17%	-0.16%	-0.14%	-0.13%	-0.12%	-0.11%	-0.10%	-0.10%	-0.09%	-0.09%
Imported Wholesale Pork	-0.14%	-0.13%	-0.12%	-0.11%	-0.10%	-0.10%	-0.09%	-0.09%	-0.08%	-0.08%
Retail Pork	-0.13%	-0.10%	-0.09%	-0.08%	-0.07%	-0.06%	-0.05%	-0.05%	-0.05%	-0.04%

Data Source: Economic Impacts of 2009 and 2013 U.S. Country of Origin Labeling Rules on U.S. Beef and Pork Markets by Glynn Tonsor, Ted Schroeder, and Joe Parcell (2015).

Table 15. Aggregated 5-year Average Variables, as the baseline (Year0)

	2021-2025 5Y Average U.S.- Only Origin (Variables, in Million)	2021-2025 5Y Average Mixed Origin Animals/Products (Variables, in Million)	2021-2025 5Y Average Aggregated Total from All Origins (Variables, in Million)
Beef			
Feeder Cattle (head)	33.9	NA	33.9
Slaughter Cattle (head)	26.03	1.1	27.13
Wholesale Beef (head)	29.09	NA	29.09
Imported Wholesale Beef (head)	NA	2.79	2.79
Retail Beef (pounds)	3817.8	5726.5	9544.3
Pork			
Slaughter hogs (head)	10	9.6	19.6
Wholesale Pork (head)	60.8	NA	60.8
Imported Wholesale Pork (head)	NA	10	10
Retail Pork (pounds)	2553.5	1057.2	3610.7
Data Source: Update of Cost Assessments for Country of Origin Labeling -- Beef and Pork (2009) report, by Informa (2010). DIS Estimates			



To account for inflation over the next 10 years, USDA implementation costs were adjusted using a 2.33% 10-year breakeven inflation rate from FRED¹, relative to a 2025 baseline. For each year ($i = 1$ to 10), the annual inflation factor was calculated as $(1+0.0233)^i$.

When calculating the 5-year and 10-year cumulative mCOOL implementation costs, the total cost was segregated into one-time capital expenditures (e.g., initial equipment and software setups, etc.) and recurring variable operating expenses (e.g., labor, tracking and label media, etc.). Therefore, the capital expense only applied to the first-year implementation cost, and the variable expenses applied to all 10 years. Based on literature review, consultations with industry economists, and our professional judgment, two scenarios were developed to model the ratio of capital to variable expenses within the framework:

- Scenario1:
 - for wholesale and imported wholesale beef, capital expense is 10% of the cost, and variable expense is 90% of the cost.
 - for wholesale and imported wholesale pork, capital expense is 20% of the cost, and variable expense is 80% of the cost.
 - for retail beef and pork, the capital expense is 5% of the cost, and variable expense is 95% of the cost.
- Scenario2:
 - for wholesale and imported wholesale beef, capital expense is 15% of the cost, and variable expense is 85% of the cost.

¹ <https://fred.stlouisfed.org/series/T10YIE>

- for wholesale and imported wholesale pork, capital expense is 25% of the cost, and variable expense is 75% of the cost.
- for retail beef and pork, the capital expense is 12% of the cost, and variable expense is 88% of the cost.

Based on the USDA report, the 2013 rule focused strictly on more specific labeling requirements and stricter commingling allowances on muscle cuts. Therefore, the resulting cost increases mainly affected the processor and retail levels, and had no mCOOL implementation cost for feeder cattle, slaughter cattle and slaughter hogs.

Cumulative implementation cost estimations by scenario are shown in Table 16 and Table 17, respectively. Under scenario1 (Table 16), total costs under the 2013 mCOOL rule would be \$1.02 billion dollars to cover both beef and pork supply chains in the first year. Cumulatively, this cost would reach \$4.97 billion dollars over 5 years and \$10.45 billion dollars over 10 years. Among these costs, the beef industry made up about 70% of total costs, compared to the pork industry. Under both industries, the recurring variable expenses are the absolute driving factor. Out of the \$1.02 billion dollars in Year 1 total cost, 92% (\$0.93 billion dollars) was from variable expenses. Among all the segments, retail beef bears the most expense at \$0.05/lb implementation cost and incurred costs of \$487.85 million dollars in year 1, which are compounded to a massive \$5.17 billion dollars over 10 years.

Table 16. Cumulative Implementation mCOOL costs by Year and Beef/Pork Segment under Scenario 1

	2013 mCOOL Implementation Costs	2013 mCOOL Implementation Costs: Capital Expenses for the First Year Only	2013 mCOOL Implementation Costs: Variable Expenses for All 10 Years	Year1 on Capital Expenses (in Millions)	Year1 on Variable Expenses (in Millions)	Year1 Total Implementation Cost (in Millions)	5-Year Cumulative Implementation Cost (in Millions)	10-Year Cumulative Implementation Cost (in Millions)
Beef								
Feeder Cattle	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Slaughter Cattle	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Wholesale Beef	\$7.16/head	\$0.72	\$6.44	\$21.30	\$191.69	\$212.99	\$1,024.44	\$2,148.20
Imported Wholesale Beef	\$7.16/head	\$0.72	\$6.44	\$2.04	\$18.39	\$20.43	\$98.30	\$206.18
Retail Beef	\$0.05/lb	\$0.003	\$0.05	\$24.39	\$463.45	\$487.85	\$2,449.72	\$5,166.96
Total Beef				\$47.73	\$673.53	\$721.27	\$3,572.47	\$7,521.35
Pork								
Slaughter hogs	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Wholesale Pork	\$1.79/head	\$0.36	\$1.43	\$22.24	\$88.94	\$111.18	\$486.79	\$1,005.12
Imported Wholesale Pork	\$1.79/head	\$0.36	\$1.43	\$3.66	\$14.63	\$18.29	\$80.13	\$165.51
Retail Pork	\$0.045/lb	\$0.002	\$0.04	\$8.30	\$157.75	\$166.05	\$833.15	\$1,755.76
Total Pork				\$34.20	\$261.32	\$295.52	\$1,400.07	\$2,926.39
Total Costs				\$81.93	\$934.86	\$1,016.79	\$4,972.54	\$10,447.74

Data Source: Update of Cost Assessments for Country of Origin Labeling -- Beef and Pork (2009) report, by Informa (2010).
Economic Impacts of 2009 and 2013 U.S. Country of Origin Labeling Rules on U.S. Beef and Pork Markets by Glynn Tonsor, Ted Schroeder, and Joe Parcell (2015).
DIS Estimates



Scenario 2 introduced a higher capital expense ratio for the first year, representing a heavier upfront investment compared to scenario 1. Results are shown in Table 17. Since a larger portion of the capital expense is in the Year 1 cost, the recurring annual variable expense dropped, the long-term cumulative implementation costs were lower compared to the results from scenario 1. Though the first-year total cost remained the same as in scenario 1, \$1.02 billion dollars, the 5-year cumulative total cost decreased by \$270.46 million dollars (from \$4.97 billion to \$4.70 billion dollars), and the 10-year cumulative total cost dropped by \$644.8 million dollars (from \$10.45 billion to \$9.80 billion dollars). Regardless of these changes, retail beef still had the highest implementation cost among all the segments. Retail beef

incurred \$487.85 million dollars in the year 1 cost and compounded to \$4.82 billion dollars over 10 years.

Table 17. Cumulative Implementation mCOOL costs by Year and Beef/Pork Segment under Scenario 2

	2013 mCOOL Implementation Costs	2013 mCOOL Implementation Costs: Capital Expenses for the First Year Only	2013 mCOOL Implementation Costs: Variable Expenses for All 10 Years	Year1 on Capital Expenses (in Millions)	Year1 on Variable Expenses (in Millions)	Year1 Total Implementation Cost (in Millions)	5-Year Cumulative Implementation Cost (in Millions)	10-Year Cumulative Implementation Cost (in Millions)
Beef								
Feeder Cattle	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Slaughter Cattle	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Wholesale Beef	\$7.16/head	\$1.07	\$6.09	\$31.95	\$181.04	\$212.99	\$979.36	\$2,040.69
Imported Wholesale Beef	\$7.16/head	\$1.07	\$6.09	\$3.06	\$17.37	\$20.43	\$93.98	\$195.86
Retail Beef	\$0.05/lb	\$0.006	\$0.04	\$58.54	\$429.30	\$487.85	\$2,305.16	\$4,822.19
Total Beef				\$93.55	\$627.71	\$721.27	\$3,378.50	\$7,058.74
Pork								
Slaughter hogs	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Wholesale Pork	\$1.79/head	\$0.45	\$1.34	\$27.79	\$83.38	\$111.18	\$463.32	\$949.25
Imported Wholesale Pork	\$1.79/head	\$0.45	\$1.34	\$4.57	\$13.72	\$18.29	\$76.26	\$156.31
Retail Pork	\$0.045/lb	\$0.005	\$0.04	\$19.93	\$146.13	\$166.05	\$784.00	\$1,638.62
Total Pork				\$52.29	\$243.23	\$295.52	\$1,323.58	\$2,744.18
Total Costs				\$145.85	\$870.94	\$1,016.79	\$4,702.08	\$9,802.92

Data Source: Update of Cost Assessments for Country of Origin Labeling -- Beef and Pork (2009) report, by Informa (2010).
Economic Impacts of 2009 and 2013 U.S. Country of Origin Labeling Rules on U.S. Beef and Pork Markets by Glynn Tonsor, Ted Schroeder, and Joe Parcell (2015).
DIS Estimates



4.2.2.2 Estimated Supply Shifts

Because these higher costs applied only to specific subsets of the industry, the model adjusted for the targeted scope of the regulation using USDA benchmarks. Specifically, the cost increases were charged only against the estimated 12.5% of beef and pork products that come from commingled sources. Furthermore, the shocks were applied exclusively to the livestock segments impacted by the rule: 78.4% of commercial cattle slaughter (including steers and heifers, while exempting cows and bulls destined for ground beef) and 97% of commercial hog slaughter (including barrows and gilts).

This section demonstrates the calculation of EDM implementation costs and subsequent supply shifts under both the 2009 and 2013 mCOOL rules, updated with 2025 data. The specific data inputs utilized for these calculations are shown in Table 18. The “2008 Estimate” and “2012 Estimate” were from the 2015 USDA analysis conducted by Tonsor, Schroeder, and Parcell, and the “2025 Estimate” was from LMIC and DIS estimates.

Table 18. Price and Quantity Definitions and Estimates in 2008, 2012, and 2025

Definition	2008 Estimate	2012 Estimate	2025 Estimate
Quantity of retail beef, billion pounds (retail weight)	19.03	18.16	18.22
Quantity of wholesale beef, billion pounds (carcass weight)	26.56	25.91	26.00
Quantity of beef obtained from slaughter cattle, billion pounds (live weight)	43.88	42.81	42.66
Quantity of wholesale beef imports, billion pounds (carcass weight)	2.54	2.22	5.47
Quantity of wholesale beef exports, billion pounds (carcass weight)	2.00	2.45	2.58
Quantity of beef obtained from feeder cattle, billion pounds (live weight)	28.18	27.49	21.97
Federally inspected live weight of steer, pounds	1,285	1,305	1,435
Feeder cattle (steers) weight, pounds	838	859	955
Price of retail (Choice) beef, dollar per pound	4.33	5.02	9.38
Price of wholesale (Choice) beef, dollar per pound	1.53	1.90	5.45
Price of wholesale beef imports, dollar per pound	1.63	2.03	3.35
Price of slaughter cattle, \$/cwt (live weight)	92.78	122.86	224.06
Price of feeder cattle, \$/cwt	104.99	148.81	325.21
Quantity of retail pork, billion pounds (retail weight)	15.07	14.52	17.22
Quantity of wholesale pork, billion pounds (carcass weight)	23.35	23.25	27.58
Quantity of pork obtained from slaughter hogs, billion pounds (live weight)	31.20	31.08	37.02
Quantity of wholesale pork imports, billion pounds (carcass weight)	0.83	0.80	1.12
Quantity of wholesale pork exports, billion pounds (carcass weight)	4.65	5.38	6.97
Federally inspected live weight of barrow, pounds	268	275	289
Price of retail pork dollar per pound	2.94	3.47	4.95
Price of wholesale pork, dollar per pound	0.69	0.85	1.96
Price of wholesale pork imports, dollar per pound	0.43	0.53	1.76
Price of slaughter hogs, \$/cwt (live weight)	48.51	62.63	68.23
Quantity of retail poultry, billion pounds (retail weight)	25.84	25.87	33.72
Quantity of wholesale poultry, billion pounds (carcass weight)	47.70	47.75	62.25
Quantity of wholesale poultry exports, billion pounds (carcass weight)	6.96	7.28	6.67
Price of retail poultry, dollar per pound	1.75	1.89	2.45
Price of wholesale poultry, dollar per pound	0.80	0.94	1.45

Data Source: LMIC and Economic Impacts of 2009 and 2013 U.S. Country of Origin Labeling Rules on U.S. Beef and Pork Markets by Glynn Tonsor, Ted Schroeder, and Joe Parcell (2015).



Given this information, Table 19 and Table 20 demonstrate under 2009 and 2013 mCOOL implementation costs and the subsequent supply shifts with the corresponding data inputs, respectively. When calculated the supply shift with 2025 data inputs, the model estimated implementation costs were adjusted by corresponding inflation factors, 1.5 (calculated as 2025 CPI divided by 2009 CPI) and 1.4 (calculated as 2025 CPI divided by 2012 CPI).

The 2009 mCOOL implementation costs were from the Informa 2010 report, using 2009 mCOOL model and the estimated supply shift with 2008 and 2025 data inputs are shown in Table 19. Detailed information with 2025 data inputs are discussed individually as follows:

- *Feeder cattle, supply shift:* The value in 2025 of domestic feeder cattle was \$3,106 (955 lb steer per head; \$325.21/cwt of feeder cattle, shown in Table 18). Informa (2010) estimates a \$0.375/head (adjusted by inflation from \$0.25/head) impact for all cow-calf producers which reflects the typical producer providing affidavits conveying origin details when selling their calf crop.

- This results in an EDM shock equal to 0.012%: [$\$0.375/\3106], which means the implementation cost results in a 0.012% change in cost of producing feeder cattle.
- *Slaughter cattle, supply shift*: The value in 2025 of domestic slaughter cattle was \$3,215 (1,435 lb steer per head, \$224.06/cwt of slaughter cattle live weight, shown in Table 18). Informa (2010) estimates a \$0.375/head, adjusted by inflation, impact for feedlots sourcing U.S. origin only feeder cattle and \$1.125/head (mid-point of \$0.50-\$1.00/head reported range, then adjusted by inflation) for mixed origin sourcing. This is coupled with an estimate that 4.80% of fed cattle sold by U.S. feedlots are born in either Canada or Mexico (Informa, 2010).
 - This results in an EDM shock equal to 0.013%:
[$0.0480 * (\$1.125/\$3,215) + 0.9520 * (\$0.375/\$3,215)$], which means the implementation cost results in a 0.013% change in cost of producing slaughter cattle.
- *Wholesale beef, supply shift*: Informa (2010) estimates a \$0.375/head, adjusted by inflation, impact for beef processors sourcing only U.S. origin fed cattle and \$21.00/head (mid-point of \$10.00- \$18.00/head reported range, then adjusted by inflation) for mixed origin sourcing. Informa estimates that 30.63% of fed cattle slaughtered in the U.S. may incur the Mixed Origin label. As with the retail beef supply shift, the 30.63% reflects the industry maintaining some sourcing flexibility. That is, using a lower value such as the exact volume of foreign born animals that were processed domestically would understate impacts in implicitly assuming no cost for lost sourcing flexibility.
 - This results in an EDM shock equal to 0.208%:
[$0.3063 * (\$21.00/\$3,215) + 0.6937 * (\$0.375/\$3,215)$], which means the implementation cost results in a 0.208% change in cost of producing wholesale beef.
- *Imported wholesale beef, supply shift*: Given international trade is accounted for explicitly in the form of wholesale beef imports, the Informa (2010) estimate of \$21/head for mixed origin fed cattle sourcing is also utilized to identify the supply shift realized at this market level.
 - This results in an EDM shock equal to 0.653%: [$\$21.00/\$3,215$], which means the implementation cost results in a 0.653% change in cost of producing imported wholesale beef.
- *Retail beef, supply shift*: The retail beef price was \$9.38/lb in 2025 (shown in Table 18). Informa (2010) estimates a \$0.047/lb (adjusted by inflation) impact for U.S. origin beef products and \$0.239/lb (mid-point of \$0.148-\$0.169/lb reported range, then adjusted by inflation) for mixed origin beef products. Informa (2010) estimates that 74.68% of retail grocery store operations have responded to mCOOL by investing in the capability to handle multiple labels and maintaining flexibility in beef sourcing. Coupling this with an estimate that 46.54% of total beef sales occur through retail grocery channels (the balance is largely food service outlets) leads us to estimate 34.76% of total beef pounds may incur the higher \$0.239/lb cost impact of mCOOL implementation.

- This results in an EDM shock equal to 1.209%:

$$[(\$0.047 \times 0.652 + \$0.239 \times 0.348) / \$9.38]$$
, which means the implementation cost results in a 1.209% change in cost of producing retail beef.
- *Slaughter hogs, supply shift:* The value in 2025 of domestic slaughter hogs was \$197 (289 lb barrow per head; \$68.23/cwt of slaughter hogs live weight, shown in Table 18). Informa (2010) estimates a \$0.075/head (mid-point of \$0-\$0.10/head reported range, then adjusted by inflation) impact for hog producers not importing foreign born weaned pigs, feeder pigs, or market hogs. Informa (2010) also estimates \$0.563/hd (mid-point of \$0.25-\$0.50/head reported range, then adjusted by inflation) for mixed origin sourcing producers. Using an estimate that 9.17% of market hogs raised in the U.S. coming from mixed origin operations.
 - This results in an EDM shock equal to 0.061%:

$$[0.092 \times (\$0.563 / \$197) + 0.908 \times (\$0.075 / \$197)]$$
, which means the implementation cost results in a 0.061% change in cost of producing slaughter hogs.
- *Wholesale pork, supply shift:* The Informa (2010) report provides a detailed set of cost impacts that vary for hog packers who source market hogs not only from fully integrated and non-integrated systems but also from mixed origin and U.S. only sources. Packers sourcing solely U.S. hogs are suggested to have mCOOL costs of \$0.075/head (adjusted by inflation) while those sourcing from mixed origins incur costs of \$8.25/head (mid-point of \$5.00-\$6.00/head reported range, then adjusted by inflation). We utilized Informa's estimate that 11.01% of hogs processed in the U.S. were derived from mixed origin sources to derive a cost shock for the pork processing sector.
 - This results in an EDM shock equal to 0.495%:

$$[0.110 \times (\$8.25 / \$197) + 0.890 \times (\$0.075 / \$197)]$$
, which means the implementation cost results in a 0.495% change in cost of producing wholesale pork.
- *Imported wholesale pork, supply shift:* As with beef, international trade is accounted for explicitly in the form of wholesale pork imports. The Informa (2010) estimate of \$8.25/head for mixed origin sourcing is also utilized to identify the supply shift realized at this market level.
 - This results in an EDM shock equal to 4.186%: $[\$8.25 / \$197]$, which means the implementation cost results in a 4.186% change in cost of producing imported wholesale pork.
- *Retail pork, supply shift:* The retail pork price was \$4.95/lb in 2025. Informa (2010) estimates a \$0.00011/lb (adjusted by inflation) impact for U.S. origin only and \$0.08/lb (mid-point of \$0.045-\$0.06/lb reported range, then adjusted by inflation) for mixed origin retail pork products. Informa (2010) also estimates 50% of retail grocery operations have responded to mCOOL by investing in multiple labels and maintaining flexibility in pork sourcing. Coupling this with an estimate that 77.8% of total pork consumption occurs at home and hence corresponds with pork sales through retail grocery channels leads to an estimated 38.90% of total pork pounds incurring the higher cost impact of mCOOL implementation.

- This results in an EDM shock equal to 0.627%:

$$[(\$0.00011 \times 0.611 + \$0.08 \times 0.389) / \$4.95]$$
, which means the implementation cost results in a 0.627% change in cost of producing retail pork.

Table 19. EDM Implementation Costs and Supply Shifts for the 2009 mCOOL Rule with 2008 and 2025 Data Inputs

	2009 mCOOL Implementation Costs	2009 mCOOL Supply Shift with 2008 Data Inputs	2009 mCOOL Supply Shift with 2025 Data Inputs
Beef			
Feeder Cattle	\$0.25/head	0.033%	0.012%
Slaughter Cattle	\$0.25 - \$0.75/head	0.023%	0.013%
Wholesale Beef	\$0.25-\$14.00/head	0.374%	0.208%
Imported Wholesale Beef	\$10.00-\$18.00/head	1.174%	0.653%
Retail Beef	\$0.031-\$0.159/lb	1.746%	1.209%
Pork			
Slaughter hogs	\$0.05-\$0.375/head	0.061%	0.061%
Wholesale Pork	\$0.05-\$5.50/head	0.500%	0.495%
Imported Wholesale Pork	\$5.00-\$6.00/head	4.230%	4.186%
Retail Pork	\$0.000075-\$0.053/lb	0.704%	0.627%

Source: Update of Cost Assessments for Country of Origin Labeling -- Beef and Pork (2009) report, by Informa (2010); Economic Impacts of 2009 and 2013 U.S. Country of Origin Labeling Rules on U.S. Beef and Pork Markets by Glynn Tonsor, Ted Schroeder, and Joe Parcell (2015); DIS Estimates



The 2013 mCOOL implementation costs were from the USDA 2013 mCOOL Final Rule document, using 2013 mCOOL model and the estimated supply shift with 2012 and 2025 data inputs are shown in Table 20. Detailed information with 2025 data inputs are discussed individually as follows:

- *Feeder cattle, supply shift:* We follow USDA's assumption of no additional costs occurring at the feeder cattle level.
- *Slaughter cattle, supply shift:* We follow USDA's assumption of no additional costs occurring at the slaughter cattle level.
- *Wholesale beef, supply shift:* The value in 2025 of domestic slaughter cattle was \$3,215 (1,435 lb steer per head, \$224.06/cwt of slaughter cattle live weight, shown in Table 18). The USDA estimate of \$10.04/head (adjusted by inflation) was used along with 12.5% commingling and 78.4% of slaughtered animals being impacted.
 - This results in an EDM shock equal to 0.031%: $[\$10.04 \times 0.125 \times 0.784 / \$3,215]$, which means the implementation cost results in a 0.031% change in cost of producing wholesale beef.
- *Imported wholesale beef, supply shift:* Given international beef trade is accounted for explicitly in the form of wholesale beef imports, the USDA cost increases for processors were also used to identify cost increases at this market level. Here the commingling estimate was used but an adjustment for cull cow and bull slaughter was not needed.

- This results in an EDM shock equal to 0.039%: $[\$10.04 * 0.125 / \$3,215]$, which means the implementation cost results in a 0.039% change in cost of producing imported wholesale beef.
- *Retail beef, supply shift:* The retail beef price was \$9.38/lb in 2025 (shown in Table 18). The USDA estimate of \$0.07/lb (adjusted by inflation) impact was used along with the 12.5% commingling estimate which resulted in 78.4% of slaughtered animals being affected.
 - This results in an EDM shock equal to 0.073%: $[0.07 * 0.125 * 0.784 / \$9.38]$, which means the implementation cost results in a 0.073% change in cost of producing retail beef.
- *Slaughter hogs, supply shift:* We follow USDA's assumption of no additional costs occurring at the slaughter hog level.
- *Wholesale pork, supply shift:* The value in 2025 of domestic slaughter hogs was \$197 (289 lb barrow per head; \$68.23/cwt of slaughter hogs live weight, shown in Table 18). The USDA estimate of \$2.51/head (adjusted by inflation) was used along with 12.5% commingling and observation of 97% of slaughtered animals being impacted.
 - This results in an EDM shock equal to 0.154%: $[\$2.51 * 0.125 * 0.97 / \$197]$, which means the implementation cost results in a 0.154% change in cost of producing wholesale pork.
- *Imported wholesale pork, supply shift:* As with beef, international trade is accounted for explicitly in the form of wholesale pork imports. Similarly, the commingling assumption was used but an adjustment for sow and boar slaughter was not needed.
 - This results in an EDM shock equal to 0.159%: $[\$2.51 * 0.125 / \$197]$, which means the implementation cost results in a 0.159% change in cost of producing imported wholesale pork.
- *Retail pork, supply shift:* The retail pork price was \$4.95/lb in 2025. The USDA estimate of \$0.063/lb (adjusted by inflation) was used along with 12.5% commingling and 97% of slaughtered animals being affected.
 - This results in an EDM shock equal to 0.155%: $[\$0.063 * 0.125 * 0.97] / \$4.95]$, which means the implementation cost results in a 0.155% change in cost of producing retail pork.

Table 20. EDM Implementation Costs and Supply Shifts for the 2013 mCOOL Rule with 2012 and 2025 Data Inputs

	2013 mCOOL Implementation Costs	2013 mCOOL Supply Shift with 2012 Data Inputs	2013 mCOOL Supply Shift with 2025 Data Inputs
Beef			
Feeder Cattle	0	0.000%	0.000%
Slaughter Cattle	0	0.000%	0.000%
Wholesale Beef	\$7.16/head	0.044%	0.031%
Imported Wholesale Beef	\$7.16/head	0.056%	0.039%
Retail Beef	\$0.05/lb	0.098%	0.073%
Pork			
Slaughter hogs	0	0.000%	0.000%
Wholesale Pork	\$1.79/head	0.126%	0.154%
Imported Wholesale Pork	\$1.79/head	0.130%	0.159%
Retail Pork	\$0.045/lb	0.157%	0.155%

Source: USDA 2013 Federal Register;
Economic Impacts of 2009 and 2013 U.S. Country of Origin Labeling Rules on U.S. Beef and Pork Markets by Glynn Tonsor, Ted Schroeder, and Joe Parcell (2015);
DIS Estimates



According to the calculations from both 2009 model and 2013 model, the potential lower and upper bound of supply shift under mCOOL rules for beef and pork industry are shown in Table 21. For beef industry, the implementation of mCOOL has the biggest impact on retail beef compared to other segments of the supply chain, driving production costs upward by 0.073% to 1.209%. This finding spans all analyzed variables, from live animals to meat products, and accounts for both U.S.-only and mixed-origin categories. Imported wholesale beef followed as the next most impacted sector, posting a production cost increase between 0.039% and 0.653%. For pork industry, the implementation of mCOOL has the greatest impact on imported wholesale pork resulting in a production cost increase between 0.159% and 4.186%, followed by retail pork, driving increased production costs by 0.155% to 0.627%.

Imported beef arrives in the U.S. as billions of pounds of chilled or frozen lean trimmings from different countries. Retailers and processors blend these foreign lean trimmings with domestic fat trimmings and ground muscle cuts to create retail ground beef. Because this blending occurs at the retail and final grinding stages, retail beef faces an immense labeling and record keeping burden. Every package of high-volume retail ground beef suddenly required dynamic, multi-country origin labels (e.g., "*Product of the U.S. and Country X(s)*"). This continuous tracking at the final point of sale causes retail beef production costs to skyrocket. Conversely, imported wholesale beef, moves through the border in clean, large bulk containers destined straight for grinders. It doesn't require retail level package by package sorting or complex label changes at the wholesale level itself, keeping the percentage change in wholesale production costs relatively low compared to the retail end of the chain.

On the other hand, the pork supply chain operates in the exact opposite direction. The U.S. pork industry imports millions of live, young feeder pigs from Canada. Because mCOOL required the Canadian born pigs to be strictly tracked, separated at the packing plants, and processed on separate shifts, it

created massive operational efforts and costs. While for retail pork, the majority of pork sold at U.S. grocery stores are domestic hogs, resulting in a smaller percentage change in production cost for retail pork compared to imported wholesale pork.

If labels must track specific production stages at the wholesale and retail levels, the operational costs for processing mixed-origin meat will rise. It should be noted that this framework models the short-run cost shocks of mCOOL. As processors refine their standard operating procedures over time, learning-curve efficiencies are likely to yield slight cost reductions after the first few years.

Table 21. Potential Lower and Upper Bounds of Supply Shift under mCOOL Rule with 2025 Data Inputs

	mCOOL Supply Shift (with 2025 Data Inputs) Lower Bound	mCOOL Supply Shift (with 2025 Data Inputs) Upper Bound
Beef		
Feeder Cattle	0.000%	0.012%
Slaughter Cattle	0.000%	0.013%
Wholesale Beef	0.031%	0.208%
Imported Wholesale Beef	0.039%	0.653%
Retail Beef	0.073%	1.209%
Pork		
Slaughter hogs	0.000%	0.061%
Wholesale Pork	0.154%	0.495%
Imported Wholesale Pork	0.159%	4.186%
Retail Pork	0.155%	0.627%
Source: USDA 2013 Federal Register; Economic Impacts of 2009 and 2013 U.S. Country of Origin Labeling Rules on U.S. Beef and Pork Markets by Glynn Tonsor, Ted Schroeder, and Joe Parcell (2015); Update of Cost Assessments for Country of Origin Labeling -- Beef and Pork (2009) report, by Informa (2010); DIS Estimates The lower bound was calculated under the 2013 mCOOL model, and the upper bound was calculated under the 2009 mCOOL model.		



4.3 Ground Beef and Ground Pork

4.3.1 Ground Beef

The high market value of domestic U.S. beef drives the industry to primarily utilize domestic carcasses for premium muscle cuts. To satisfy robust consumer demand for ground beef, the industry blends high-fat domestic trimmings with lean imported beef, to achieve specific lean-to-fat ratios, which routinely results in final ground products containing a mix of multiple national origins. Requiring processors to trace and dynamically print every individual production step (birth, raising, and slaughter locations) for a rapidly blended batch of ground beef or pork was deemed logistically impossible and cost-prohibitive by the USDA. The high-lean ground beef formulations, which require a higher volume and/or a wider variety of origin inputs, are exposed to greater operational complexity and potentially higher implementation costs under mCOOL regulations due to the increased necessity of tracking and labeling multiple foreign supply chains. Note that the label had to list all countries of origin that have supplied

raw materials processed at the facility within a 60-day window. If an imported meat source was out of inventory for more than 60 days, it had to be removed from the label.

Consequently, in the 2013 mCOOL revision rule, ground products retained a flexible, multi-country category label as in the 2009 mCOOL rule (e.g., "*Product of the U.S. and Country X(s)*"), effectively exempting them from the hyper-specific identity preservation rules imposed on the rest of the commercial slaughter, and repealed by Congress in late 2015.

Ground beef is a major component of the beef retail market. In 2025, 2.88 billion pounds of fresh ground beef were sold², worth 16.4 billion dollars, which was about 50% of total U.S. fresh beef market. Among various lean-to-fat ratios, the "80-89% lean" ground beef are the most popular products, accounting for 46% of all ground beef sales by volume^{3,4}, as shown in Figure 1. Data was estimated using 2-year average of 2022 and 2023.

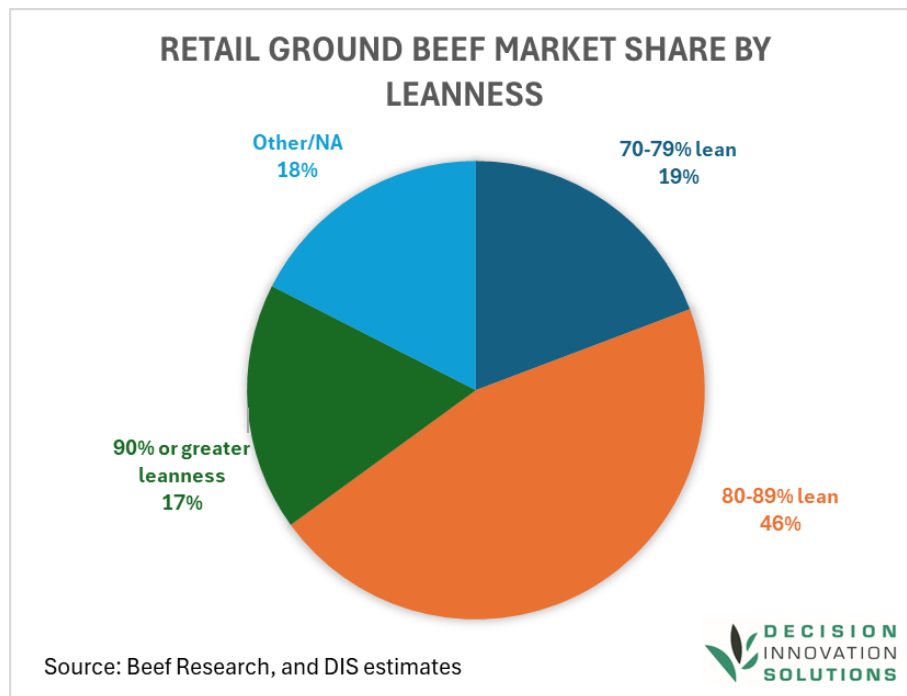


Figure 1. Retail Ground Beef Market Share by Leanness

² <https://www.beefresearch.org/resources/market-research-planning/marketplace-landing-page/beef-marketplace-update-fullyear-2025>

³ <https://www.beefresearch.org/resources/market-research-planning/white-papers/ground-beef-performance-sales-trends-by-leanness-form-and-label>

⁴ <https://www.beefitswhatsfordinner.com/retail/sales-data-shopper-insights/ground-beef-performance-sales-trends-by-leanness-form-and-primal>

The midpoint of mCOOL cost of retail beef from the Informa 2010 report under mixed origin category shown in Table 11 was \$0.159/lb, after inflation, the mCOOL cost would be \$0.239/lb. And the estimated mCOOL cost from the USDA 2013 COOL Final Rule was \$0.07/lb after inflation. Therefore, the implementation cost could range from \$202.1 million dollars to \$687.9 million dollars, using the 2025 ground beef production times the corresponding implementation costs. If the new COOL rule for ground beef requires identification of origin(s) for production stages, the implementation cost would be increased.

4.3.2 Ground Pork

Like ground beef, fresh ground pork has different fat contents. The majority of standard retail fresh ground pork contains 20% to 30% fat, typically averaging 20% to 25% fat. Other options include 15% fat content (85/15 Lean/Fat Ratio), which has emerged as the primary premium by large-scale packers, such as Smithfield, and 4% to 10% fat, as an ultra-lean option. However, unlike ground beef, which heavily relies on imported lean trimmings, ground pork is almost exclusively produced from domestic hog trimmings. This means labeling on ground beef frequently required complex mixed country origins, while ground pork rarely triggered foreign tracking.

Ground pork was held to the same regulation as ground beef, including the 60-day rule. In the 2013 mCOOL revision rule, ground products retained a flexible, multi-country category label as in the 2009 mCOOL rule (e.g., "*Product of the U.S. and Country X*") but was later repealed by Congress in late 2015.

U.S. commercial pork production in 2025 was 27.6 billion pounds, 15.8% of that was ground pork⁵. Assume 40% of the total ground pork goes to retail channels, and 12.5% of the total ground pork was fresh plain ground pork, then the total retail ground pork in 2025 was about 217.9 million pounds, which was around 8% of U.S. pork production. Apply the mCOOL costs with inflation (\$0.00011/lb (U.S. origin) and \$0.08/lb (mixed origins) from the 2010 Informa report, and \$0.063/lb from the USDA 2013 COOL Final Rule report), to the estimated retail ground pork supply, the implementation cost could range from \$24,500 to \$17.3 million dollars. Again, if the new COOL rule for ground pork requires identification of origin(s) for production stages, the implementation cost would likely be higher.

5 Suggestions for Further Research

A primary limitation of this study is its reliance on a short-run analytical horizon, which inherently captures peak, immediate compliance shocks. Future research should transition this framework into a long-run equilibrium analysis to evaluate how the meat-livestock industry adapts over time. Over a multi-year trajectory, supply chain operators typically mitigate initial shocks by establishing dedicated segregation infrastructure, restructuring sourcing networks, and adjusting long-term breeding herd investments. A long-run model would capture these structural shifts, revealing the extent to which

⁵ Kansas State University, Research and Extension, Pork Processing Options for Consumers.
https://bookstore.ksre.ksu.edu/pubs/pork-processing-options-for-consumers_MF3396.pdf

learning-curve efficiencies and automated standard operating procedures soften the economic burden over time.

Furthermore, because the underlying structural models and cost estimates are derived from two historical papers, one published in 2010 and the other in 2015, the parameters do not fully reflect contemporary macroeconomic realities. Significant shifts in inflation, labor costs, energy prices, and processing technologies over the past decade suggest that the original regulatory implementation cost estimates are likely outdated. Future studies should prioritize updating these baseline cost parameters with modern primary data to ensure the model accurately captures the present-day cost structure of slaughter and retail operations. Given the significant advancements made with today's technology, integrating a tech-adoption variable into the EDM would be appropriate to test whether modern supply chain tools, such as blockchain ledgers, automated RFID tags, and digital tracking systems, could lower product segregation costs relative to the manual frameworks used in the past.

Finally, because this report simulates the economic outcomes of a hypothetical mCOOL reinstatement based on past frameworks, the analysis must be continuously updated as actual policy develops. If federal authorities codify a new set of rules, the existing models should be re-evaluated to match the exact regulatory text.

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7 Appendix. Literature Review

7.1 Beef and Pork

Despite extensive literature on COOL and mCOOL that has expanded over the last two decades as regulations have changed, estimated supply chain and economic impacts of such policy have similarly changed following substantial changes in domestic livestock inventories and economic conditions. The 2009 regulation pertained to muscle cuts of beef (including veal), ground beef, pork, and ground pork, as well as other meat commodities such as lamb, chicken, goat, ground lamb, ground goat, and other non-meat covered commodities. Several prominent studies have examined estimated costs of mCOOL specific to the beef and pork industries.

Compliance costs vary dramatically depending on whether the supply chain handles U.S. only or mixed origin beef and pork (Informa Economics, 2010). In 2003, total supply chain estimated costs were \$1.57 to \$1.72 billion (\$46.6 to \$51.6 per head). In 2009, total supply chain estimated costs declined to \$1.06 to \$1.26 billion with U.S. only origin per head costs estimated at \$1.50 and mixed origin per head estimated costs ranging from \$45.5 to \$59. Costs for mixed origin animals and products are substantially higher with the costs to packer/processor and retail distribution/sales carrying the most substantial portion of the cost burden.

The complexities of tracking beef cattle, both domestic and imported, arise from comingling, ownership transfers, and diverse production systems (Peel, 2003). Mandatory COOL created substantial compliance and segregation costs that significantly altered beef and pork supply chains (Informa Economics, 2010). Imported livestock bore disproportionate economic impact relative U.S. only origin livestock. The updated 2013 ruling strengthened the rule for more detailed labeling by production steps for muscle cut labels such as: Born, raised, and slaughtered in the United States; Imported and processed in the United States; and derived from multiple countries.

Implementation and compliance costs of mCOOL in the pork industry are lower relative to the beef industry. An analysis on the implementation of mCOOL in the pork industry authored by Meyer, S. (2008) notes trade distortion as a primary concern of mCOOL emphasizing the importance of free and open trade to the pork industry that has become increasingly more dependent on exports. The study indicates that despite lower compliance costs relative to other livestock industries, the reduction of Canadian pork imports generates uncertainty of shifts in North American supply chains where displaced

Canadian pork output with either compete with U.S. pork products and export markets while production in the U.S. depends on consumer responses to mCOOL labeling. With pork production becoming increasingly vertically integrated over time, these structural changes improved efficiency, but more costly and complex to implement COOL rules (Tonsor et al., 2015).

These production systems have a significant impact on the overall cost estimates of COOL. Relative to the beef industry, comingling of pigs is not as prevalent contributing to lower implementation and compliance costs (Meyer, 2008). In 2003, U.S. hog and pork chain cost estimates were \$514 to \$805 million (\$3.25 to \$10.25 per head) including integrated and non-integrated systems (Informa Economics, 2010). Cost estimates in 2009 ranged from \$167.5 to \$228 million, with mixed origin realizing the highest total supply chain costs ranging from an estimated \$152.5 to \$197 million. Informa Economics (2010) makes a similar conclusion for the pork supply chain as deduced with the beef supply chain that much of the estimated costs falls on packer/processors and retail distribution and sales.

Literature examining the overall impact on the pork industry also emphasizes the proportional impact of mCOOL regulations. Meyer (2008) notes the large majority of pork carcass that is cured, smoked, or characteristically altered that exempts the product from mCOOL. Further, even as a small proportion of pork products fall under mCOOL regulations, the cost impact of record-keeping and tracking are imposed on all animals.

7.2 Processors and Retailers

Plants processing and handling mixed origin livestock face operational costs and complexities that involve segregation, potential new equipment, changes to processing lines, and inventory management based on the 2013 rule that eliminated commingling flexibility. Informa Economics (2010) indicates that at the packer/processor level is when COOL costs start to have more of a burdensome and differential cost impact. For U.S. only origin packer/processing facilities, record keeping and box labeling would be the primary costs. For packers/processors with operations with mixed origin have substantially higher costs associated with potential segregation of foreign and U.S. livestock or shift operations to designate certain days or shifts to handle foreign and U.S. livestock. Incurred costs for mixed origin plants are also generated from labeling. Segregation and labeling costs for plants handling mixed origin livestock are likely so steep that it discourages plants from engaging (Informa Economics, 2010).

The law defines “retailer” as “any person subject to be licensed as a retailer under the Perishable Agricultural Act of 1930.” Distributors and retailers face the highest costs associated with identification, labeling, and tracking of product through the distribution and retail channel. Peel (2003) estimated these costs around \$23 per head, however; the updated analysis by Informa Economics (2010) estimates costs between \$35 to \$40 per head at the distribution/retail level. Retailers are responsible for ensuring the accuracy of the product level and driving up costs. Further, this additional cost burden pushing retailers to sell only U.S. origin product (Informa Economics, 2010). Additionally, the study by Informa Economics (2010) concludes that retailers, if they elect to handle both U.S. only and mixed origin products must make full scale changes to add packaging labels as required under mCOOL (Informa

Economics, 2010). In summary, the “greatest cost burden to the US beef supply for labeling flexibility occurs at the retail distribution and retail store level” (Informa Economics, 2010).

7.3 Consumers

Tonsor et al. (2015) concluded that although consumers have an interest in the transparency offered by COOL, there are minimal measurable economic benefits. Additionally, even if consumers were provided with label information, there’s “little evidence that consumers would be likely to increase their purchases of food items bearing U.S. origin labels.” (Tonsor et al., 2015) Similarly, there is little to no evidence suggesting that COOL would result in a meaningful increase in consumer demand for beef or pork. Consequently, research pertaining to consumers and COOL conclude that despite consumer interest in information provided by COOL, the regulatory impacts may not translate into a substantial economic impact.

The existing literature acknowledges the costs associated with food labeling with acknowledging a consumer’s right to know. Costs accrue throughout the entire supply chain, often trickling down to consumers in the form of higher taxes and higher food price for consumers (Tonsor et al., 2015).

Collectively, the findings highlight the substantial costs to the beef and pork supply chains largely realized by processors and retailers. While these findings should be interpreted with respect to the time period in which they were published and do not account for the significant changes that have occurred in the beef and pork industries relevant to inventories and prices, the findings suggest impacts to producers, processors and retailers, while a lack of evidence supports the idea of mCOOL translating into increased beef or pork demand from consumers.