

Disease, Trade Disruption, and Provincial Transportation Regulations: Welfare Effects on Ontario's Beef Sector



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Ontario's Beef Sector

- The largest beef processing hub outside Western Canada in 2024 (Statistics Canada, 2025; AAFC, 2025).
- Relies on interprovincial inflows of live cattle and beef from Western Canada and on the U.S. market.
- Three potential shocks:
 - Foot-and-mouth disease (FMD) outbreak in Western Canada (zoning recognized): Western inflows suspended; Ontario remains disease-free, exports continue.
 - U.S. import ban on Ontario-origin live cattle and beef: Exports to the U.S. drop to zero.
 - Removing regulations (Ontario's Safe, Productive and Infrastructure-Friendly (SPIF) standards and mandatory speed limiter): Reduces interprovincial trade frictions.

Research Question

- Which shock generates the largest welfare impact after market adjustment: (i) an FMD outbreak in Western Canada with zoning recognized, (ii) a U.S. import ban on Ontario's live cattle and beef, or (iii) removing Ontario's transportation regulations (SPIF and the speed limiter)?

Data

- Datasets: (i) model calibration using quarterly data (2009–2024), and (ii) transportation regulation quantification using quarterly data (2000–2024).
- Core variables include prices (cattle/wholesale/retail), quantities (production, slaughter, inventories), and trade flows (inter-provincial and international trade). Policy dummies include SPIF and the speed limiter, used to quantify internal trade frictions.
- Source: Statistics Canada and Agriculture and Agri-Food Canada, supplemented with industry sources (e.g., CanFax and BFO).

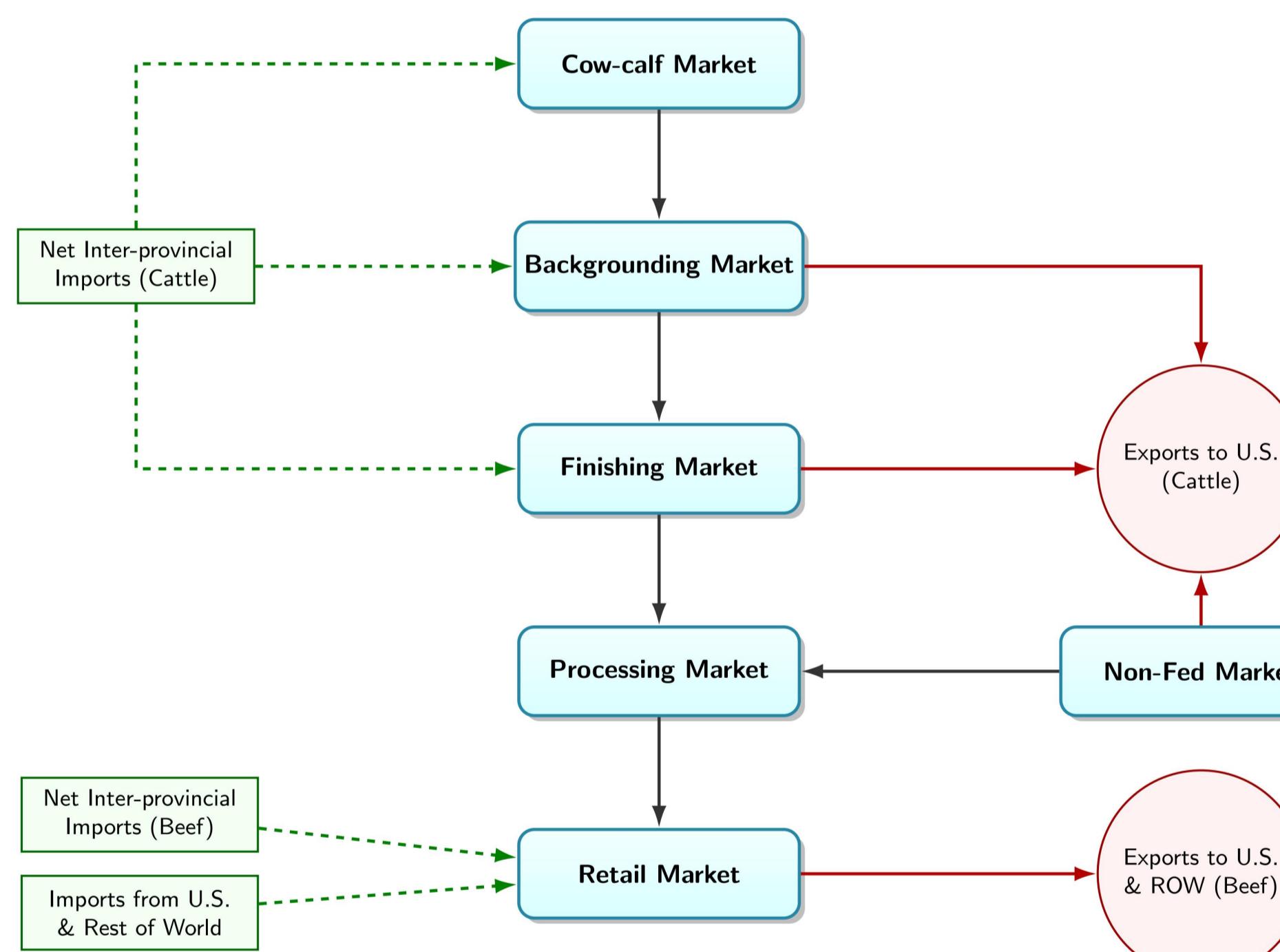
What: Compare welfare impacts of an FMD outbreak with zoning, U.S. import ban, and removing Ontario transportation regulations.

How: Cairns et al. (2017) partial equilibrium model + ARDL; one-year short-run simulations.

Key finding: FMD causes the largest welfare loss (-1.73%), then U.S. import ban (-1.40%); deregulation is small in aggregate (-0.05%)

Methods

Figure 1: Model Structure of the Ontario Beef Supply Chain



Source: Author's illustration based on Cairns et al. (2017)

Note: Blue rounded boxes denote markets in Ontario's supply chain; green dashed boxes indicate imports; red circles represent exports. Black arrows indicate internal supply chain flows; green dashed arrows indicate imports; red arrows indicate exports (outflows). Backgrounding market receives additional supply from the dairy sector. Inter-provincial net-imports are shown as net inflows.

- Estimate the effect of transportation regulations on Ontario's interprovincial net imports of live cattle and beef using autoregressive distributed lag (ARDL) models.
- Recalibrate and extend the partial equilibrium model developed by Cairns et al. (2017) to simulate one-year short-run counterfactual scenarios.
- Simulations: (i) FMD, (ii) Import ban, (iii) deregulation.
- Total welfare equals the sum of consumer and producer surplus across the supply chain (welfare effect = counterfactual – baseline).

Results

Table 1: Comparison of Welfare Effects across All Scenarios

Market	Base (\$M)	Disease		U.S. Import Ban		Deregulation	
		Value	(%)	Value	(%)	Value	(%)
<i>Cow-Calf Market</i>							
Consumer	278.95	267.55	(-4.09%)	280.35	(0.50%)	283.79	(1.74%)
Producer	165.22	180.50	(9.25%)	162.63	(-1.57%)	155.99	(-5.59%)
Subtotal	444.17	448.05	(0.87%)	442.98	(-0.27%)	439.78	(-0.99%)
<i>Backgrounding Market</i>							
Consumer	296.52	160.97	(-45.71%)	297.20	(0.23%)	298.46	(0.65%)
Producer	26.33	29.92	(13.63%)	25.04	(-4.90%)	18.79	(-28.64%)
Subtotal	322.85	190.89	(-40.87%)	322.24	(-0.19%)	317.25	(-1.73%)
<i>Finishing Market</i>							
Consumer	115.05	104.66	(-9.03%)	115.93	(0.76%)	115.26	(0.18%)
Producer	54.00	53.89	(-0.20%)	41.93	(-22.35%)	51.54	(-4.56%)
Subtotal	169.05	158.55	(-6.21%)	157.86	(-6.62%)	166.80	(-1.33%)
<i>Non-Fed Cattle Market</i>							
Consumer	24.79	24.79	(0.00%)	24.90	(0.44%)	24.79	(0.00%)
Producer	7.64	7.64	(0.00%)	5.05	(-33.90%)	7.64	(0.00%)
Subtotal	32.43	32.43	(0.00%)	29.95	(-7.65%)	32.43	(0.00%)
<i>Processed Beef Market</i>							
Consumer	21518.84	21518.84	(0.00%)	21518.84	(0.00%)	21518.84	(0.00%)
Producer	4494.72	4167.40	(-7.28%)	4132.19	(-8.07%)	4494.72	(0.00%)
Subtotal	26013.56	25686.24	(-1.26%)	25651.03	(-1.39%)	26013.56	(0.00%)
Total Surplus	26982.06	26516.16	(-1.73%)	26604.06	(-1.40%)	26969.82	(-0.05%)

Notes: Values are in millions of dollars (\$M). Percentage changes from base values are shown in parentheses. The transportation regulation scenario models the removal of SPIF and speed limiter constraints.

- Total surplus changes by -1.73% (disease), -1.40% (import ban), and -0.05% (deregulation). Aggregate effects are driven mainly by the processed beef market, while backgrounding market bears the largest relative losses (FMD: -40.87% subtotal; deregulation: -28.64% producer surplus).

Conclusion & Implications

- The model indicates that Ontario's beef sector is more vulnerable to disease outbreaks than to drastic changes in U.S. trade policy.
- Deregulation removes implicit protection and exposes Ontario producers to stronger competition from Western Canada.
- Policymakers should prioritize disease preparedness to minimize losses. Transportation regulatory reform should address distributional impacts and include targeted support where needed.

References

- Statistics Canada. Table 32-10-0046-01 farm cash receipts, quarterly (x1,000).
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- Alexander Cairns, Tor Tolhurst, Kenneth Poon, Alan P. Ker, Stephen Duff, David Jacques, and Lin Yang. The economic impact of a foot-and-mouth disease outbreak for Ontario's beef sector. Canadian Journal of Agricultural Economics/Revue canadienne d'agroéconomie, 65(1):159–183, 2017.