

Animal Identification Systems: Overview & Global Economics Discussion

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Guest Lecture – ASI 650

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What is meat/animal identification/traceability?

- “Recordkeeping systems designed to track the flow of product or product attributes through the production process or supply chain.” (USDA, Golan et al.)



Breadth, depth, precision mix

- Breadth: quantity of information maintained at each stage
 - E.g., farm of origin, feed used, age
- Depth: distance of traceability forwards and/or backwards in supply chain
 - E.g., can meat be traced from retail shelf to farm of origin or only to processor?
- Precision: extent to which product flow can be isolated
 - E.g., accuracy, level of detail in the system
- Unique breadth, depth, precision mix is economically chosen to most confidently provide desired tracing capabilities at the lowest feasible expenditure (Tonsor and Schroeder, 2006)



Situation as of 10/3/2013

- USDA's Final Rule (Dec. 20, 2012):
 - Does NOT contain:
 - Premises registration
 - Mandatory electronic identification
 - Centralized databases
 - Reporting of market animal movements
 - Reporting of any in-state movements
 - Any new requirements for pig, sheep, & goat owners



Situation as of 10/3/2013

- USDA's Final Rule (Dec. 20, 2012):
 - Does contain:
 - Requiring low-tech form of identification
 - Brands, tattoos, and breed registry certificates are official if shipping & receiving states agree
 - Some form of documenting when cattle 18 months or older, dairy cattle, or show cattle cross state lines
 - “Feeder cattle, beef cattle younger than 18 months of age, will be addressed in a separate rulemaking.”



Traceability: Economic incentives

- Economic incentives:
 - Animal health (proactive and reactive)
 - Food safety concerns
 - Foreign and domestic consumers
 - Credence attribute verification
 - Organic, V-COOL, Natural, Age, GM-free,...
 - Legal/reg. compliance (e.g. MCOOL)
 - Improving management
 - On-farm AND throughout supply chain
 - Competition implications across species
 - Bioterrorism risk control
 - Properly assign liability



Traceability: Economic incentives

- Countries, industries, firms WITH traceability:
 - May access new or sustain existing markets
 - Can protect brand valuation/differentiation
 - Can assist in reducing non-tariff trade barrier issues
 - May also help with regionalization efforts
- Countries, industries, firms WITHOUT traceability:
 - Risk falling behind on all fronts
 - Less Information =
Reduced Likelihood of Optimal Decision Making

“EVERYTHING IS RELATIVE”



Traceability: National vs Private

- National/Governmental Incentives
 - Public Good Points:
 - Animal Health
 - Bioterrorism
 - Overall Food Safety
- Private Incentives
 - Enter/sustain niche/valuable markets
 - Verify credence attributes
 - Improve management
 - Properly assign liability
 - improve overall quality/producer behavior



Economics of Evolving Red Meat Export Market Access Requirements for Traceability of Livestock and Meat

Research Team:

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USMEF Project Coordinators:

**Paul Clayton
Erin Daley Borrer**



Quick Background & Motivation

- 1. United States has struggled implementing national animal identification and traceability programs**
- 2. Current and future importance of international trade to U.S. livestock industries is growing**
- 3. Yet, the global meat marketplace is rapidly changing access involves growing protocols including traceability**
- 4. Net economic impacts of varied requirements and the U.S. (in)ability to meet them are unknown...**



Main Purpose/Objective

Determine economic impacts on U.S. livestock and meat producers and consumers resulting from potential import requirements for meat traceability.



Total DIRECT costs to beef and dairy sectors...

Summary of Cattle Industry Costs Under 100% SAV Enrollment

	Beef Cow/Calf	Dairy	Background	Feedlot	Packers	Industry Total
% of Animals	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Number of Operations	753,000	65,000	50,870	82,170	307	950,000
Average Inventory	31,762,567	9,201,000	17,229,903	26,395,876	34,282,502	96,740,733
Total Annual Cost, \$	\$206,302,530	\$29,743,019	\$38,581,435	\$69,356,937	\$6,665,337	\$350,649,257
Cost Per Animal in Inv.	\$6.50	\$3.23	\$2.24	\$2.63	\$0.19	\$3.62
Cost Per Animal Markete	\$7.66	\$5.93	\$2.27	\$2.66	\$0.19	\$10.23
Total Cost Per Operation	\$274	\$458	\$758	\$844	\$21,725	\$369

58.8%

8.5%

1.0%

19.8%

1.9%

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	58.8%	8.5%	1.0%	19.8%	1.9%	

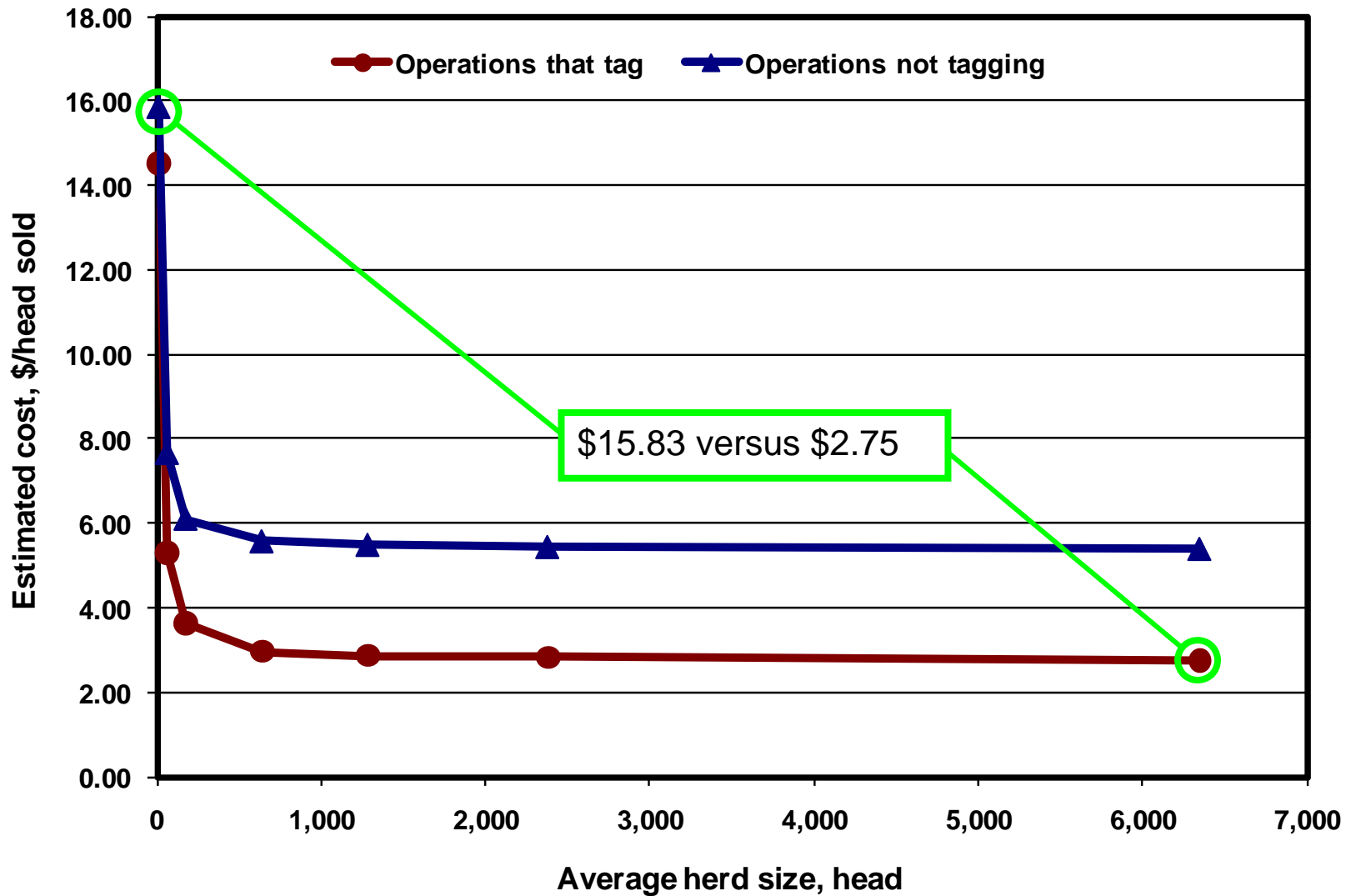
Breakdown of Cattle Industry Costs Under 100% SAV Enrollment

Breakdown of Costs (%)

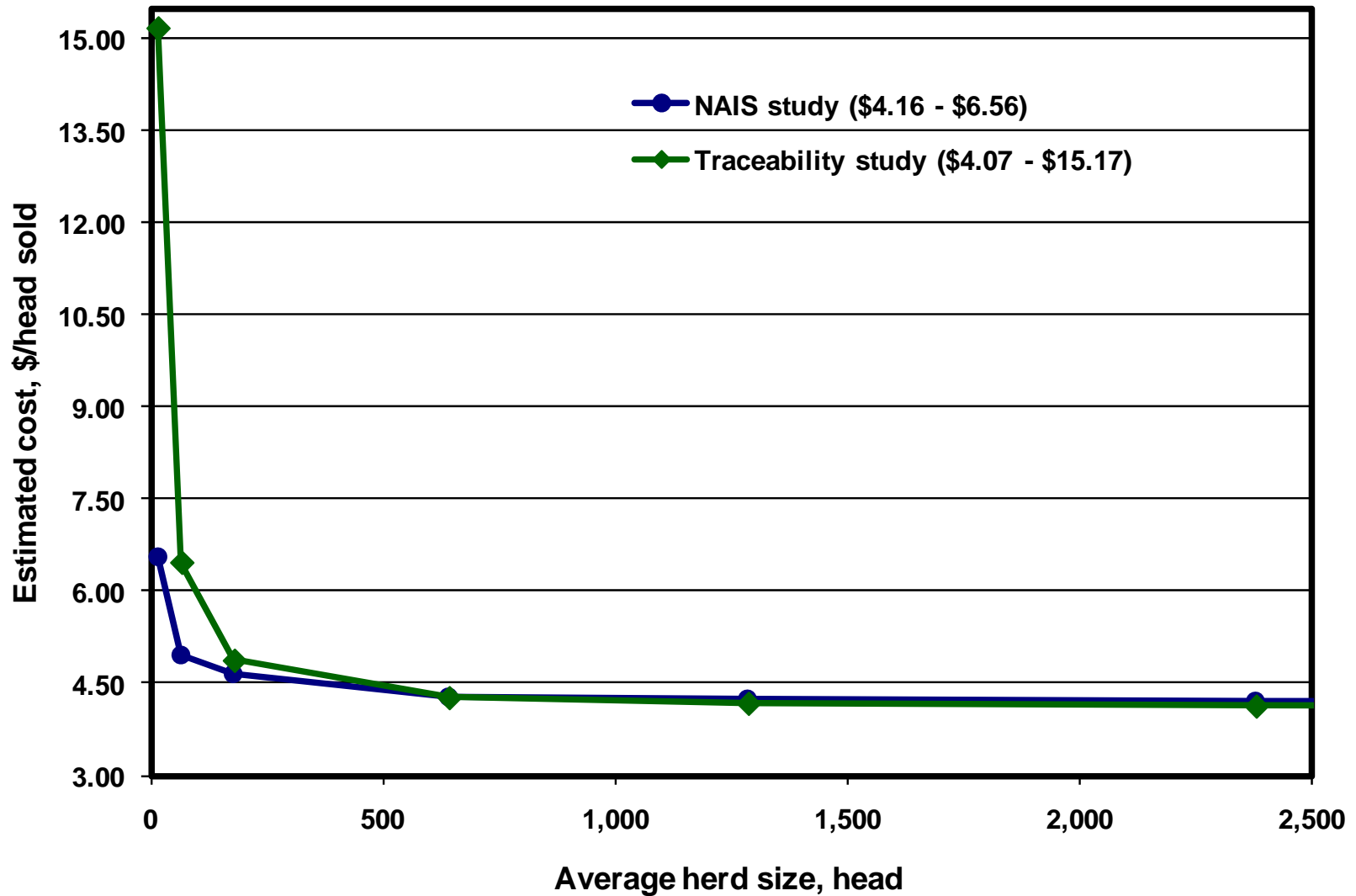
Tags and Tagging Cost	51.2%	65.2%	9.3%	6.8%	0.0%	38.0%
RFID Tag	29.2%	50.7%	2.4%	1.8%		22.1%
Applicator	2.6%	3.4%	3.1%	1.7%		2.5%
Labor	1.5%	3.0%	1.6%	1.4%		1.6%
Chute	13.7%	7.0%	1.1%	0.9%		9.0%
Shrink	3.5%	0.5%	0.7%	0.7%		2.3%
Injury	0.8%	0.7%	0.3%	0.2%		0.6%
Reading Costs	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RFID Capital	0.0%	0.0%	0.0%	0.0%		
Labor/Chute	0.0%	0.0%	0.0%	0.0%		
Shrink/Injury	0.0%	0.0%	0.0%	0.0%		
Premise Registration	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Traceability (SAV)	48.8%	34.8%	90.7%	93.2%	100.0%	62.0%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%



DIRECT cost versus size of operation for beef cow-calf...



DIRECT cost vs. size of operation for beef cow-calf*...



* Similar patterns for dairy, backgrounding, feedlots, and packers



Total DIRECT costs to beef and dairy sectors...

Total Cattle Industry Cost versus Adoption Rate Under Alternative Scenarios

Industry Sector	NAIS Study					
	Full Traceability		Book End		Full Traceability	
	Total	\$/head ¹	Total	\$/head ¹	Total	\$/head ¹
Beef cow-calf	\$206,302,530	\$7.66	\$129,792,734	\$4.56	\$139,764,146	\$4.91
Dairy	\$29,743,019	\$5.93	\$22,601,817	\$4.46	\$31,437,688	\$6.21
Background	\$38,581,435	\$2.27	\$3,958,165	\$0.23	\$12,072,978	\$0.71
Feedlot	\$69,356,937	\$2.66	\$5,442,789	\$0.20	\$13,562,885	\$0.51
Auction yards	\$0	\$0.00	\$0	\$0.00	\$8,765,395	\$0.23
Packers	\$6,665,337	\$0.19	\$3,467,081	\$0.10	\$3,467,081	\$0.10
TOTAL COST	\$350,649,257	\$10.23	\$165,262,586	\$4.72	\$209,070,173	\$5.97

Adoption rate	Full Traceability		Book End		Full Traceability	
	Total	\$/head ¹	Total	\$/head ¹	Total	\$/head ¹
10%	\$11,308,505	\$0.33	\$11,042,459	\$0.32	\$13,269,613	\$0.38
20%	\$24,305,215	\$0.71	\$23,173,569	\$0.66	\$28,030,002	\$0.80
30%	\$37,706,538	\$1.10	\$35,408,252	\$1.01	\$43,179,355	\$1.23
40%	\$52,338,547	\$1.53	\$47,857,435	\$1.37	\$58,940,210	\$1.68
50%	\$70,909,453	\$2.07	\$61,313,638	\$1.75	\$76,084,734	\$2.17
60%	\$92,521,823	\$2.70	\$79,128,199	\$2.26	\$98,847,876	\$2.82
70%	\$117,565,348	\$3.43	\$98,289,501	\$2.81	\$122,563,473	\$3.50
80%	\$161,676,020	\$4.72	\$118,145,015	\$3.37	\$147,191,641	\$4.20
90%	\$235,413,816	\$6.87	\$140,285,046	\$4.01	\$175,868,526	\$5.02
100%	\$350,649,257	\$10.23	\$165,262,586	\$4.72	\$209,070,173	\$5.97

¹ Per head marketed annually



Summary...

- Economies of size exist, but most of the benefit is captured relatively quick
- Costs considerably higher for small operations compared to NAIS study
(due to private party providing verification)
- Beef have considerably higher costs than hogs (due to individual RFID tag)

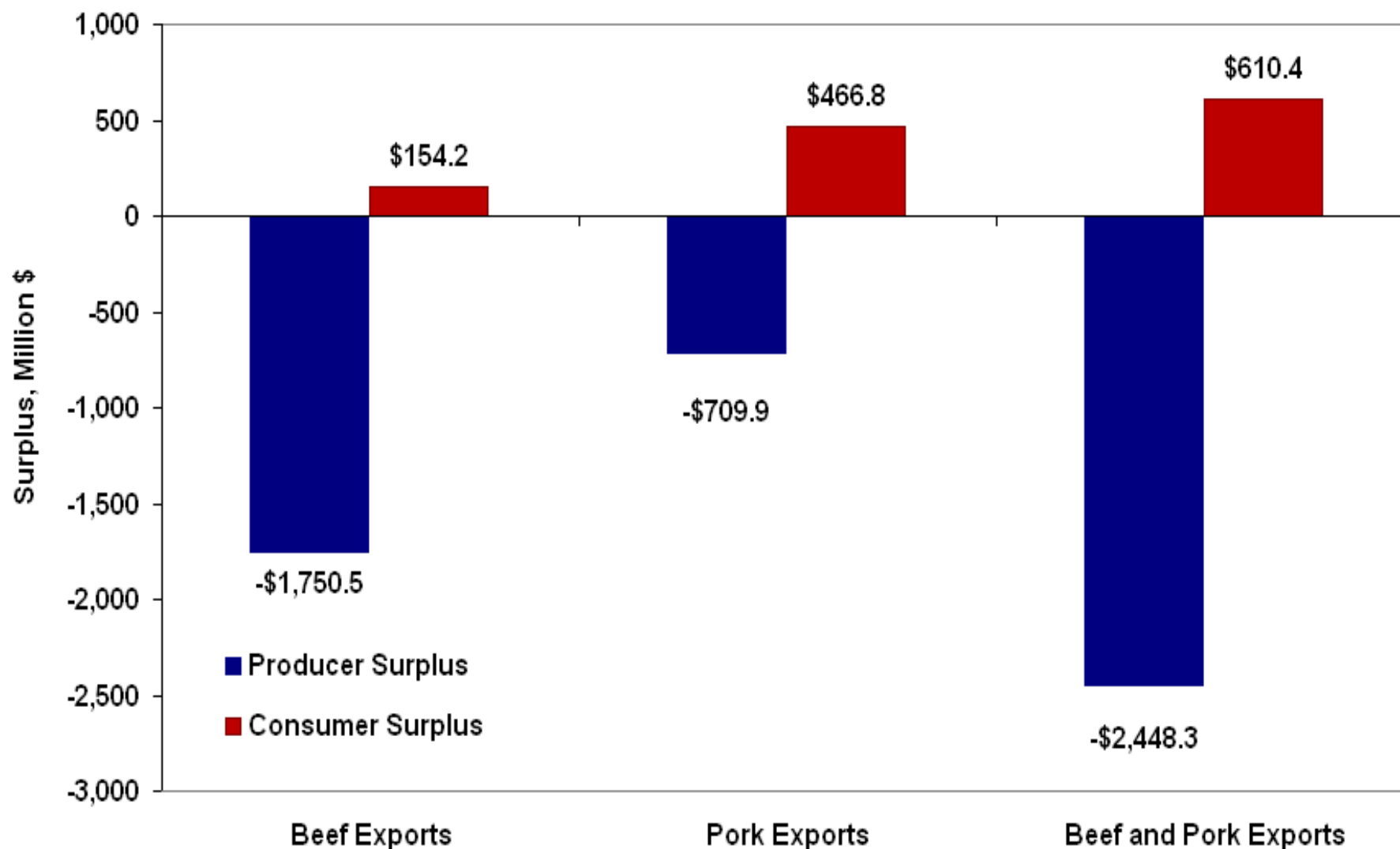


“What If” Scenarios

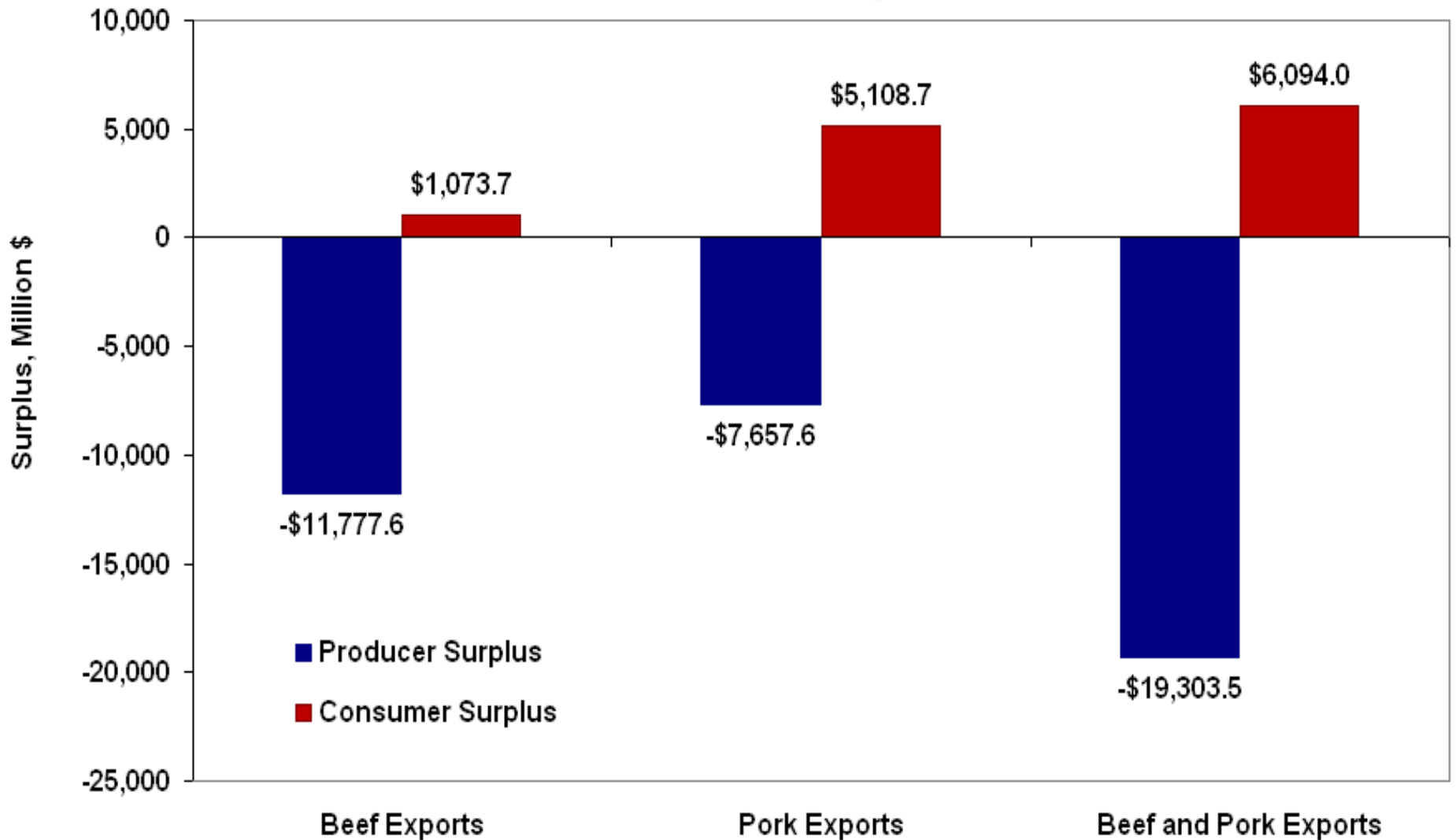
1. Loss of export beef and pork if traceability is not implemented
2. Increases in export beef and pork demand needed to offset increases in traceability costs
3. Effects of increased traceability costs without export expansion



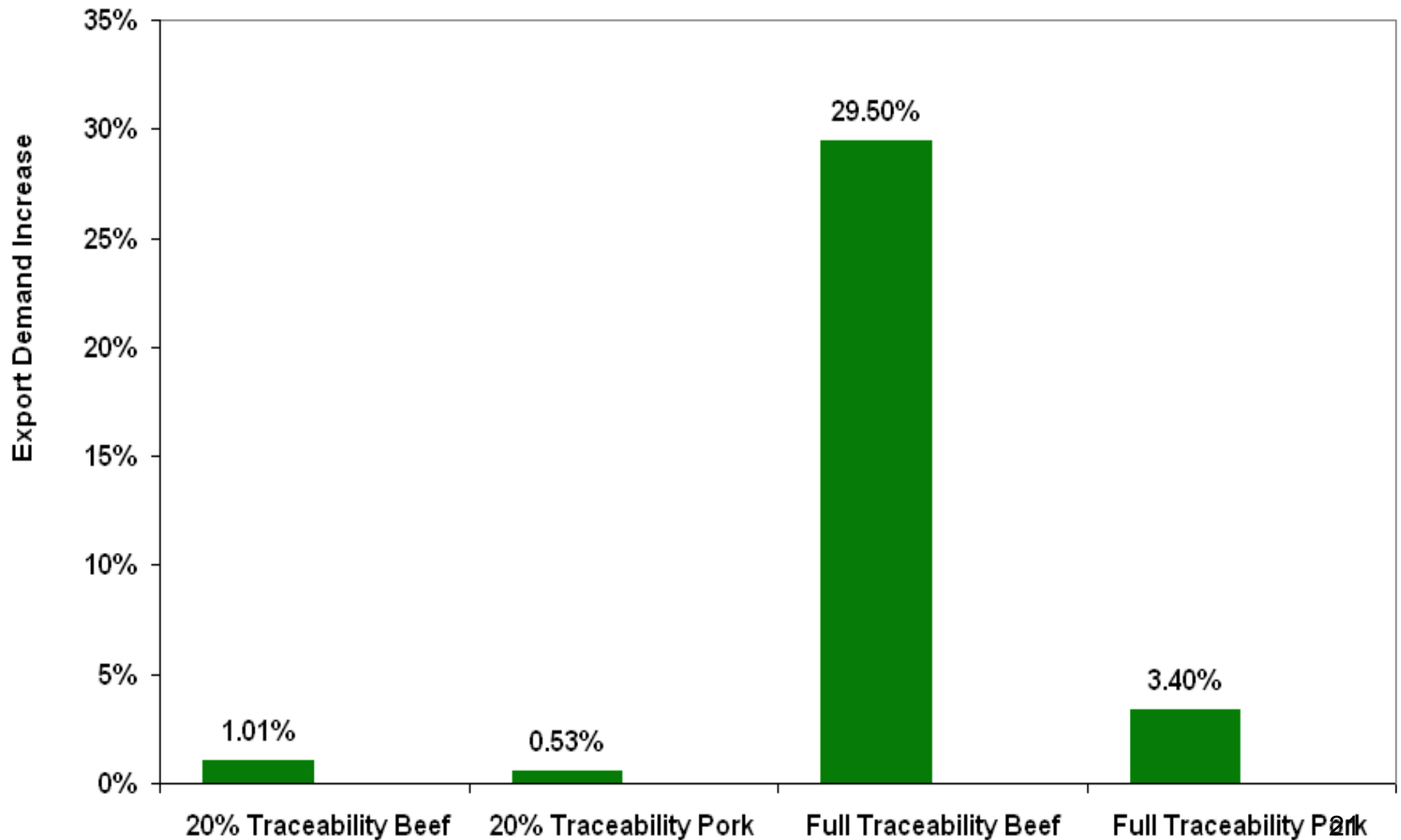
Cumulative present value of 10-year total producer and consumer surplus changes, with varying export market losses to South Korea



Cumulative present value of 10-year total producer and consumer surplus changes, with varying export market losses to all non-North American export markets



Change in domestic beef demand needed so that wholesale beef, slaughter cattle, and feeder cattle sectors do not lose any cumulative present value 10-year surplus from achieving varying levels of traceability





Contents lists available at SciVerse ScienceDirect

Food Policy

journal homepage: www.elsevier.com/locate/foodpol



International cattle ID and traceability: Competitive implications for the US

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A B S T R A C T

Global standards for animal identification and traceability are evolving rapidly. Major world animal health, trade, and food safety organizations have formally recognized the importance of, and actively promoted, animal identification and traceability system development. Advanced animal traceability systems have been deployed by major beef exporters and are increasingly being adopted by important beef importing countries. This study summarizes and compares animal identification systems across major export and import countries. Results reveal that the United States lags behind both major export and import countries in development and adoption of cattle identification and tracing systems. As such, the United States has placed itself in a vulnerable position relative to competing export countries with respect to demonstrated animal traceability. This status could adversely affect market access in the future for US beef exports.

Cow-Calf Producer Preferences for **Voluntary Traceability Systems**

Glynn Tonsor

Dept. of Agricultural Economics
Kansas State University

Presentation recorded on July 8, 2010 for [AgManager](#) posting



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Introduction/Problem Statement

- Multiple attempts at implementing nationwide animal traceability systems.
 - NAIS deadlines elapsed with participation rates below expectation; NAIS funding now \$0
 - “new, flexible framework” being developed (Feb 2010)
- Key unanswered issue: *How should traceability systems be designed and promoted to obtain voluntary producer participation?*



Objective

(w/ Lee Schulz, ISU)

- Determine what preferences cow-calf producers have for voluntary traceability systems and their attributes.
- Determine...
 1. Expected participation rates for alternative systems,
 2. Sensitivity to \$/head premiums/discounts,
 3. Sensitivity to the entity in charge of data maintenance,
 4. Additional information affect on participation rate,
 5. Welfare effects of mandatory traceability,



Research Design/Data Used

- Nov. 2007 mail survey to 2,000 U.S. cow-calf producers
 - 609 useable responses (30.5% effective response)
- Conducted choice experiments
 - Simulated choices among alternative traceability system options



Results: 3 Producer Segments

- “Premises Registered” – 47%
 - Prefer *Advanced Traceability* to *NAIS*
- “Premises Not Registered” – 22%
 - Prefer *No Traceability*
- “Auction Users” – 31%
 - Strongly against *Advanced Traceability*



Results: Welfare Effects (\$/head) of Policy Adjustments

	Class 1 "Premises Registered" (47%)	Class 2 "Premises Not Registered" (22%)	Class 3 "Auction Users" (31%)
Removal of No Traceability	-\$2.32 [-\$2.34, -\$2.30]	-\$89.89 [-\$93.46, -\$86.66]	-\$0.76 [-\$0.77, -\$0.75]
Mandatory NAIS Traceability	-\$19.10 [-\$19.29, -\$18.91]	-\$118.82 [-\$123.98, -\$114.19]	-\$0.76 [-\$0.77, -\$0.75]



Conclusions

- Heterogeneity does exist between cow-calf producers and their preferences for traceability systems and system attributes.
- Removal of traceability options contributes negatively to the economic welfare of producers – Assumes no \$/head market adjustments...
- Bottom line: participation will likely be slow under all voluntary traceability systems and current livestock market situations ...



Suggestions for U.S.

- Broad U.S. Beef Industry:
 - Int'l meat market changes
 - Keep up or get out
 - Cost/benefit analysis
 - Australia benefiting from our absence
 - Domestic issues
 - Keep up with poultry/pork or lose demand
 - Quality/consistency issues must be addressed
 - Address consumer food safety concerns



Suggestions for U.S.

- Broad U.S. Beef Industry:
 - Recognize distinction between aggregate welfare & individual producer preferences
 - +/- 1% increase in domestic demand or maintaining South Korea may cover national system costs IN AGGREGATE
 - Several producers are opposed so voluntary participation will never be absolute...



Suggestions for U.S.

- Glass half-full not half-empty
 - See benefits and not just the costs
 - Liability arguments
 - Added incentive to improve performance
 - Mandatory vs. voluntary issues
 - 1 vs. 2 beef markets issue
 - Free-riding incentives
 - Credibility of ID system



Will the “debate” ever end?

- **Animal Agriculture and Identification: Historical Significance**
([Prepared by National Institute for Animal Agriculture for U.S. Veterinarian 2005](#))

<http://www.animalagriculture.org/Information/Hot%20Topics/Animal%20ID/Animal%20Agriculture%20and%20Identification%20Historical%20Significance.pdf>

- “Moving forward, the President’s budget has requested \$33 million for NAIS implementation in 2005. [A variety of issues are still outlying, and must be addressed before a complete workable system can be functional.](#) These topics include, but are not limited to:

- 1.Data Housing
- 2.Confidentiality
- 3.Funding and Industry Cost Burdens
- 4.Producer Participation
- 5.Voluntary vs. Mandatory
- 6.Technology/Information System Standards”



AgManager Information:

<http://www.agmanager.info/livestock/marketing/AnimalID/>

- USMEF Study
- NAIS Study
- Cow-Calf Producer Preferences Study
 - Factsheets, YouTube Videos, etc.



More information available at:



This presentation will be available in PDF format at:
<http://www.agmanager.info/about/contributors/individual/tonsor.asp>

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QUESTIONS???



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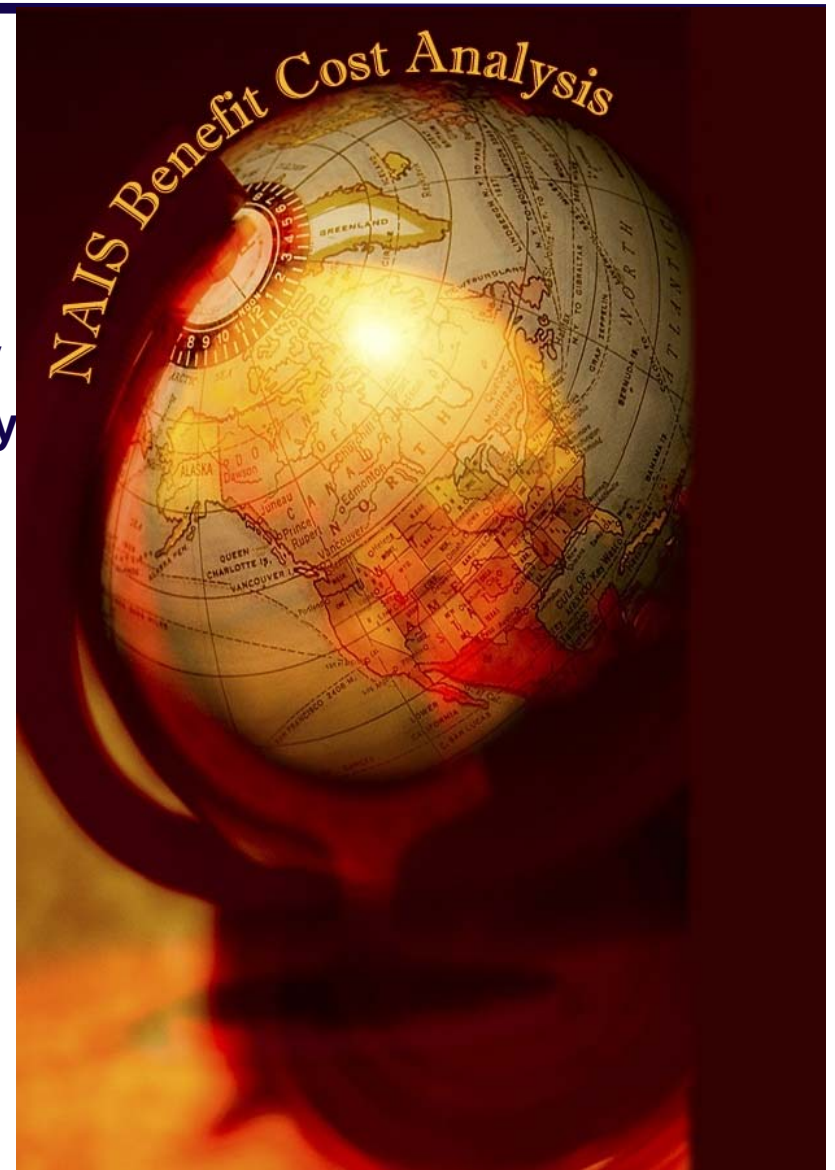
Benefit-Cost Analysis of the *National Animal Identification System*

NAIS Benefit-Cost Research Team:

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Kevin Dhuyvetter, Kansas State University
Jennifer Freeborn, Kansas State University
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Ted Schroeder, Kansas State University
Jeri Stroade, Kansas State University
Glynn Tonsor, Michigan State University

APHIS Project Coordinator:

Dr. John Wiemers



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Benefit/Cost Adoption Type Scenarios

- 1. Premises registration**
- 2. Bookend (ID at birth and record termination)**
- 3. Animal or group ID and movement recording**

Vary adoption rates from 30% to 90%



Producer Adoption Cost

Average Annual Producer Adoption Costs of NAIS

Sector		Bookend	Full Tracing
Dairy Cow	(\$/cow)	\$2.47	\$3.43
Beef Cow	(\$/cow)	\$3.92	\$4.22
Backgrounding	(\$/hd sold)	\$0.23	\$0.71
Feedlot	(\$/hd sold)	\$0.20	\$0.51
Farrow-Wean	(\$/hd sold)	\$0.01	\$0.02
Farrow-Finish	(\$/hd sold)	\$0.03	\$0.13
Feeder-Finish	(\$/hd sold)	\$0.00	\$0.01
Sheep	(\$/hd sold)	\$0.71	\$1.06
Layers	(\$/hd sold)	\$0.02	\$0.02
Broilers	(\$/hd sold)	\$0.001	\$0.001

NAIS Benefit-Cost
Analysis Study Results



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How producers recapture adoption costs

- 1. Market access makes prices received higher**
- 2. Adopt technology to enhance production & marketing efficiency**
- 3. Secure market premiums for process certification etc.**



1. What if we do nothing?

Net Annual Gain in Total Beef Producer Revenue Less Variable Costs

Export Market Loss Status Quo			
0%	10%	25%	50%
(\$/head sold)			
\$0.00	-\$7.31	-\$18.25	-\$36.47



2. What if we do something?

Net Annual Gain in Total Beef Producer Revenue Less Variable Costs
Under Varying Adoption of Full ID and Tracing Rates

Full Tracing Adoption Rate	Export Market Loss Status Quo			
	0%	10%	25%	50%
	(\$/head sold)			
30%	-\$3.72	\$3.59	\$14.53	\$32.74
50%	-\$5.62	\$1.70	\$12.63	\$30.85
70%	-\$8.99	-\$1.68	\$9.26	\$27.47
90%	-\$15.02	-\$7.71	\$3.23	\$21.45

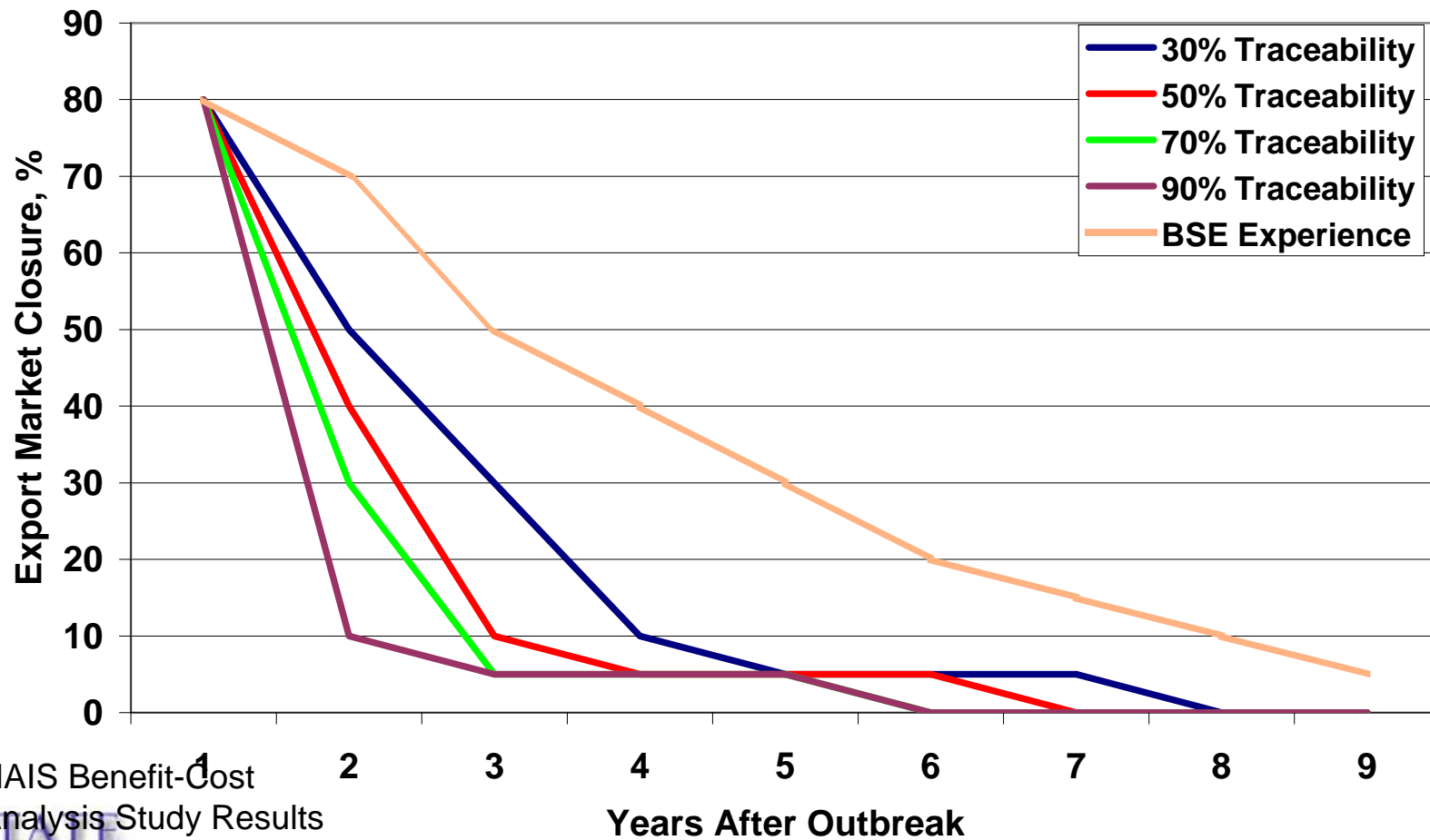


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NAIS Benefit-Cost
Analysis Study Results

3. Market Impacts of Animal Disease

Beef Export Markets Close with Foreign Animal Disease
Actual US experience with BSE and assumed export market losses with FMD outbreak



Additional Benefits of NAIS Adoption

- 1. Enhance animal health surveillance**
- 2. Regionalization & compartmentalization, market access**
- 3. Reduces producer costs of animal disease testing**
- 4. Enhance responsiveness to natural disasters**
- 5. Facilitate meeting COOL requirements**
- 6. Enhance food safety assurances**
- 7. Enhance animal production management efficiency**
- 8. Enhance information flow vertically in supply chain**
- 9. Reduce risks of unfounded liability claims**
- 10. Ownership verification of animals**
- 11. Enhance global competitiveness**

