



## Estimating the Cost of an RFID System

(as it applies to NAIS and/or traceability)

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## Components of NAIS / traceability

- Premise ID
- Individual / group animal ID
- Animal tracking/tracing

### Factors that will impact costs of these components:

- 1) National program mandated by the government
- 2) Industry program driven by market forces (voluntary)
- 3) Technology used and data granularity



## Components -- costs

- Premise ID – enrollment fee
  - Mandatory vs. voluntary
  - Minimal labor/management cost
- Individual animal ID
  - Cost of tags
  - Cost of tagging (labor, facilities, shrink, injury)
  - Minimal cost of reading/reporting
- Animal tracking/tracing
  - Costs of readers and reading
  - Data storage/management cost



## Estimating the Cost of an RFID System for a Beef Operation (at the producer level)





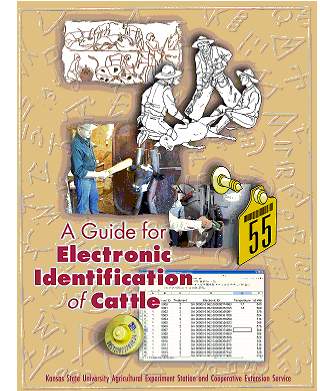
## Estimating the Cost of RFID

- The cost of implementing an RFID system will depend on the level of complexity (completeness of the system) that is desired, which will be a function of your objective(s).
- Objectives:
  - Compliance (e.g., if ID / traceability became mandatory)
    - Minimal amount of data are required
  - Compliance Plus (e.g., improve management)
    - Data → Analysis → Information → Knowledge



## Estimating the Cost of RFID

- Discussion and approach of cost estimation is generally going to follow the method outlined in *A Guide for Electronic Identification of Cattle*.
- Approach is incorporated into *RFID costs.xls* spreadsheet (available at [www.agmanager.info](http://www.agmanager.info)).



## Economic principles ...

- Variable vs. fixed costs
- Multiyear investments vs. annual purchases
- Time value of money / opportunity cost
- Allocating/prorating costs to RFID system



## Variable vs. fixed costs ...

- Variable costs are directly related to number of head in the herd (e.g., eID tag, possibly data storage/analysis fees).
- Fixed costs are constant regardless of the number of animals (e.g., hardware, software, management, etc).
- Fees of various traceability programs are a mixture of variable and fixed costs. Fee structure will determine type of participants.



## Hardware Selection (fixed cost)

Choice of hardware will depend upon ...

- Intended activity
  - Alley way to trucks, sale ring, etc.
  - Chuteside
- Volume
  - Number of head per year
  - Throughput (processing capacity)
- Labor
  - Availability (quantity)
  - Skill level (quality)



## Variable vs. fixed costs ...

- Variable costs will generally be relatively consistent across operations (with the exception of volume discounts that may be available).
- Fixed costs often vary considerably between operations due to economies of size that exist (i.e., spreading fixed costs over more units).



## Multi-year investments vs. annual purchases ...

- Some components of RFID system have a useful life of more than one year (e.g., reader, data accumulator, eID tag for cows).
- Some components of an RFID system represent annual purchases (e.g., eID tag for calves, subscriptions, internet access).
- When considering the cost of an RFID system, the relevant cost is the annualized cost.



## Multi-year investments vs. annual purchases ...

- The annualized cost of multiyear investments is a function of the useful life of the component (depreciation) and the cost of money (interest).
- Depreciation reflects the cost associated with the equipment wearing out (either physically or due to obsolescence).
- Interest reflects the cost of money tied up in RFID components.



## Allocating costs to RFID system ...

- In many cases some of the costs associated with an RFID system will not be used exclusively for RFID. Thus, it is important to allocate costs accordingly.
- Percent of costs to allocate to RFID system will be obvious for some components (e.g., eID tag, reader), but less so for others (e.g., desktop computer, internet access, labor).



## Using RFID costs.xls ...

- Excel spreadsheet that allows user to estimate the cost of an RFID system.
- Inputs required:
  - Size of herd
  - Various components considering
    - Cost (per head and/or fixed amount)
    - Useful life and salvage value
    - Percent to allocate to RFID
  - Interest rate

Microsoft Excel - RFID costs - Presentation version(2011).xls

RFID Cost.xls ----- A spreadsheet to estimate the economic costs of a radio frequency identification (RFID) system.

Version -- 7.6.06

costs associated with an individual animal identification system. It is important to recognize that not all of the cost categories identified would be required to comply with a National Animal Identification System (NAIS) program if one should become mandatory. Rather, these additional pieces of hardware and software represent components of an improved informational management system. For example, a cow-calf operator would not be required to have an electronic reader, computer, or any type of software for storing and analyzing data to comply with a mandatory animal ID program, but these components might be desired for improved management purposes. Thus, it is not necessarily appropriate to allocate these costs to a mandatory animal ID program.

**DESCRIPTION OF "SHEETS"** (see tabs at bottom of screen)

**Intro** - brief instructions for using spreadsheet and author contact information.

**RFID components** - basic information about the various components of a RFID system.

**RFID costs** - user inputs to estimate operation-specific RFID system costs.

**INPUTS vs CALCULATED VALUES**

In the "RFID costs" tab blue shaded cells represent inputs that need to be entered by the user and all black numbers are calculated from these inputs. If not all input cells are needed, they should be left blank.

**DESCRIPTION OF INPUTS**

Several inputs required have a red diamond in the upper right hand corner of the cell. By moving your mouse cursor over this diamond, a brief description of the input will be displayed on the screen.

**RELATED PUBLICATION**

For a more detailed discussion of RFID systems see **A Guide for Electronic Identification of Cattle**, an order form for this publication can be found at [www.beefstockerusa.org/efid](http://www.beefstockerusa.org/efid).

**RFID Cost.xls was developed by:**

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Microsoft Excel - RFID costs - Presentation version(2011).xls

**Brief Description of Components of a Radio Frequency Identification (RFID) System<sup>1</sup>**

**Transponder (electronic tag)**

The transponder (electronic tag) is applied in the left ear of each animal prior to leaving its herd of origin. The most common eID tag is the small "donut" ear tag produced by a variety of companies although some may offer visual panel tags with the electronic chip placed within it. Make sure this component complies with ISO 11784 and 11785.

**Electronic reader**

The RFID electronic reader activates and transfers the data contained on the transponder to a data interrogator. This device may either be handheld or permanently mounted in an alleyway. Make sure this component complies with ISO 11785. If wedge software is not included with the purchase of a reader, be sure to include the costs of purchasing "standalone" wedge software.

**Data accumulator**

A data accumulator can be any device (wired or wireless) such as a laptop or handheld computer or scale head that is capable of interfacing and accepting data from the electronic RFID reader.

**Software/web-based analysis and storage**

The purchase of herd or health management software, subscriptions to web-based analysis tools and/or data storage options should be placed in this section.

**Other**

Miscellaneous costs such as software or hardware technical support and upgrade plans, internet/long distance telephone costs should be included in this section. Labor costs associated with any extra labor required at the chute to capture information as well as time spent inputting extra data or generating reports should be included in this section as well.

<sup>1</sup> For a more detailed discussion of the RFID components see **A Guide for Electronic Identification of Cattle**, an order form for this publication can be found at [www.beefstockerusa.org/efid](http://www.beefstockerusa.org/efid).

**Cow-calf operation**

### Estimated Costs for a Radio Frequency Identification (RFID) System

Average herd size, number of head: 250  
Interest rate, %: 7.0%

RFID Components<sup>1</sup>

Description	Initial cost, \$ <sup>2</sup>		Useful life, yrs	Salvage value, \$	Annual Cost, \$	Percent to RFID	RFID Cost	
	Total	Per Head					Total	Per Head
<b>eID Transponder (electronic tag)</b>								
Electronic tag	---	\$2.00	---	---	\$518		\$0	\$0.00
Replacement tags	---	\$0.05	---	---	\$13		\$0	\$0.00
Tags for cows (one-time purchase)	---	\$0.00	50	0				
<b>Electronic reader</b>								
Wand/stick reader	\$750		4	0	\$221		\$0*	\$0.00
Panel reader	\$3,000		4	0	\$886		\$0*	\$0.00
<b>Data accumulator</b>								
Scale-head	\$2,500		4	500	\$625		\$0*	\$0.00
Laptop computer	\$1,000		4	250	\$239		\$0*	\$0.00
Desktop computer	\$800		4	200	\$191		\$0*	\$0.00
<b>Software / web-based analysis and storage</b>								
Computer software	\$750		10	0	\$107		\$0*	\$0.00
Data storage		\$0.10	1	0	\$26		\$0*	\$0.00
<b>Other</b>								
Internet access	\$480		---	---	\$497		\$0	\$0.00
Software upgrade fees, etc.	\$100		---	---	\$104		\$0	\$0.00
Labor	\$500		---	---	\$518		\$0	\$0.00
Premises registration	\$5		---	---	\$5		\$0	\$0.00
<b>Total annual cost</b>							<b>\$0</b>	<b>\$0.00</b>

<sup>1</sup> See the RFID components tab for a brief discussion of the different components of the RFID system.  
<sup>2</sup> Only enter Total and Per Head costs if there is a fixed and a variable component (i.e., do not enter costs twice).

Which of these costs would be incurred for compliance, assuming a mandatory program?

**Cow-calf operation**

### Estimated Costs for a Radio Frequency Identification (RFID) System

Average herd size, number of head: 250  
Interest rate, %: 7.0%

RFID Components<sup>1</sup>

Description	Initial cost, \$ <sup>2</sup>		Useful life, yrs	Salvage value, \$	Annual Cost, \$	Percent to RFID	RFID Cost	
	Total	Per Head					Total	Per Head
<b>eID Transponder (electronic tag)</b>								
Electronic tag	---	\$2.00	---	---	\$518	100%	\$518	\$2.07
Replacement tags	---	\$0.05	---	---	\$13	100%	\$13	\$0.05
Tags for cows (one-time purchase)	---	\$0.00	50	0		0%		
<b>Electronic reader</b>								
Wand/stick reader	\$750		4	0	\$221	0%	\$0*	\$0.00
Panel reader	\$3,000		4	0	\$886	0%	\$0*	\$0.00
<b>Data accumulator</b>								
Scale-head	\$2,500		4	500	\$625	0%	\$0*	\$0.00
Laptop computer	\$1,000		4	250	\$239	0%	\$0*	\$0.00
Desktop computer	\$800		4	200	\$191	0%	\$0*	\$0.00
<b>Software / web-based analysis and storage</b>								
Computer software	\$750		10	0	\$107	0%	\$0*	\$0.00
Data storage		\$0.10	1	0	\$26	100%	\$26*	\$0.10
<b>Other</b>								
Internet access	\$480		---	---	\$497	0%	\$0	\$0.00
Software upgrade fees, etc.	\$100		---	---	\$104	0%	\$0	\$0.00
Labor	\$500		---	---	\$518	50%	\$259	\$1.04
Premises registration	\$5		---	---	\$5	100%	\$5	\$0.02
<b>Total annual cost</b>							<b>\$820</b>	<b>\$3.28</b>

<sup>1</sup> See the RFID components tab for a brief discussion of the different components of the RFID system.  
<sup>2</sup> Only enter Total and Per Head costs if there is a fixed and a variable component (i.e., do not enter costs twice).

Costs of compliance only

**Cow-calf operation**

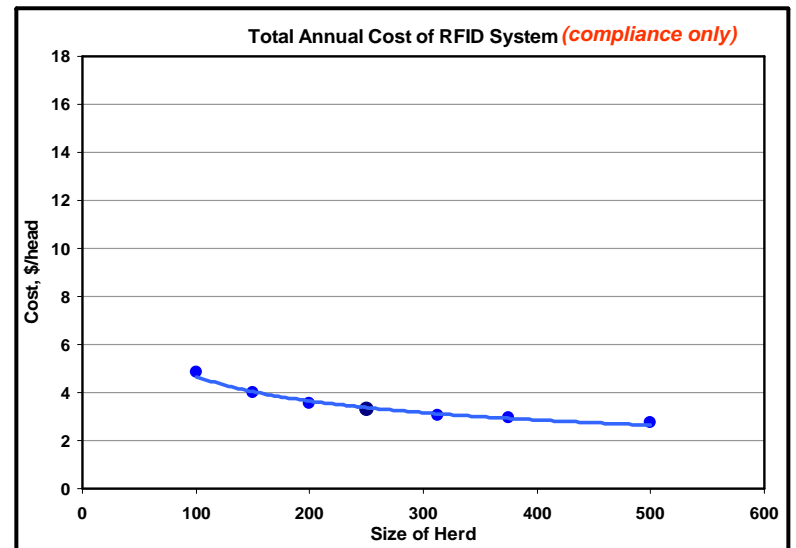
### Sensitivity table for alternative herd sizes (assumes investment amounts do not change)

Total Annual RFID System Cost, \$/head

RFID Components	Base	Size of Herd, percent of base						
		40%	60%	80%	100%	125%	150%	200%
Description	250	100	150	200	250	313	375	500
<b>eID Transponder (tag)</b>								
Electronic tag	\$2.07	\$2.07	\$2.07	\$2.07	\$2.07	\$2.07	\$2.07	\$2.07
Replacement tags	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05
Tags for cows (one-time purchase)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Electronic reader</b>								
Wand/stick reader	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Panel reader	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Data accumulator</b>								
Scale-head	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Laptop computer	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Desktop computer	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Software/web-based analysis and storage</b>								
Computer software	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Data storage	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10
<b>Other</b>								
Internet access	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Software upgrade fees, etc.	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Labor	\$1.04	\$2.59	\$1.73	\$1.29	\$1.04	\$0.83	\$0.69	\$0.52
Premises registration	\$0.02	\$0.05	\$0.03	\$0.03	\$0.02	\$0.02	\$0.01	\$0.01
<b>Total annual cost</b>	<b>\$3.28</b>	<b>\$4.86</b>	<b>\$3.98</b>	<b>\$3.54</b>	<b>\$3.28</b>	<b>\$3.07</b>	<b>\$2.93</b>	<b>\$2.75</b>



## ASI 650 - Animal ID and Data Management of Food Animals



Example of estimated cost of RFID system (figure generated in RFID cost.xls)



**Cow-calf operation**

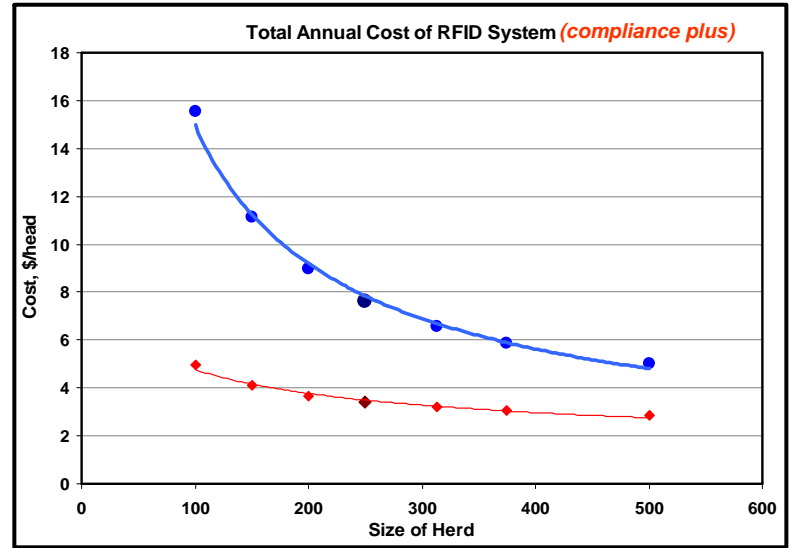
**Estimated Costs for a Radio Frequency Identification (RFID) System** Print report

Average herd size, number of head: 250  
Interest rate, %: 7.0%

**Costs of compliance plus**

Description	Initial cost, \$ <sup>2</sup>		Useful life, yrs	Salvage value, \$	Annual Cost, \$	Percent to RFID	RFID Cost	
	Total	Per Head					Total	Per Head
<b>eID Transponder (electronic tag)</b>								
Electronic tag	---	\$2.00	---	---	\$518	100%	\$518	\$2.07
Replacement tags	---	\$0.05	---	---	\$13	100%	\$13	\$0.05
Tags for cows (one-time purchase)	---	\$2.00	50	0	\$36	100%	\$36	\$0.14
<b>Electronic reader</b>								
Wand/stick reader	\$750		4	0	\$221	100%	\$221	\$0.89
Panel reader	\$3,000		4	0	\$886	0%	\$0	\$0.00
<b>Data accumulator</b>								
Scale-head	\$2,500		4	500	\$625	0%	\$0	\$0.00
Laptop computer	\$1,000		4	250	\$239	100%	\$239	\$0.96
Desktop computer	\$800		4	200	\$191	0%	\$0	\$0.00
<b>Software / web-based analysis and storage</b>								
Computer software	\$750		10	0	\$107	100%	\$107	\$0.43
Data storage	\$0.10		1	0	\$26	100%	\$26	\$0.10
<b>Other</b>								
Internet access	\$480		---	---	\$497	25%	\$124	\$0.50
Software upgrade fees, etc.	\$100		---	---	\$104	100%	\$104	\$0.41
Labor	\$500		---	---	\$518	100%	\$518	\$2.07
Premises registration	\$5		---	---	\$5	100%	\$5	\$0.02
<b>Total annual cost</b>							<b>\$1,910</b>	<b>\$7.64</b>

<sup>1</sup> See the RFID components tab for a brief discussion of the different components of the RFID system.  
<sup>2</sup> Only enter Total and Per Head costs if there is a fixed and a variable component (i.e., do not enter costs twice).



Example of estimated cost of RFID system (figure generated in RFID cost.xls)

**Feedlot operation**

**Estimated Costs for a Radio Frequency Identification (RFID) System** Print report

Average herd size, number of head: 80,000  
Interest rate, %: 7.0%

Description	Initial cost, \$ <sup>2</sup>		Useful life, yrs	Salvage value, \$	Annual Cost, \$	Percent to RFID	RFID Cost	
	Total	Per Head					Total	Per Head
<b>eID Transponder (electronic tag)</b>								
Electronic tag	---	\$0.05	---	---	\$4,140	100%	\$4,140	\$0.05
<b>Electronic reader</b>								
Wand/stick readers (4)	\$3,000		3	0	\$1,143	100%	\$1,143	\$0.01
Stationary readers (2)	\$6,000		3	0	\$2,286	100%	\$2,286	\$0.03
<b>Data accumulator</b>								
Scale head	\$2,500		3	0	\$953	100%	\$953	\$0.01
Laptop computers (2)	\$2,000		3	0	\$762	100%	\$762	\$0.01
Desktop computer	\$800		3	0	\$305	100%	\$305	\$0.00
<b>Software / web-based analysis and storage</b>								
Computer software	\$750		5	0	\$183	100%	\$183	\$0.00
<b>Other</b>								
Internet access	\$480		---	---	\$497	0%	\$0	\$0.00
Data analysis / storage		\$1.25	---	---	\$103,500	100%	\$103,500	\$1.29
Labor	\$60,000		---	---	\$62,100	33%	\$20,679	\$0.26
<b>Total annual cost</b>							<b>\$133,951</b>	<b>\$1.67</b>

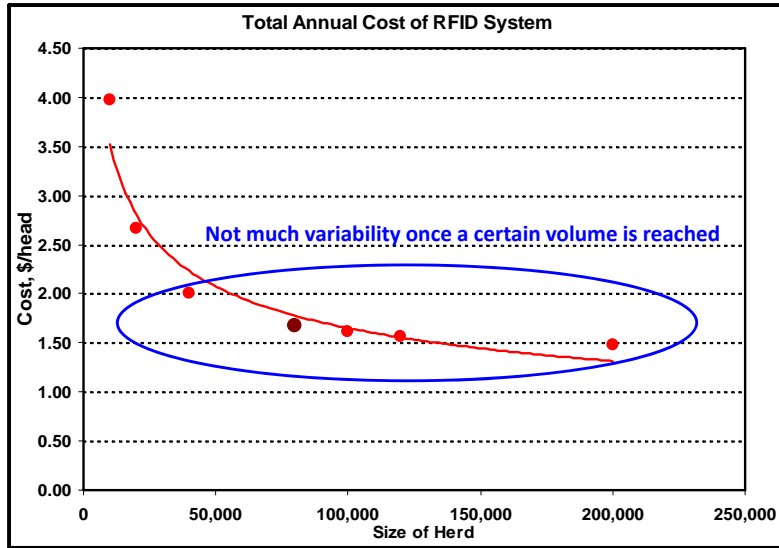
<sup>1</sup> See the RFID components tab for a brief discussion of the different components of the RFID system.  
<sup>2</sup> Only enter Total and Per Head costs if there is a fixed and a variable component (i.e., do not enter costs twice).

**Fixed vs. Variable**

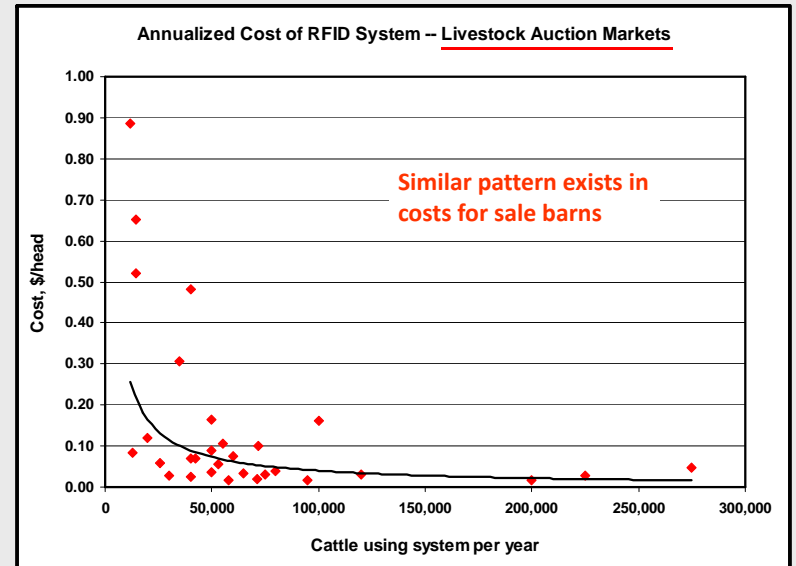
**Feedlot operation**

**Sensitivity table for alternative herd sizes (assumes investment amounts do not change)**

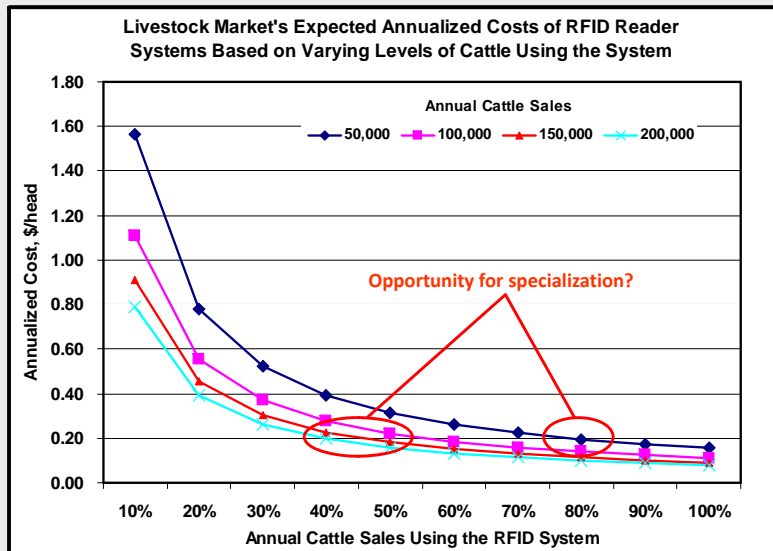
RFID Components	Base	Size of Herd, percent of base						
		13%	25%	50%	100%	125%	150%	250%
		Size of Herd, number of head						
<b>Total Annual RFID System Cost, \$/head</b>								
eID Transponder (tag)	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05
<b>Electronic reader</b>								
Wand/stick readers (4)	\$0.01	\$0.11	\$0.06	\$0.03	\$0.01	\$0.01	\$0.01	\$0.01
Stationary readers (2)	\$0.03	\$0.23	\$0.11	\$0.06	\$0.03	\$0.02	\$0.02	\$0.01
<b>Data accumulator</b>								
Scale head	\$0.01	\$0.10	\$0.05	\$0.02	\$0.01	\$0.01	\$0.01	\$0.00
Laptop computers (2)	\$0.01	\$0.08	\$0.04	\$0.02	\$0.01	\$0.01	\$0.01	\$0.00
Desktop computer	\$0.00	\$0.03	\$0.02	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00
<b>Software/web-based analysis and storage</b>								
Computer software	\$0.00	\$0.02	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Other</b>								
Internet access	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Data analysis / storage	\$1.29	\$1.29	\$1.29	\$1.29	\$1.29	\$1.29	\$1.29	\$1.29
Labor	\$0.26	\$2.07	\$1.03	\$0.52	\$0.26	\$0.21	\$0.17	\$0.10
<b>Total annual cost</b>	<b>\$1.67</b>	<b>\$3.98</b>	<b>\$2.66</b>	<b>\$2.00</b>	<b>\$1.67</b>	<b>\$1.61</b>	<b>\$1.56</b>	<b>\$1.48</b>



Example of estimated cost of RFID system (figure generated in *RFID cost.xls*)



Bolte, et al.

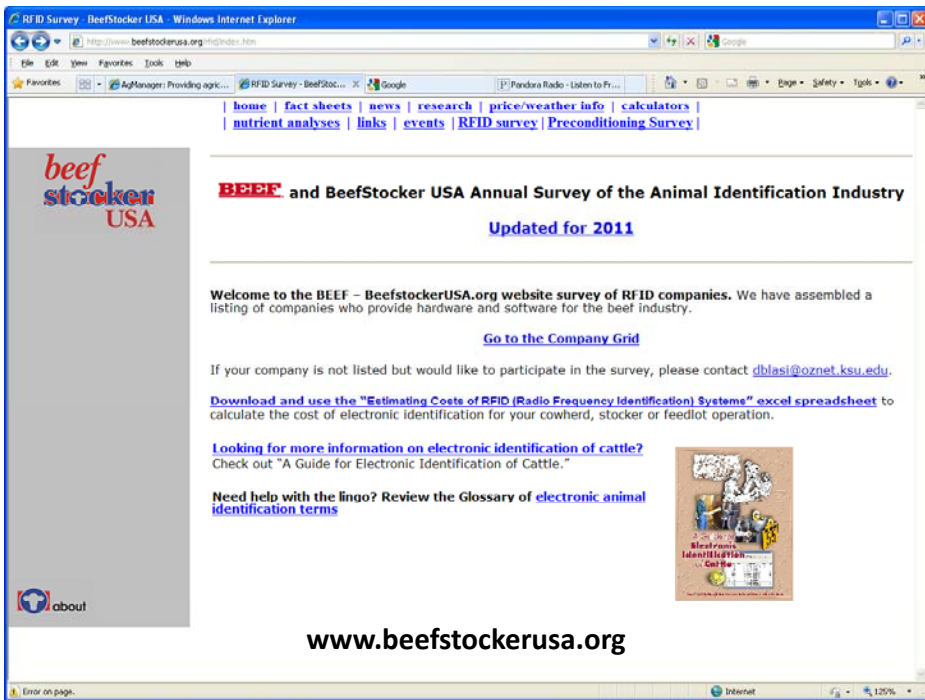


Bolte, et al.



## Where can I find cost information?

- Beef Stocker USA 2011 Survey of the Animal Identification Industry (varying levels of information from 34 companies).



## Where can I find cost information?

- Beef Stocker USA 2010 Survey of the Animal Identification Industry (varying levels of information from 34 companies).
- Web searches (e.g., google.com), service providers, input suppliers, and commodity organizations.
- Market continues to develop so keep in mind that information becomes dated quickly.



## Can You Justify an RFID System?

- If ID becomes mandatory, the answer for most producers will be **YES**.
- However, the type of RFID system used will depend on the goals and objectives of the producer and his/her record-keeping ability.
- Whether or not an RFID system that exceeds the minimum required for compliance can be justified will depend on how data will be used.



## Alternative Considerations...

- Do the minimum required myself
- Hire somebody to make sure I'm in compliance
- Develop a "compliance plus" system for collecting, analyzing, and storing data
  - Do everything myself (i.e., in-house)
  - Do several parts in-house and contract out for others
  - Hire somebody for most all aspects of RFID system
- Likely service providers will exist that are willing to do as much or little as desired (for a fee).



## Estimating the Cost of a Animal ID or Traceability System at the Industry Level

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

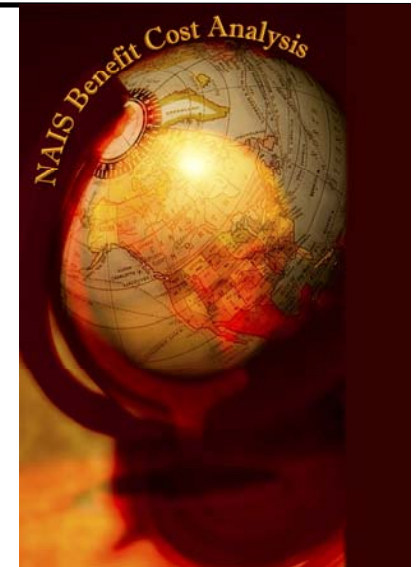
### NAIS Benefit-Cost Research Team:

Dale Blasi, Kansas State University  
Gary Brester, Montana State University  
Chris Crosby, Kansas State University  
Kevin Dhuyvetter, Kansas State University  
Jennifer Freeborn, Kansas State University  
Dustin Pendell, Colorado State University  
Gary Smith, Colorado State University  
Ted Schroeder, Kansas State University  
Jeri Stroade, Kansas State University  
Glynn Tonsor, Michigan State University

### APHIS Project Coordinator:

Dr. John Wiemers

(Final report submitted 1-14-2009)



### Objectives...

- Estimate annual costs of adopting animal ID for major livestock species at industry level
  - Beef and dairy
  - Swine
  - Sheep
  - Poultry
  - Equine
- Determine how costs vary across different production sectors within a species
- Determine how costs vary by operation size

### Objectives...

- Estimate costs for alternative ID adoption type scenarios:
    1. Premises registration
    2. Bookend (ID at birth and record termination)
    3. Animal or group ID and movement recording (full traceability)
- Vary adoption rates from 10% to 100%  
(30% to 90% used for benefit analyses)

## Final report of study

- Approximately 150 pages of text, tables, and figures related to costs (entire report is 442 pages)...
- Attempt here is to give a broad overview of methods and key results of cost section and what some of the implications are...
- Full report is available at <http://www.agmanager.info/livestock/marketing/default.asp>

## Beef and Dairy Sectors

- Production sectors
  - Beef Cow-Calf
  - Dairy
  - Backgrounders
  - Feedlots
- Marketing/processing
  - Auction markets
  - Packers
- Individual animal ID (RFID technology)



## Understanding the budgets...

- Beef Cow-Calf and Dairy (two groups)
  - Operations that tag
    - Tagging is assumed at birth
  - Operations that do not tag
    - Assumed tagging will be done at auction when sold
- Backgrounders (one group)
  - Operations that buy cattle to background
- Feedlots (one group)
  - Operations that buy cattle to finish to slaughter weight

## Understanding the budgets...

- Cost categories
  - Tagging-related costs
    - Tags and tag applicators
    - Labor
    - Chute costs
    - Shrink
    - Injury (human and animal)
  - Reading costs
    - Capital investment
    - Labor/chute
    - Shrink/injury
  - Premises registration
    - Cost to reflect management time

## Total costs to beef and dairy sectors...



Table 4.9. Summary of Cattle Industry Costs Under Scenario #3 (full traceability)

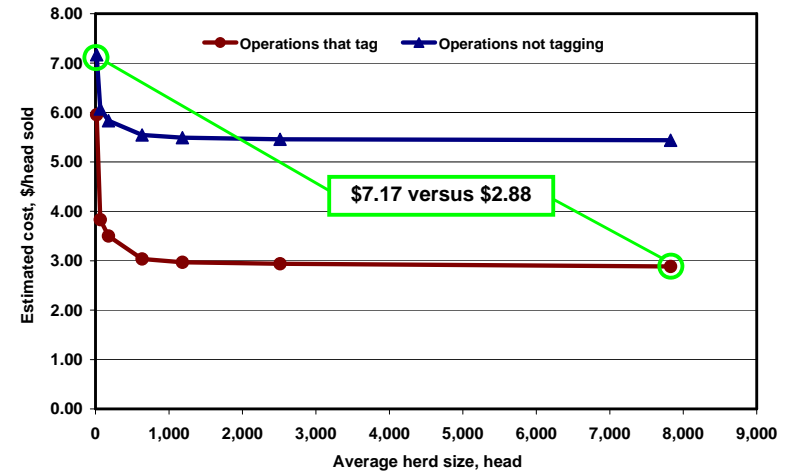
	Beef Cow/Calf	Dairy	Background	Feedlot	Auction Yards	Packers	Industry Total
Number of Operations	757,900	71,510	50,870	87,160	1,050	318	967,440
Average Inventory	33,120,600	9,158,000	17,229,903	26,964,948	38,128,769	35,017,500	100,953,011
Total Annual Cost, \$	\$139,764,146	\$31,437,688	\$12,072,978	\$13,562,885	\$8,765,395	\$3,467,081	\$209,070,173
Cost Per Animal in Inv.	\$4.22	\$3.43	\$0.70	\$0.50	\$0.23	\$0.10	\$2.07
Cost Per Animal Marketed	\$4.91	\$6.21	\$0.71	\$0.51	\$0.23	\$0.10	\$5.97
Total Cost Per Operation	\$184	\$440	\$237	\$156	\$8,348	\$10,889	\$216
	66.9%	15.0%	5.8%	6.5%	4.2%	1.7%	

Table 4.10. Breakdown of Cattle Industry Costs Under Scenario #3 (full traceability)

	Beef Cow/Calf	Dairy	Background	Feedlot	Auction Yards	Packers	Industry Total
<b>Breakdown of Costs (%)</b>							
Tags and Tagging Cost	90.4%	70.9%	30.8%	37.1%	0.0%	0.0%	75.3%
RFID Tag	55.2%	57.1%	9.0%	10.9%			46.7%
Applicator	3.9%	3.3%	9.8%	9.3%			4.3%
Labor	2.1%	2.6%	4.8%	6.8%			2.5%
Chute	21.3%	6.6%	3.5%	4.9%			15.8%
Shrink	6.2%	0.5%	2.6%	3.8%			4.6%
Injury	1.6%	0.8%	1.0%	1.5%			1.4%
Reading Costs	7.1%	28.1%	67.2%	59.9%	100.0%	100.0%	22.6%
RFID Capital	5.4%	20.9%	42.8%	30.5%			
Labor/Chute	1.4%	6.5%	14.1%	20.3%			
Shrink/Injury	0.3%	0.8%	10.3%	9.0%			
Premise Registration	2.5%	1.0%	2.0%	3.0%	0.0%	0.0%	2.1%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

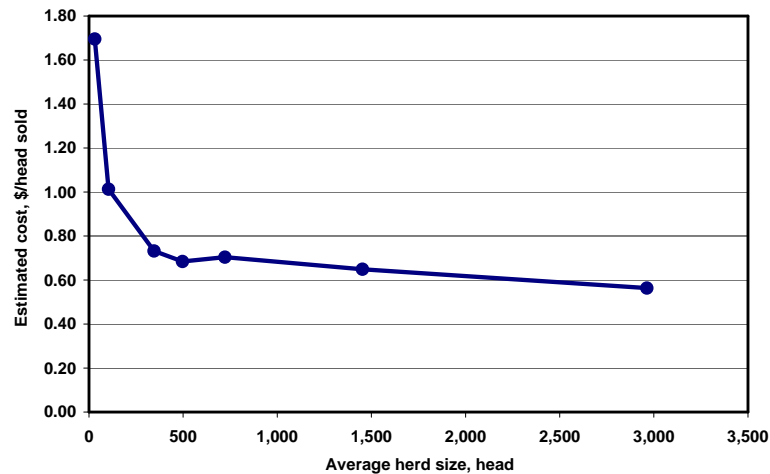
## Cost versus size of operation for beef cow-calf...

Figure 4.4. Estimated Costs of RFID Full Traceability Technology Adoption



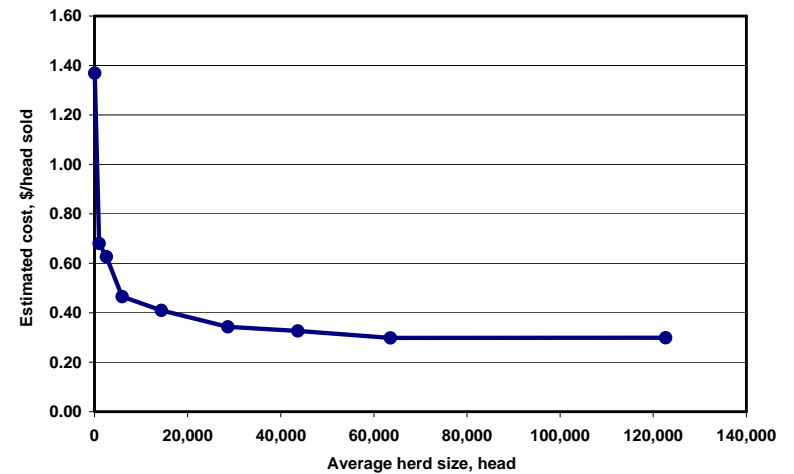
## Cost versus size of operation for beef backgrounders...

Figure 4.6. Estimated Costs of RFID Full Traceability Technology Adoption



## Cost versus size of operation for beef feedlots...

Figure 4.7. Estimated Costs of RFID Full Traceability Technology Adoption



## How producers recapture adoption costs...

1. Market access makes prices received higher
  - industry-wide benefit
2. Adopt technology to enhance production and marketing efficiency
  - producer-specific benefit
3. Secure market premiums for process certification
  - producer-specific benefit

How do these relate to voluntary vs. mandatory?

## Summary...

- Economies of size exist, but most of the benefit is captured relatively quick
- Beef and dairy (and sheep) have relatively higher cost than swine and poultry
- Producers reluctant to adopt because of
  - Concern about confidentiality
  - Not sure which technology will prevail
  - See increased cost without seeing direct benefit (free rider problem)

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

### Research Team:

Gary Brester, Montana State University  
Kevin Dhuyvetter, Kansas State University  
Dustin Pendell, Colorado State University  
Ted Schroeder, Kansas State University  
Glynn Tonsor, Kansas State University

### USMEF Project Coordinators:

Paul Clayton  
Erin Daley Borrer

## Objectives...

- Estimate annual costs of traceability programs for beef/dairy and swine operations
- Determine how costs vary by...
  - production sector within a species
  - operation size
  - adoption rate
- Compare results to earlier NAIS animal ID cost estimates (i.e., 2009 NAIS study)



## Total costs to beef and dairy sectors (2009 NAIS)...

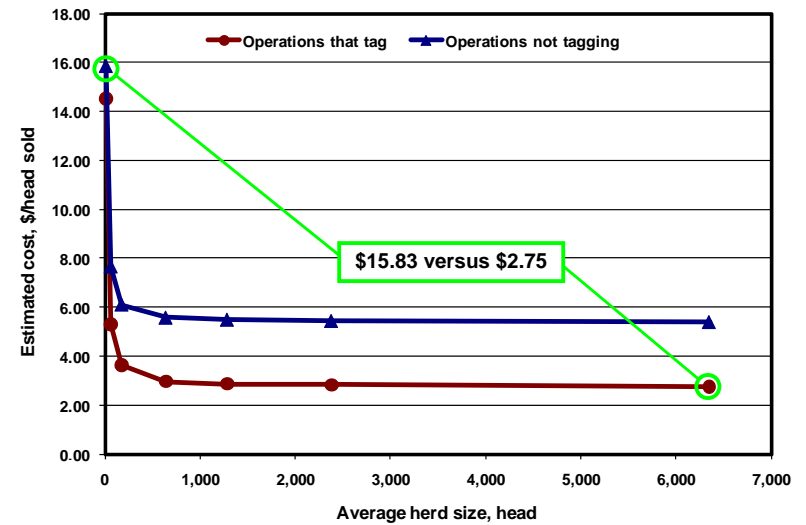
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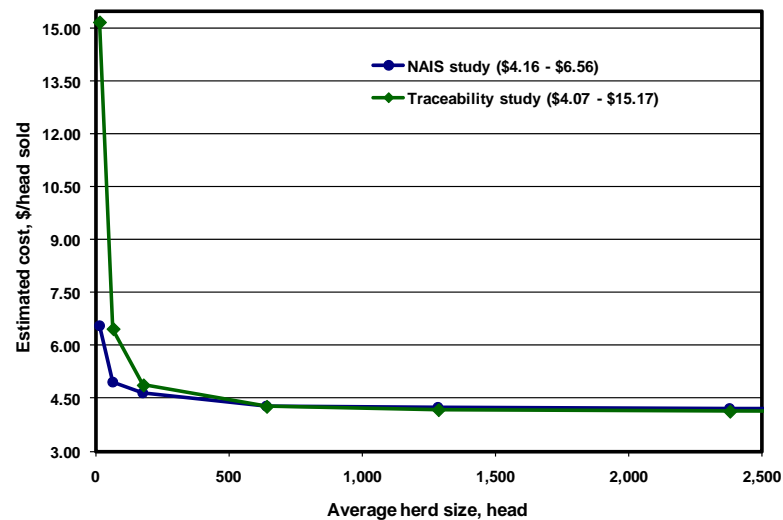
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Shrink/Injury	0.3%	0.8%	10.3%	9.0%			
Premise Registration	2.5%	1.0%	2.0%	3.0%	0.0%	0.0%	2.1%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

## Cost versus size of operation for beef cow-calf...



## Cost versus size of operation for beef cow-calf\* ...



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

## Total costs to beef and dairy sectors...

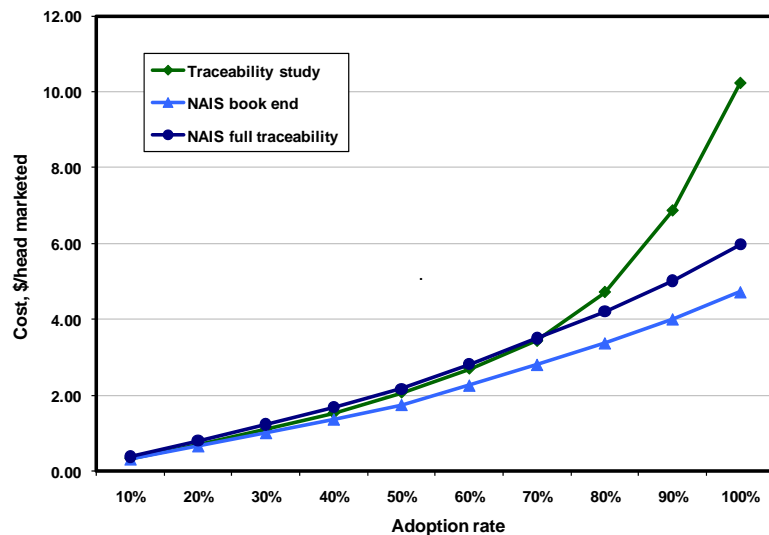
Total Cattle Industry Cost versus Adoption Rate Under Alternative Scenarios

Industry Sector	NAIS Study					
	Full Traceability		Book End		Full Traceability	
	Total	\$/head <sup>1</sup>	Total	\$/head <sup>1</sup>	Total	\$/head <sup>1</sup>
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
<b>TOTAL COST</b>	<b>\$350,649,257</b>	<b>\$10.23</b>	<b>\$165,262,586</b>	<b>\$4.72</b>	<b>\$209,070,173</b>	<b>\$5.97</b>

Adoption rate	Full Traceability		Book End		Full Traceability	
	Total	\$/head <sup>1</sup>	Total	\$/head <sup>1</sup>	Total	\$/head <sup>1</sup>
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

<sup>1</sup> Per head marketed annually

## Costs versus adoption rate for beef/dairy sector...



## 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)
- Even though costs are considerably higher than NAIS study, still takes relatively small impacts in demand for benefits to exceed costs



ASI 650 - Animal ID and Data Management of Food Animals

## Miscellaneous thoughts of NAIS/traceability...

- Mandatory vs. voluntary?
- Impact on different sectors within beef industry (e.g., cow-calf, stocker, feedlot, sale barn, packers)?
- Impact on different species within livestock industry (e.g., beef vs. swine and poultry)?
- Benefits vs. costs?



ASI 650 - Animal ID and Data Management of Food Animals

## Summary...

- RFID systems do require capital outlay and increase operating costs (EOS exist).
- If this technology is used only for compliance purposes, the beef industry most likely will lose market share and be worse off.
- If this technology is used to lower the relative cost of production of beef through better management, the beef industry will benefit.
- Is the glass half empty or half full?



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