- Evolving beef export market access requirements for age and source verification: This paper uses costs for different sectors within the beef industry from Brester et. al. 2011. Cow/calf, Dairy, Backgrounding and feedlot, and packer.

These cost estimates include source and age verification participation costs (2009) along with the tags and tagging costs.

COW/CALF: Currently Tag Cattle - Annual cost range from $14.51/head (operation with less than 50 head) to $2.75 (operation with more than 5000 head) Currently not tagging cattle - Annual cost range from $15.83/head (operation with less than 50 head) to $5.39 (operation with more than 5000 head).

DAIRY: Currently Tag Cattle - Annual cost range from $17.34/head (operation with less than 50 head) to $3.83 (operation with more than 2000 head) Currently not tagging cattle - Annual cost range from $16.79/head (operation with less than 50 head) to $5.02 (operation with more than 2000 head)

BACKGROUNDING: Annual cost range from $23.51/head (operation with 31 head) to $0.39 (operation with 2963 head)

FEEDLOT: Annual cost range from $15.89/head (< 1000 head) to $0.15 (> 32000 head)

PACKING PLANTS: Steers and Heifers: Annual cost range from $0.47/head for smallest plants (slightly over 300 head per year) to $0.16/head for the largest plants (approximately 1.3 million head per plant per year).

Just tag and tagging costs:

COW/CALF: Currently Tag Cattle - $4.21/head (<50 head) to $2.40/head (>5000 head) Currently Not Tagging Cattle - $5.54/head (<50 head) to $5.04/head (>5000 head)

DAIRY: Currently Tag Cattle - $5.57/head (<50 head) to $3.34/head (>2000 head) Currently Not Tagging Cattle - $5.04/head (<50 head) to $4.55/head (>5000 head)

BACKGROUNDING: $0.75/head (31 head) to $0.14/head (2,963 head)

FEEDLOT: $0.50/head (<1000 head) to $0.12/head (>32000 head)

These five group subtotals are summed to obtain the total cost for the cattle industry of adopting ASV. Costs associated with several sectors within the beef industry are aggregated for use in the economic model. For example, dairy, background, and feedlot costs are aggregated into the slaughter cattle sector while packer costs are referred to as wholesale costs.

For our analysis I am following the same strategy as the study i.e., aggregating all the costs to get a total cost.

Just the tag and tagging costs excluding Dairy sector:

Currently Tag Cattle - Small operations: 4.21 + 0.75 + 0.50 + 0.47= $5.93/head ; Large operations: 2.40 + 0.14 + 0.12 + 0.16= $2.82/head; Average Cost: $4.375/head

Currently Not Tagging Cattle - Small operations: 5.54 + 0.75 + 0.50 + 0.47= $7.26/head ; Large operations: 5.04 + 0.14 + 0.12 + 0.16 = $5.46/head; Average Cost: $6.36/head

Total costs (includes SAV costs):

Currently Tag Cattle - Small operations: 14.51 + 23.51 + 15.89 + 0.47 = $54.38/head; Large operations: 2.75 + 0.39 + 0.15 + 0.16 = $3.45/head; Average Cost: $28.91/head

Currently Not Tagging Cattle - Small operations: 15.83 + 23.51 + 15.89 + 0.47 = $55.7/head ; Large operations: 5.39 + 0.39 + 0.15 + 0.16 = $6.09/head; Average Cost: $30.89/head

- ANIMAL IDENTIFICATION AND TRACING IN THE UNITED STATES: This paper uses the cost estimates for all the meat sectors from the report Blasi et.al.2009. Similar to the above study, they use cost estimates for different segments within the industry. Specifically, Cow/Calf, Dairy, Background and feedlot, packer, and dairy. These costs are estimated according to the size of the operation. (We have to note that in our model we just look at the cost per pound of beef.)

ESTIMATED COST (2007) OF RFID FULL TRACEABILITY TECHNOLOGY ADOPTION

COW/CALF: Operation that Currently Tags Cattle - Annual cost range from $5.95/head (operation with less than 50 head) to $2.88/head (operation with more than 5000 head)

Operation that Currently not tagging cattle - Annual cost range from $7.17/head (<50 head) to $5.44/head (>5000 head)

DAIRY: Operation that Currently Tags Cattle - Annual cost range from $5.84/head (operation with less than 50 head) to $2.53/head (operation with more than 5000 head) Operation that Currently not tagging cattle - Annual cost range from $5.28/head (<50 head) to $2.97/head (>5000 head)

BACKGROUND: $1.70/head (31 head) to $0.56/head (2963 head)

FEEDLOT: $1.37/head (<1000 head) to $0.30/head (>50000)

AUCTION MARKETS: $0.145 per head and a data storage cost of $0.085 per head totaling $0.23 per head

PACKERS: steer and heifer: Volume weighted average = $0.15 cow and bull: Volume weighted average = $0.29 calf: Volume weighted average = $0.36

Summary of Cattle Industry Costs Under Scenario #3 (full traceability) Beef Cow/Calf - $4.22, Dairy- $3.43, Background- $0.70, Feedlot- $0.50, Auction Yards- $0.23, Packers- $0.10, Industry Total - $2.07. (Should I use these cost numbers?)

Similar to the above study, I am aggregating all the costs to get the total costs

Just the tag and tagging costs excluding Dairy sector:

Currently Tag Cattle - Small operations: $5.95 + 1.7 + 1.37 + 0.23 + 0.1 = \$9.35$/head ; Large operations: $2.88 + 0.56 + 0.30 + 0.23 + 0.1 = \$4.07$/head; Average Cost: $6.71/head

Currently Not Tagging Cattle - Small operations: $7.17 + 1.7 + 1.37 + 0.23 + 0.1 = \$10.57$/head ; Large operations: $5.44 + 0.56 + 0.30 + 0.23 + 0.1 = \$6.63$/head; Average Cost: $8.600/head

How do we include these costs in the model? These costs are dollars per head, our model is dollars per pound of meat. We have to convert these into those units and include in the model. One more question, which costs should we use? AJAE paper published in 2010 (the cost estimates in this paper is taken from "B-C analysis of NAIS" 2009) or Food Policy paper published in 2013 (the cost estimates in this paper is taken from "Economic assessment of evolving red meat export market access requirements for traceability of livestock and meat" 2011)? How about the costs in year? If we are modeling from that year then, we can use the same numbers. For instance, 2007 numbers from B-C analysis of NAIS, 2009 numbers from SAV study.

These studies also have exogenous supply changes. Each of these percentage increases in costs represent upward shifts (reductions in supply) of the respective supply functions. Should we include these in our model?