



AgEcon SEARCH

RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Food Authenticity, Technology and Consumer Acceptance

Jill E. Hobbs*, Jill McDonald* and Jing Zhang**

* Department of Bioresource Policy, Business & Economics,
University of Saskatchewan, Canada

** RTI Health Solutions, North Carolina, USA

Corresponding author: jill.hobbs@usask.ca

Poster paper prepared for presentation at the Agricultural & Applied Economics Association's 2012 AAEA Annual Meeting, Seattle, Washington, August 12-14, 2012

Copyright 2012 by Hobbs, McDonald, Zhang. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Food Authenticity, Technology and Consumer Acceptance



Jill E. Hobbs*, Jill McDonald* and Jing Zhang**

* Department of Bioresource Policy, Business & Economics, University of Saskatchewan

** RTI Health Solutions, North Carolina

Email: jill.hobbs@usask.ca

The Issue

THE ISSUE:

- Traceability and authenticity issues in food markets:
- Traceability:** growing consumer interest in source of food
- Authenticity:** misrepresentation, unlabelled substitution of ingredients
- Implications:
 - Collective industry reputation (e.g. fake Canadian ice wines)
 - Food safety (melamine in milk, China)
 - Substitution of cheaper ingredients (juice)
 - Mislabelling: consumer & environmental implications (e.g. fish species)
 - Challenge: provision of **credible** assurances to consumers (reputation effects)



Source: <http://www.john-west.co.uk/>

Headlines

- China's Fake Ice Wine Epidemic**: "Sources estimate 80 percent of ice wine on sale may be fake, a sign of the dangers in a young but lucrative wine market" (Wine Spectator, February 2011)
- "Counterfeit Icewine Puts Chill on Canadian Sales"** (Wine Business Monthly, February 2005)
- "The Great Supermarket Fish Scam: Shoppers are 'Being Duped into Buying Mislabeled Species'"** (Mail online, April 2011) (UK)
- "Technology Offers Solution to Mislabeled Fish"** (9-news.com, 28 Oct 2011) (USA)

Research Questions

- Will consumers **accept** molecular tagging as a traceability technology (Vs RFID)?
- Does acceptance differ across **product category** (apple juice Vs salami)?
- How does **information** affect consumer acceptance of a new technology (i.e. positive Vs neutral technology information, Vs information on the issue of adulteration)?

Potential Technological Solution

EXPERIMENTAL TECHNOLOGY: Internal Molecular Tags (MT)

- Collaborative research initiative with food scientists (Univ of Saskatchewan and Univ of Guelph)
- Molecular tag: derived from oligosaccharides and oligonucleotides and added to a food product in trace amounts
- Becomes a unique identifier for the product and can assist in delivering stronger traceability and authenticity assurances
- An alternative to external package-based (e.g. RFID) traceability systems

Data & Choice Experiment Design

- Survey data gathered online across Canada in December 2010
- Sample representative of Canadian population by region (province), gender and education. Oversampling of older consumers and those with higher incomes
- Discrete choice experiments used to evaluate consumer acceptance of molecular tagging technology
- Two survey designs:** apple juice (430 responses) and salami (433 responses)
- Four information treatments:** information on the problem of adulteration Vs positive information about the technology

Technology Attribute Descriptions

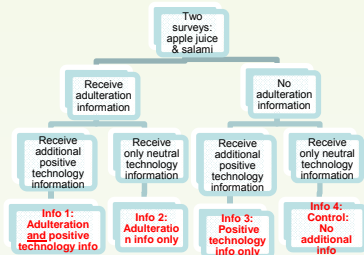
- Molecular tagging (MT)** – assurance that product is **authentic** and is not diluted or substituted with inferior material. This is inserted in the food product and is a secure form of identification that can not be removed or manipulated.
- Radio frequency identification (RFID)** – **traceability** of product from farm to processing/packaging to retail shelf. This technology is attached to the package, as an external label, but could be removed.
- RFID & MT** – strongest assurance that product is **authentic** (unadulterated) with the ability to provide full **traceability** of product from farm to retail shelf. The authenticity verification is provided through molecular tagging technology inserted into product, with traceability provided by an external label.
- Regular label** on package – no additional verification of authenticity or traceability claims

Choice Set Design (apple juice)

ATTRIBUTE	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
Traceability Technology	Regular label	Radio Frequency Identification (RFID)	Molecular Tagging (MT)	MT & RFID
Manufacturer	Store Brand	Major Brand		
Country of Origin	(Not identified)	Product of Canada	Product of U.S.A	
Price	\$XX	\$XX	\$XX	\$XX

Example of a Choice Set (juice)

	Option A	Option B	Option C
Technology	Radio Frequency Identification (RFID)	Radio Frequency Identification (RFID) & Molecular Tagging (MT)	I would not purchase either product.
Manufacturer	Major Brand	Store Brand	
Price	\$0.69/litre	\$1.09/litre	
Country of Origin	Product of Canada		
I would choose:	[]	[]	[]



Analysis

- Tests for pooling data when scale parameters allowed to vary suggest that **product-specific effects exist**.
 - Apple juice and salami data analysed separately
- Tests for pooling data across the information treatments show that **adulteration information matters** whereas positive technology information does not
 - Estimate pooled model for info treatments 1+2 and for 3+4 (apple juice); all information treatments pooled for salami
 - Conditional Logit and **Random Parameters Logit Models** estimated

Apple Juice RPL Model :

Info Treatments 3+4 No Adulteration Information

Variable	Coefficient	WTP (\$/litre)	Variable	Coefficient
Molecular Tagging (MT)	-0.208 (0.132)	-0.19 (0.136)	Nstdev.BuyNone	2.109 (0.000)
RFID	-0.409 (0.002)	-0.37 (0.002)	Nstdev.USA	0.507 (0.111)
MT&RFID	-0.590 (0.000)	-0.53 (0.000)	Nstdev.Canada	0.828 (0.000)
Product of Canada	0.615 (0.000)	0.56 (0.000)		
Product of USA	0.062 (0.601)	0.06 (0.602)		
Major Brand	0.559 (0.000)	0.50 (0.000)	Log likelihood	-1123.306
BuyNone	-2.98 (0.000)	-2.70 (0.000)		
Price	-1.107 (0.000)			

Apple Juice RPL Model

Info Treatments 1+2: With adulteration Information

Variable	Coefficient	WTP (\$/litre)	Variable	Coefficient
Molecular Tagging (MT)	0.238 (0.091)	0.29 (0.087)	Nstdev.BuyNone	2.227 (0.00)
RFID	-0.021 (0.876)	-0.02 (0.877)	Nstdev.USA	0.006 (0.996)
MT&RFID	0.063 (0.608)	0.08 (0.608)	Nstdev.Canada	0.862 (0.000)
Product of Canada	0.903 (0.000)	1.11 (0.000)		
Product of USA	0.299 (0.007)	0.37 (0.009)		
Major Brand	0.478 (0.000)	0.59 (0.000)	Log likelihood	-1118.666
BuyNone	-1.725 (0.000)	-2.22 (0.000)		
Price	-0.813 (0.000)			

Salami RPL

(All information treatments pooled)

Variable	Coefficient	WTP (\$/100g)	Variable	Coefficient (\$/100g)
Molecular Tagging (MT)	0.071 (0.485)	0.13 (0.182)	Nstdev.BuyNone	2.174 (0.000)
RFID	-0.028 (0.770)	-0.05 (0.771)	Nstdev.USA	0.477 (0.035)
MT&RFID	-0.040 (0.660)	-0.07 (0.660)	Nstdev.Canada	1.015 (0.000)
Product of Canada	0.869 (0.000)	1.57 (0.000)		
Product of USA	0.219 (0.007)	0.40 (0.009)		
Major Brand	0.447 (0.000)	0.81 (0.000)	Log likelihood	-2323.272
BuyNone	-1.647 (0.000)			
Price	-0.552 (0.000)			

Conclusions

- Initial consumer acceptance of the technology appears to be low, however, information matters.
- Highlighting the problems of adulteration reduces resistance more effectively than providing positive technology information
- The effects appear to be product specific across a juice product versus a processed meat product.
- Other proxy signals (country of origin, brand) resonate strongly with consumers and tend to have a larger impact on willingness-to-pay.

Acknowledgements

Funding provided by the Advanced Food & Materials Network (AFMNET)
<http://www.afmcanada.ca/>