

UNIVERSITY of GUELPH

Internal Tagging In-depth Research



Réseau des aliments et des matériaux d'avant-garde
ADVANCED FOODS & MATERIALS NETWORK
Inspiration from the ground up | Aux racines de l'inspiration



INFORMA

TABLE OF CONTENTS

EXECUTIVE OVERVIEW	3
Familiarity with Existing Tagging/Tracking Technology	3
Reactions to Internal Tagging.....	3
Segmenting Reactions.....	4
Considered Reactions	5
Acceptability Levels Related To Usage	6
Acceptability and Product Source	6
Reactions to the Study.....	6
Conclusions.....	7
Emerging Food Safety and Health Related Issues.....	7
Reaction to Internal Tagging.....	7
Background and Aims	8
Research Method	8
Profile of Respondents	9
DETAILED FINDINGS	12
Natural Health Product Purchase and Usage.....	12
Concern about Authenticity of Natural Health Products	14
The Integrity of the Food Supply	17
Reaction to Food Fraud Disclosure.....	19
Tracking Systems	20
Internal Tagging	21
Groups 1 & 2.....	21
Groups 3 and 4	22
Questions about Internal Tagging	25
Reaction to the Research	32
APPENDICES	33
Appendix 1 – Discussion Guide and Feedback Form	33
Appendix 2 – Concept Description Materials – Groups 1 & 2 and Groups 3 & 4	37
Appendix 3 – Q & A with Professor Andreas Boecker and Amanda Naum	42

EXECUTIVE OVERVIEW

Introduction:

Four focus groups were conducted among a total of 36 women between the ages of 25 to 65 and over who buy natural health products (NHP) for personal consumption. The sessions took place in a research facility located in Toronto on the evenings of Jan 19th and 21st.

The groups were equally divided between those who consume these products on a regular, on-going basis and those who are more sporadic in their use of NHP. In fact recruiting discovered that there was considerable overlap between the two usage patterns: some items are taken regularly while others tend to be used on a more sporadic basis.

This report presents reactions based on Groups 1 and 2 and Groups 3 and 4 rather than on frequency of taking natural health products because the stimulus material was adjusted from one set of groups (Jan. 19th) to the second set (Jan. 21st). The initial groups were exposed to a more scientific description of internal tagging technology; this information was substantially revised in content and presentation style as a result of the negative responses it evoked. The second set of groups was given a description and a mock-up of a press release reporting about the technology approval by Health Canada that would be more likely found on the internet. It is noteworthy that this approach tended to generate more positive reactions to internal tagging technology.

Familiarity with Existing Tagging/Tracking Technology

Most respondents are not familiar with currently available tracking or tagging technology, although they are confronted with daily examples of it such as barcodes and expiry dates. While the latter provides them with a guide to freshness, the former is used by manufacturers and retailers and has no meaning for buyers. Groups 1 and 2 exhibited such low interest in a hand-out describing barcodes and RFID that this material was not introduced in Groups 3 and 4.

Rather than relying on technology and obscure, behind-the-scenes tracking systems, consumers place their trust in the Canadian government as the lead authority in protecting the safety of food and natural health products/drug supply. There is very little awareness, however, of the Canadian Food Inspection Agency or which arm of the government is responsible for inspecting the food supply. Nonetheless, the federal government is seen as the bulwark of integrity followed by major brands, household names they trust, and powerful retailers (Loblaw and Shoppers Drug Mart). These public and private sector players act together and separately to ensure that only safe food and natural health products are sold in Canada.

However, trust levels are eroding; the solid and unquestioned, well-documented belief in the integrity of food of the past is now too-frequently disrupted by incidents to the contrary. For instance, the outbreak of listeriosis in famed Maple Leaf Foods' Toronto plant brought discredit to a trusted Canadian brand. Consumers' defense is to create a mental list of suspect food products (processed meat, for instance) which varies by the individual but could include items from offshore – China, India and other countries in the developing world. Also, some women extend their suspicions to include American food products, believing that the United States has less stringent quality standards than those practiced in Canada.

Reactions to Internal Tagging

The first question that internal tagging technology prompts is why is it being developed? Participants have had no media exposure of the problem; knowledge that this is occurring is closely guarded by industry and for good reason has not been shared with the general public. Respondents were shocked to learn that food adulteration is occurring to any extent in Canada. It is a sobering thought to consider that government and corporate strategies designed to protect the safety of the food supply are being attacked by unethical operators. Hence, internal tagging technology is being developed for a non-existent or hidden problem.

It was evident throughout all sessions that the majority of respondents were struggling to understand both the scientific and the less complex 'press release' descriptions of internal tagging. This is in line with previous studies showing that most Canadians have a low comprehension of the worlds of science and chemistry. And while people generally tend to view scientific advancement as a positive and potentially beneficial force, they have reservation about its application in the world of food. This is consistent with the current trend to reach out for more unadulterated, unprocessed food from local sources; concurrently, a growing number of people are questioning the health and environmental impacts of our industrial food system. It may have delivered on convenience and apparent abundance but is it really good for us after all?

The introduction to internal tagging prompted many questions, including:

- ▣ What is it? Is this tag real or artificial? Is there just one tag per product or one per ingredient?
- ▣ How does it work and who is able to test for it? Will it introduce a tracking system that will only be evident to manufacturers? Will consumers be able to determine whether a product has molecular tagging?
- ▣ Is it harmful to humans? What happens to these molecules if they accumulate in the system? Does it have long term negative consequences? (Despite best efforts, technology launched today may prove to be harmful in the long run.)
- ▣ Will it be exhaustively tested before it is released?
- ▣ Is it used elsewhere in the world or is this a first for Canada? While it is good to know that Canada is leading the way, does this mean that Canadians are going to be "human guinea pigs"?
- ▣ Will it benefit humans in any way or is strictly a protective measure for manufacturers/brand owners? Is government abdicating its responsibility by permitting the introduction of internal tags?
- ▣ Doesn't it add substantially to the cost of an item?

Segmenting Reactions

As the table below illustrates, respondents tended to fall into three categories – *Acceptors*, *Doubters* and *Rejecters*.

The first group, *Acceptors*, intuitively responded positively to the use of internal tags to monitor the integrity of product ingredients. They believe that this technology will be perfected and will only be released after it has been thoroughly tested. *Acceptors* appear to be more at ease or familiar with chemical names and scientific terminology.

Doubters and *Rejecters* are suspicious; neither segment was at ease with the concept. Will it 'pollute' the food supply in aid of addressing another problem? More importantly, what impact might it have on human health? *Doubters* however are somewhat willing to suspend distrust if the technology proves to be harmless and protects the food supply, while *Rejecters* simply do not believe that it can deliver the intended benefit without causing harm. Is this another example of well-intentioned scientists unleashing a technology that will be proven to be dangerous in the longer term? References were made to genetic modification, hormone replacement therapy and Thalidomide to illustrate this point.

It should be noted that *Doubters* and *Rejecters* have a low comfort or awareness level of science or the terminology that is used to describe internal tagging. For instance, reference to DNA caused alarm – are they introducing a foreign item that could negatively interact or disrupt natural systems?

Should the items you take have internal tags?*	Acceptors Yes		Rejecters No		Doubters Don't know	
	1&2	3&4**	1&2	3&4	1&2	3&4
Regular Users	6	6	6	1	9	4
Occasional Users	5	2	3	1	5	2

*The numbers above do not stand for respondents but rather are the tally of up to three responses to the question: "Please list up to 3 natural health products you take below. Then indicate whether these products should have molecular tags."

**Please note that the table and the other information in the feedback form tallies (see report for full results) is incomplete for Groups 3 and 4 due to lack of time to fully complete the form prior to the end of the session.

Considered Reactions

Concluding reactions to internal tagging were measured using a ten-point rating scale where 1 is No Confidence to 10 is the highest level of Confidence. It is important to note that Confidence averages for Groups 1 and 2 were based on all respondents completing this question, whereas only half (nine out of eighteen) Group 3 and 4 respondents did so. Nonetheless, several points are noteworthy:

- ▣ Ratings for Groups 1 and 2 and Groups 3 and 4 are dramatically different. Internal tagging was introduced to the first two groups using formal, semi-scientific descriptions that proved to be a challenge for most respondents. The upshot was that it created considerable alarm. Despite the best efforts of the expert team, most respondents remained in negative or 'wait and see' positions. This spilled out into the ratings that follow: the average ratings were lower for all eight factors – on average 2.6 points lower across all eight factors – whereas internal tagging was introduced to Groups 3 and 4 using a 'press release' designed for general audiences and as a result the ratings were higher for all statements. Groups 3 and 4 were addressed as members of the public – the announcement was devoid of words and terminology that had confused or alarmed Groups 1 and 2 – and it was presented as a report about a possible Health Canada document, which in itself could have added to the credibility of the information. While people might not fully understand what it means, the source is unimpeachable. Also, another possible reason for the difference is that one of the Group 4 participants was a strong, articulate and credible proponent of the technology.
- ▣ The difference in the scores for "I won't mind buying products with it inside" is 2.7, right in line with the overall average difference. It shows the impact of information on technology acceptance.
- ▣ Despite this major difference, all respondents agreed that internal tagging would have limited consumer appeal with averages of 3.9 and 5.4: "It would have wide consumer appeal" received the lowest rating along with "It is safe technology for now." In the discussion, both Groups 1 and 2 and Groups 3 and 4 agreed that internal tagging is still untried and that it must undergo more testing.
- ▣ Perceptions about the economic impact of internal tagging varied from a mediocre confidence rating of 6.7 out of 10 to a low of 4.6. This is a reflection of respondents' lack of awareness of the financial toll that food adulteration is taking on some companies.
- ▣ Looking at positive benefits of internal tagging, Groups 3 and 4 were far more likely to say that it would increase trust in food production (average confidence rating of 8.7) than Groups 1 and 2 (average confidence rating of 4.5). There was a similar gap between the two sectors on the issue of tagging improving food safety – 8.2 versus 5.7.

- ▣ The level of dis-ease with the technology was higher between the two sets of groups: Groups 1 and 2 appeared to be more inclined to think that it might be released prematurely, before it has undergone long trials. This was evident in the rating for “It will be properly tested prior to approval” – average confidence rating of 5.4 versus 7.6 (Groups 3 and 4).

Confidence Rating internal tagging: 1 to 10	RATING AVERAGE Groups 1 & 2	RATING AVERAGE Groups 3 & 4
It will increase trust in food production.	4.5	8.7
It will improve food safety.	5.7	8.2
It will be properly tested prior approval.	5.4	7.6
It will improve food quality.	5.3	7.3
I won't mind buying products with it inside.	4.6	7.3
It will bring economic benefits to Canada.	4.6	6.7
It is a safe technology for now.	2.8	5.7
It will have wide consumer appeal.	3.9	5.4

Acceptability Levels Related To Usage

Judging from the direction and content of discussion and written responses (items that should have internal tagging), respondents either considered that internal tagging could be useful or was not to be trusted regardless of whether it was used for natural health products, food or beverages. If they were relatively supportive of developing and testing internal tagging, then they tended to believe that it could be used in many different applications.

Acceptability and Product Source

One view persisted that challenged many respondents regardless of how they felt about internal tagging. It was likely going to be affordable for only “big agricultural business or large natural products companies.” Even if it was found to have no long-term effects on human health, the apparent complexity of this technology would render it financially inaccessible to small and local companies. This went against the rapidly expanding appeal of buying local and supporting small enterprises.

Reactions to the Study

Respondents were surprised and pleased to learn that they were being consulted at this early stage in the development of internal tagging, despite their personal concerns about this technology and the disclosure that food adulteration is a significant problem. The opportunity to learn more about tagging from the expert team helped to allay concerns to some extent, but it did not overcome all of the discomfort that the technology evoked in the majority of respondents.

CONCLUSIONS

Emerging Food Safety and Health Related Issues

Study participants reflected a widespread phenomenon that is occurring in Toronto and elsewhere in Canada regarding food. The traditional and social media is flooded with messages, stories and newly emerging findings regarding food and health. Word of mouth and grassroots activities are rife with examples of rapidly changing attitudes and responses towards food and its impact on human health, the community and local agriculture. Several studies conducted in Ontario and among Canadian samples indicate that the majority of heads of household are drawing a direct link between their health, the food they consume and the benefits of eating locally produced food (examples to be inserted).

Study participants also reflected increasing lack of trust in the safety of food, per se. This is an expected outcome given the seemingly continual series of food recalls, outbreaks of E.coli and listeriosis affecting major respected Canadian companies (Maple Leaf Foods and all their brands) and relatively benign items such as spinach. The study revealed that some consumers are attempting to protect themselves and their families by placing their trust in supermarket chains and/or major brands or shopping locally and accessing supply through farmers' markets, when available. This context is critical in understanding respondents' reactions to internal tagging technology.

It is worth noting that respondents were more comfortable making food and beverage choices than NHP choices. The rapidly growing field of natural health products and supplements is, for most, much less familiar.

Reaction to Internal Tagging

The purpose of internal tagging – namely, to address food fraud – is a problem that is not on the public's radar. Respondents were shocked to learn the extent to which it is occurring in the United States (\$10 to \$15 billion annually, source A.T. Kearny, *Consumer Product Fraud: Deterrence and Detection*, 2010). While some people distanced themselves from the issue by insisting that the Canadian government's inspection regime is much more stringent than their U.S. counterparts, this information confirmed their worst suspicions about dangers in the food system, per se.

Reaction to the new internal tagging technology was affected, to some extent, by both the content and the manner in which it was introduced. Generally, information couched in technical language evoked a negative reaction, whereas the more neutrally worded 'press release' about Health Canada authorization elicited less rejection. It is reasonable to assume that both the source – respected Health Canada – and the use of plain language/less scientific terminology produced this outcome.

Science is generally seen to be an essential tool in developing human and resource potential. However, its connection with food has become an issue of public concern, connected with such widely debated advances as genetically modified organisms (GMOs), functional foods, irradiation, chemical additives replacing natural ingredients and, more broadly, the industrialization of the food system. Increasing public alienation with science 'tampering' with food has helped spawn the growth of the local food movement. Some participants confused or imagined that internal tagging was akin to genetic engineering/GMOs.

Respondents' reactions to the concept of internal tagging were mixed, at best. A minority of women, who have a comfort level with and a basic understanding of science, were able to comprehend the essentials of the new technology. They supported the technology and called for further testing to confirm that it was safe. However, the majority of respondents either instinctively reacted against internal tagging or were not prepared to endorse it at this stage in its development. It is important to note that these segments were unable to comprehend the science of molecular tagging.

Some respondents suspected that this technology was costly and that it would have negative impacts on product prices for both consumers and manufacturers. Retail prices would increase and it would be unaffordable for small and possibly local enterprises.

The prime issue for 'rejecters' and those with mixed feelings about the tagging system is the possible impact will it have on human health in the long term. They appeared to be convinced that the molecular tag would or could interfere with natural systems and cause harm. Consequently, the technology potentially poses untold risks for those who consume products containing molecular tags.

The risk-benefit equation is skewed to favour industry. Molecular tagging is being developed to address problems encountered by manufacturers/food processors. It will benefit industry, but the potential long-term effects will be borne by people who consume their products – consumers will be the 'guinea pigs.' Hence, the majority of respondents hoped that a more 'precautionary principle' approach will be adopted; the technology should not be released until long-term, government monitored studies have been conducted proving that it is safe for humans to ingest.

BACKGROUND AND AIMS

Supported through an AFMNet grant, the Department of Food, Agriculture & Economic Resources (FARE), University of Guelph is studying the consumer response to molecular tags which could be added to food and natural health products. The intent of introducing this new generation of micro-biological methods is to enhance traceability and increase confidence in the authenticity of food.

While molecular tags would allow for greater precision and protection, will consumers view them as a positive step forward? In an era of frequent food recalls and tainted processed items, levels of concern about the safety of the Canadian food supply have climbed dramatically. Despite grave concerns, will consumers feel that this new technology will yield desired benefits sufficient to offset potential perceptual barriers?

The following in-depth consumer research study has been designed to examine reactions and perceptions to the introduction of molecular tags among health product users. Here follows a preliminary list of related topics that could be explored:

- ▣ Familiarity with existing traceability technology – Is there some awareness and how is it viewed? Perceived impacts on safety and product quality? What are the risks and benefits?
- ▣ Reaction to molecular tagging based on exposure to two options: sugar molecules and synthetic proteins (similar to DNA) – Are both seen as equivalent or are they different? Is one superior or more immediately desirable than the other? Perceived attributes and imagined impacts of the two options.
- ▣ Acceptability levels related to usage – Would perceptions about the benefits and risks of molecular tags vary depending on the application, i.e., natural health products and processed food/beverages?
- ▣ Acceptability and product source – Does the food or natural health provider have an impact on acceptance? Would small, local enterprises be more trusted than international, large companies/brand owners? When is it safe and when is it not?
- ▣ Potential impacts or associations with conservation of endangered species?

Research Method

A total of four focus groups were conducted in order to provide a wide cross section of in-depth reactions to the study issue among two different segments (detailed below). Given the non-randomized nature of focus group recruiting and the relatively small number of participants in each group, it was determined that at least two groups would be conducted in each of the two segments of natural health product users.

The consultant prepared a Discussion Guide and a brief questionnaire (Feedback Form) in conjunction with the client team to reflect the content and flow of the proceedings and to capture critical points. (See Appendix 1)

The sessions took place in centrally located professional research facilities in Toronto that are equipped with client viewing areas, a one-way mirror and audio and audio recording systems (includes back-up recording systems). Proceedings took place on the evenings of January 19th and 21st, 2010. Each session lasted for almost two hours. .

University of Guelph team members observed the sessions and provided expert information in each session, responding to questions posed by the focus group participants. A \$75 honorarium was provided to each participant.

Recruiting

The focus groups were recruited by a trusted national supplier using a screening questionnaire developed by the consultant. A total of ten respondents were recruited for each group; overall a total of 36 qualified participants took part in this in-depth project.

Informa Market Research is a member of the Market Research and Intelligence Association, Canada's market research organization, and as such adheres to standards set by the organization. This includes engaging only recruiting companies that belong to the Central Files system, as detailed below. This ensures that focus groups conducted by Informa include only people who qualify and avoids inclusion of the 'professional respondent.'

What is Central Files?

Central Files is a system of monitoring and tracking the participation of respondents in qualitative interviews and focus groups. It can also include any undesirable respondents reported by moderators as uncooperative or over-bearing.

How does it work?

Every month recruiting firms submit the names and phone numbers of all respondents who attended a group or interview during the past month.

While one recruiting firm can easily monitor the participation of respondents in their own database, it is impossible to ascertain whether a respondent has attended for another firm in the past month or the past 6 months. When each recruiting firm submits their attendees to Central Files, they can be cross-referenced and abusers are highlighted. Central Files checks by telephone number and first and last names. If a match is found in any of the three categories, the name goes on the "Do not recruit again" list. This list is sent monthly to all recruiting firms who regularly submit to Central Files.

Profile of Respondents

Recruiting criteria for all respondents:

- ▣ women, heads of household
- ▣ 25 years and over, including retired persons and seniors (over 65 years of age) based on review of attachment profiling of the health products market (Canadian Health Food Association's *Natural Health Products Survey 2005*)
- ▣ half of households represented had one or two occupants and half had three or more occupants
- ▣ half of respondents in each group have attended college or university
- ▣ a mix of occupations including retired persons
- ▣ approximately one-third of respondents in each group was born outside of Canada

The four groups were segmented into two purchase categories:

1. Two groups of regular buyers/users – personally purchase and use one or both types of health products (see below). Regular is defined as use on an ongoing basis; keep the product stocked at all times.
2. Two groups of infrequent buyers/users – personally purchase and use one or both types of health products at least twice a year but do not use on an on-going basis. Do not always keep in stock but use it/them from time to time. For instance, they may use Echinacea at the onset of a cold but not at other times.

Products that qualified as health products for the purposes of this study include these two types:

1. Omega 3, 6 and/or 9 (including plant or fish sources)
2. Herbal supplements for general positive impacts on health and mental functions, e.g., Echinacea, ginseng, ginkgo or garlic.

Tuesday, January 19th 2010, 5:30 Regular Users

Name	Age	Occupation / Industry	Number of people in household	Country of birth	Education
Nita	25-34	FT / Real Estate	1	Canada	College / University
Kim	35-44	FT / Insurance	2	Canada	College / University
Maria	35-44	FT / architectural	3	Brazil	
Sophie	45-54	FT / non-profit	3	China	College / University
Erica	45-54	Homemaker	3	Canada	College / University
Susan	55-64	Retired / teacher	1	Canada	College / University
Anne	55-64	Homemaker	2	Germany	College - completed
Dorothy	65+	Retired / banking	2	Canada	College / University
Doreen	65+	PT / admin	1	Canada	College - partial
Phyllis	65+	Retired / Interior decorator	3	Canada	College / University

Tuesday, January 19th 2010, 7:30 Occasional Users

Name	Age	Occupation / Industry	Number of people in household	Country of birth	Education
Julia	25-34	FT / ECE	4	Canada	College / University
Elizabeth	25-34	Student	3	Canada	College / University
Jamie	25-34	FT / financial analysts	2	Canada	College / University
Amisha	35-44	FT / human resource advisor	4	Canada	College / University
Caroline	35-44	Contract / Buyer (Manufacturing)	2	Canada	College / University
Joyce	45-54	UE / psychotherapist	2	US	College / University
Karen	55-64	PT / Sales	2	Canada	College / University
Jessie	65+	Retired / printing	2	Canada	HS – partial

Thursday, January 21st 2010, 7:30 pm, Regular Users

Name	Age	Occupation / Industry	Number of people in household	Country of birth	Education
Nikita	25-34	FT / telecommunications	4	Canada	College / University
Sonia	25-34	Homemaker	4	India	College / University
Sophie	35-44	FT / Customer Service	7	Hong Kong	College / University
Jane	35-44	FT / non-profit	4	China	College / University
Donna	45-54	PT / office manager	4	Canada	College / University
Margaret	45-54	PT / warehouse	4	Jamaica	College / University
Cindy	55-64	Retired / construction	2	Canada	College - partial
Teri	55-64	FT / Property lease administrator	2	Canada	College - partial
Diane	65+	Retired / legal assistant	1	UK	College / University

Thursday, January 21st 2010, 5:30, Occasional Users

Name	Age	Occupation / Industry	Number of people in household	Country of birth	Education
Vania	25-34	UE / non-profit	3	Hong Kong	College / University
Tova	25-34	FT / Teacher	3	Israel	College / University
Alicia	25-34	FT / medical receptionist	2	Canada	College / University
Becky	35-44	FT / education	4	China	College / University
Gillian	35-44	FT / clerk	3	Barbados	College / University
Carol	45-54	PT / Retail	4	Canada	College / University
Christina	45-54	SE / sales	2	Canada	College - partial
Mila	55-64	SE / editing & proof reading	2	Philippines	

NOTE TO READERS

Focus groups are valuable for providing an in-depth understanding of people's attitudes, perceptions and behaviour, and for generating hypotheses and creative material. A relatively small number of participants, in this case 36, and an open-ended information-gathering approach distinguish in-depth research from complementary large-scale statistical studies. Research learning should be viewed as directional only.

DETAILED FINDINGS

Introduction

The focus group proceedings were planned to gradually introduce the concept of internal tagging following preliminary discussion of related issues including natural health product usage and purchasing patterns. Respondents were not aware of what the central topic would be; however, they were informed by the facilitator at the outset that the project was being conducted to aid scientific development work being conducted by teams from University of Guelph and University of Saskatchewan, funded by the federal government. Also, respondents were informed that a team from University of Guelph was observing the session and that they might be called to join the discussion at some point in the proceedings.

Natural Health Product Purchase and Usage

Natural health products play a more or less significant role in respondents' proactive healthcare routine, depending on a variety of factors usually related to personal beliefs about their role and potential efficacy. It also can be affected by the amount of time and money available or allocated to personal health and their age/stage in life. For instance, the more mature women tended to have developed a regime that they viewed as age appropriate – there were several references to post menopausal conditions that prompted a renewed focus on health and well being, whereas some women in the family rearing stage of their lives tended to pay less ongoing attention to their health, resorting to fast-acting supplements to increase energy or supplements to replace essential nutrients (lactose intolerant respondents used substitutes).

The tables that follow on the next two pages list the products that respondents indicated they were using on a regular or occasional basis. It is noteworthy that Groups 1 and 2 cumulatively mentioned 20 different NHP, vitamins and supplements while Groups 3 and 4 listed 14 options. Also, the list for Groups 3 and 4 included items that do not fall under the NHP/supplement umbrella such as milk, juice, baby food or frozen food – possibly these items were listed because they were boosted with added vitamins.

Natural Health Product Use: (Group 1 & 2)	Use regularly/On an on-going basis	Use once in a while/ Occasionally
Omega 3, Omega 3 & 6, Fish oil, Flax seed or oil	8	4
Calcium and/or Magnesium	8	3
Multivitamins, Vitamins unspecified (1)	7	1
Vitamin D	6	1
Echinacea	5	6
Vitamin C, Ester- C	4	4
Vitamin B / B-Complex	2	3
Glucosamine	2	1
Acidophilus	2	-
Herbal Teas	2	-
Vitamin E	2	-
Ginseng	1	3
Greens Powder	1	-

Natural Health Product Use: (Group 1 & 2)	Use regularly/On an on-going basis	Use once in a while/ Occasionally
Aspirin (sic)	-	1
Bromelain	-	1
Cranactin	-	1
Grape Fruit Seed Extract	-	1
Iron Supplement	-	3
Manganese	-	1
Quercitin	-	1

Natural Health Product Use: (Group 3 & 4)	Use regularly/On an on-going basis	Use once in a while/ Occasionally
Multivitamin, Vitamins unspecified (1)	6	1
Omega, Omega 3, Swiss Omega 3	5	2
Calcium, Caltrate	5	-
Vitamin D	3	1
Probiotic	2	-
Vitamin C	2	1
Formula (milk powder), Milk	2	-
Acidophilus	1	-
Baby food	1	-
CoQ10 (aka ubiquinone, or ubidecarenone)	1	-
Echinacea	-	1
Frozen Food	-	1
Gingko	-	1
Ginseng	-	1

Some respondents view vitamins as a separate category from natural health products (NHP). Vitamins are regarded as being more like drugs with monitoring systems in place, while some respondents claimed that NHP operates under a less strict regime. Some participants described vitamins as a source of nutrients delivered in food or a way of replacing nutrient-deficient produce.

I think vitamins are considered almost like a medication. They have a drug identification number, so they're inspected, whereas I think some natural health products aren't. They don't have a drug identification number on the actual package, so you don't really know what you're getting. I'm not sure.

I take one capsule with multi-vitamins and minerals, because I don't know what should I take, but I feel like I need to take. And I ask my family doctor and he said, "Oh, you don't need anything, because you eat everything. You're not a picky eater." But I feel like I should take something, because nowadays the vegetables from the supermarket, it's not like before. I read an article that says the nutrition from one pound of spinach before, now you have to take 70 pounds.

I don't think anybody really knows exactly what we should take, but it is a fact that the ground is not the same as it used to be. There's nothing in the ground. Everything is not as good as it used to be.

Study participants tend to be taking their advice from several sources in addition to doctors; their natural health product choices are influenced by friends/word of mouth, advertising/media, the internet, health food retailers, etc. A whole host of factors shape their choices and potentially their reactions to the NHP they are ingesting.

While measuring efficacy was subjective, several participants expressed doubts about the impacts of the NHP they were taking but persisted 'just in case' it was helping. Here follows an example of users questioning the efficacy of echinacea.

Participant A: I've taken echinacea when I start feeling a little bit not so...

Participant B: I take that, too. Do you think it works?

Participant A: I think it does.

Participant B: I like to believe that it works, which is why I think I still take it, although – well, I haven't been sick in a long time, in a while.

Participant B: It's like Cold FX, I assume. It's along the same line? Sometimes if I feel a cold, I'll take it. Sometimes it works. I don't know if it's psychological, I don't know if it really works, I don't know if it stalls it from coming out, the cold. Like I said, I don't do it regularly, but if you catch it may be right in the beginning.

According to some women, some vitamins are made with natural ingredients, while other lower priced brands had less costly artificial component. These buyers tend to select by brand while others do not draw this fine distinction and buy the store brands or those that are widely available (Jamieson, Life Brand, etc.) and sold at a lower price.

Many women agreed that today's consumer has to be very vigilant because things have changed so dramatically. Now without their knowledge, food contains potentially unsafe elements such as genetically modified organisms, animals are fed antibiotics and growth hormones, cows no longer eat grass, etc. "It is not the same" (as in the past).

Concern about Authenticity of Natural Health Products

The level of concern about the genuineness of natural health products varied considerably, with some women expressing considerable interest in this topic. They appeared to be particularly concerned that the NHP category was largely unregulated, believing that the untested products with questionable quality ingredients could be legally sold in Canada. Yet concerns did not stop at NHP but also included over-the-counter and possibly prescription drugs.

My concern is that we don't know what are in a lot of these products, and of course we want them to be high quality. But then, on the other hand, I think there's more danger from over-the-counter drugs like Excedrin or Tylenol or whatever. There have been deaths from those kinds of things, and I think there have been hardly any bad occurrences from natural supplements.

One of the ways of dealing with these uncertainties is information, which respondents indicated is widely available over the internet. They might try to 'inoculate' themselves against fraud or counterproductive 'remedies' by sourcing the facts from a variety of sources including nutritional counselors and other experts; health food stores tend to have knowledgeable people who can provide help to customers. The market for natural health products and supplements has mushroomed, providing interested shoppers with many options, depending on their needs.

Strategies to buy the 'real thing' include choosing quality brands which often have higher price points than the competition such as Sisu, Natural Factors and Genestra.

If you're spending more money, you always think that you're getting better than if you're spending less.

I like to take Sisu in the calcium because it doesn't have any additives, whereas before Sisu I was taking stuff from Shoppers Drug Mart, and the calcium was made from an oyster base or fish or something.

Because I take the GNC, and I used to just buy from Shopper's, and it didn't do anything for me. And I started taking the GNC omega 3, the one for women, and my body feels different taking it compared to the Shopper's. I didn't feel any difference.

Also, some respondents place considerable trust in the integrity of some retailers who stock 'big names.' They get comfort not from price but visibility, opting for brands that have high retail exposure.

I think I would choose the one I see on a daily basis in almost all the stores. I can find it, like Jamieson you mentioned, and even the Shoppers' Drug Mart, their own brand name, Life, even the Costco brand, Webber.

It's definitely a concern, I think, for me, now more than ever, just in terms of the media and just what's going on, just the trends. There's more information now available, ever since the inception of the internet, and the world is such a smaller place and there's so much out there, it gets people worrying about and wondering about now, sort of scrutinizing everything you buy and everything you pick up at the grocer.

Regulatory Authorities

There was some suspicion that full testing is not the norm for natural health products, but this was not widespread. As the below quote illustrates, many respondents are not aware of which Canadian authority is responsible for regulating natural health products.

What concerns me is that the industry is not very well regulated. I feel like a lot of the natural products, they don't have to pass a lot of testing before they're allowed to be put on the shelves here. I don't know if there is a regulating body or who regulates it in Canada.

I think that what they put on there is absolutely correct, because otherwise they could be liable. If they don't say what they haven't put in that they should maybe have put in, or the quantity that they should have put in and maybe didn't quite – it may be not quite as much or something. So really, unless you are a chemist and you can analyze these things, I don't see how the ordinary lay person can know precisely which one is better than the other.

Most respondents, however, seem to assume that generally Canada is quite diligent in this regard and that there are regulations applying to labels and product claims, if not the actual product ingredients. It is worth noting that there was no familiarity with the Canadian Food Inspection Agency. One woman mentioned that Canadians were protected by the FDA; others in the group seemed to concur.

Yeah. Even though it's natural and it doesn't go through the same process that a prescription drug would go through, they still have their standards where they make sure that the natural whatever is safe, whereas in the States I hear it's very different.

While people agreed that regulations and application of these rules is important, some women expressed concern about over-regulation and thus restricting access to new options. It is possible that this perception is a by-product of the view that North America is awash with many prescription and over-the-counter drugs that have questionable impacts at best, given that some respondents were born in Europe or elsewhere.

My concern is that we don't know what are in a lot of these products, and of course we want them to be high quality. But then, on the other hand, I think there's more danger from over-the-counter drugs like Excedrin or Tylenol or whatever. There have been deaths from those kinds of things, and I think there have been hardly any bad occurrences from natural supplements. So while on the one hand I'm concerned that they be of high quality... I'm a little bit leery of the government getting too much control so that we don't have access, because I've heard that this has happened in Europe.

Some respondents, particularly those over the age of 50, expressed concern about the impacts of mixing prescription drugs with over-the-counter remedies and natural health products. Nonetheless, they do seem to be turning to their doctors or pharmacists for answers.

They say a lot of the natural products interfere with whatever script drugs you could be on.

Commonly Used Safeguards

Respondents tend to place their trust in the brand and/or the retailer, assuming that these two factors ensured quality ingredients. And, as indicated in this quote, some natural health product consumers seek out products made from natural rather than artificial ingredients.

I go to a good shop to find a good quality. The product is good quality by its naturalness, the natural one.

...people in Germany would go to a naturopath before they would go to a doctor, and I was always told that Swiss products are very well monitored in Europe, so I wouldn't worry if I bought – I think it's called Swiss.

A small number of respondents divided brands into two categories: the quality ones such as Sisu and the ones that should be avoided based on poor quality. Jamieson and Shoppers Drug Mart Life Brand were mentioned in this latter category. This point created some dissonance as the natural tendency is to trust big brands; possibly this rule of thumb is faulty?

Some respondents turn to friends who have experience with a particular NHP or supplement for advice. If they are credible, respected individuals, their guidance can be influential in deciding whether to buy or not to buy, as indicated below. Numerous studies reveal that word-of-mouth recommendation is a very powerful force and can hold more weight than other sources, possibly more than expert advice.

I would actually read and compare the ingredients on the labels. I actually read them, and I would trust it if a friend of mine had it or a co-worker, then I would trust by word of mouth. They tried it; it's good, and all that, that would be proof for me. I usually am the person to wait and see, so I'll let somebody else try it, and if this is good, then...

... because somebody tried it and she said it works, and then she said, "Oh, I usually take this brand and they are good," so you go for Sisu, Natural Factors and whatever others, even though I haven't taken them before. But because you know that friend, of course she's a friend, and you know it works for her. And also, in the office, you talk with other people, "Oh, I have this problem," and they recommend some other...

Problematic Ingredients & Price Levels

Several women noted that they are concerned about high level of sodium in processed food and possibly natural health products. Could this ingredient and other 'fillers' be the factor accounting for the price difference between the premium and the bargain priced natural health products? This fine point did not seem to be a major concern for most participants.

Generics also roused suspicion; according to some respondents they were not identical formulations and might pose a danger to some users. Some women believe that the higher priced original product is superior in quality.

The generics, and a lot of the generics have milk products and other additives that are added to the generic that really could cause a lot of problems if you're lactose intolerant or you have other allergies. And it really isn't stated. You go to the pharmacy, and anyone that's over 65, they'll slip you the generic unless you really squawk and pay the difference...

Pending Legislation (Bill C?)

A small number of respondents noted the potentially negative impacts of pending legislation that would place obstacles in the path of the natural health products industry in Canada. One of the outcomes with the passage of Bill C would be to effectively shutdown smaller and possibly higher quality manufacturers in favour of a handful of big brands, akin to 'big Pharma' in the natural health products sector. This information has been passed along to some respondents by people engaged in the natural health sector.

I'd rather take poor quality supplements than there be a law that says we have no access to them. It's sort of up to us now to pick what we think is good, but if this bill goes through, I think it'll be terrible. I'm afraid.

I think the industry's heading toward the same direction as the pharmaceuticals, where there'll be like four major companies that will produce all of the natural products, and it'll all be big money behind each company – which is kind of unfortunate, because I think we'll miss out on a lot of other stuff that comes out that maybe smaller companies will supply and newer stuff.

THE INTEGRITY OF THE FOOD SUPPLY

As the discussion transitioned away from NHP into food, respondents were asked: *How do we know that what they say on the package is indeed what's in there?* While it tended to take time for respondents to adjust to the issue of adulteration in the food supply, once the discussion ensued it was evident that they were addressing a more familiar category of purchases. It would appear that respondents are more confident in their choices of food than for natural health products and supplements, as indicated below.

...when it comes to foods, I feel more confident in my own ability as opposed to these natural pills and stuff.

This question evoked a limited series of responses which included reference to the ambiguity or downright misleading nature of packaging descriptors. Respondents frequently mentioned juice to illustrate their product scrutinizing process. For instance, while the label may read “pure...” a closer scan could reveal that only a fraction of the product is as billed. Respondents appeared to be inured to misrepresentation generally, and to processed beverages and food specifically. For them it came down to caveat emptor – buyer beware. Shoppers have learned that they must examine labels carefully to determine exactly what they are buying; they can no longer take things at face value.

A lot of times I don't think it's real, because when you see a box that says “apple juice” or “orange” (I'm not talking about juice boxes, I'm talking about real fruit), then you flip it and you look at the content and it's like point something percent. But they say it's made with real fruit because, yes indeed, there is...

...what you're really seeing up front is deceiving.

Product labels including visual elements and product descriptors play a central role in the selection process. And while there is a belief that Canadians are protected by laws, at the same time respondents admitted that product labels can misrepresent or distort the purity of a product. Nonetheless, several respondents confessed that they are prone to believe what they read on a package. For instance, if the choice is between an orange juice and a line extension that has added calcium, they might buy the enhanced option in the hope that it has more good things in it.

I think there was an FDA – I don't know if it's called a by-law or an FDA standard that was placed I think two years ago or three years ago that all products have to have a label on them, and it must list everything inside that product.

I have faith that it's being regulated by the government, and, as you were saying, I read the list of ingredients, and of course the higher content ingredient is always listed first, so I always look at that, and I always look to see the percentages of carbs or sugar or whatever is in it. So I put a lot of faith that the things that are listed are (inaudible).

Food shopping can be a mine field of distortion and misrepresentation. By law, processed food and beverage labels must now include a list of ingredients and a standardized list of nutritional content to help consumers wade through the potential distortions of misleading product descriptions. Respondents noted that they do pay attention to the labels, especially when they are buying an item for the first time. They are in the habit of scanning for the types of ingredients and the volumes they represent, in search of items such as notorious trans fats, levels of sugar and sodium and, for the lactose intolerant, milk/dairy ingredients. There was some concern about the time some manufacturers are taking to reduce or eliminate unwanted ingredients.

In addition, some diligent shoppers noted that they avoid processed products as much as possible or those that contained unpronounceable chemicals. If the ingredient is unfamiliar and appears to be chemical in nature, then it doesn't belong in their shopping basket.

Also, shoppers in search of guidance on wise food choices were befuddled by the efforts of respected groups such as the Heart and Stroke Association and the products it recommends bearing the Heart Healthy logo. While it was

apparently designed to help shoppers make healthier choices, recent media stories question some of the potentially 'less-than-healthy' products that were licensed to carry it.

And we have the Food and Inspection Agencies. We have agencies that protect – that inspect and look after the food that you eat. There's no way, looking at a label of something processed, that you can tell ...how much sodium diphosphate is in the food. You don't know that. I try to, just like you said, kind of look at the labels and look at the ingredients and make good choices of things that I know, and cook things properly and keep things clean and things like that. So I don't think that any of the processed foods – we don't know what we're getting when we open that package. We're looking at the label and we assume that it's safe, but we don't know.

Because even with the – I don't know. They had this thing on one of the shows I watch. I think it's the Heart Healthy or Eat Smart, something like that.

It's like when they say it's sugar free or fat free, but then it doesn't tell you there might be 300 grams of carbs. So you can drive yourself crazy.

Selecting organic food and natural health products is how some respondents ensure that they are obtaining uncontaminated goods. Others viewed organics with a jaundiced eye – Can these 'organic' labels be trusted or are they simply a way of getting more money? While shoppers might trust the retailer, they are not confident that higher priced say broccoli labeled organic is really any different than the conventional option selling for a lower price. Respondents did not seem to be aware that there is a Canadian organic label to ensure that it has been produced without certain inputs.

But once it winds up in the store, how do we know if it's organic or not?

No-No Ingredients Not Authentic Ingredients

The amount of sodium, sugar and fat in processed food was mentioned in regard to food authenticity; these well known 'baddies' ingredients were of much more concern than the substitution of ingredients. Indeed, the introduction of the notion of "authenticity" in the context of food tended to be greeted with surprise. This issue is not in the common domain – people simply are not aware that this is a problem in Canada. Very few respondents indicated an awareness of food and drug adulteration.

Brand Loyalty, Retailers, Organic and Local

Brand names can be beacons of assurance; several respondents indicated that first and foremost they place their trust in particular well known brands. Established, high visibility major brands build their reputation on providing consumers with consistent products. Belief in the mega names is also matched by the credibility accorded to major supermarket chains. Canadian chains have gone one step further by spinning off their own house brands, such as the ground-breaking launch of the President's Choice line of products, followed by Metro and Sobeys' own house brands. Consumers assume that these lower priced options are made by the mainstream brands. The thinking seems to be, if you trust the supermarket chain, then the house brand is considered to be a safe choice.

I'm a great believer. When I shop, I have brand loyalty. I trust certain brands. I will never buy no name, absolutely never... basically my shopping is always the same. I trust Loblaws with their organic. I buy a lot of organic foods if I haven't got a farm handy. That's where I put my trust, and I've never been disappointed. I don't mean Del Monte or whatever (that's a name that comes to mind) or whatever. Whatever product I buy, it is brand loyalty first. So I kind of trust that they're doing the right thing.

Those things that we're using regularly – it's a kind of you can say brand name or the trust that we have in a particular product which regularly we are using. If something new is coming up, then definitely we're looking for the market value or what others say is coming.

Well, I would assume that Loblaw's and No Frills and Sobeys, you would have to trust them, absolutely. Because they're trusted names.

Also, the opinion of others also counted in assessing the merit of a new product – what were other people saying about it?

Country of Origin – Canada Means Quality

Country of origin counts – or at least it used to be meaningful prior to the introduction of new Canadian designations. Now there appears to be some confusion surrounding the meaning of the terms “Made in Canada” and “Product of Canada.” Which one of these applies to a product made in Canada with Canadian ingredients? Some respondents have a strong preference to buying Canadian and locally sourced fresh and processed foods.

In general, respondents agreed that Canada’s food is safe; standards might even surpass those in the United States and certainly are head and shoulders above those of the developing world. For example, food processed in India and China, to cite two major references, arouse suspicion and should be avoided. One woman mentioned that wine made in Austria had been tainted with anti-freeze.

I think there’s an awful lot of food that ends up on the grocery shelves that are mislabelled, and one example not that long ago with the whole – the melamine in the baby formula in China.

If it’s made in Canada, if it’s a Canadian product, I have more trust in it than even U.S. products. As long as I know that the Canadian government – and mind you, there’s flaws in Canadian government, too, but as long as the Canadian government is behind it, regulates it, then...

They (Canada) have better controls, for sure, than any of the other countries, including the U.S.

It wasn’t the Canadian ones, it was the American ones.

Yeah. Well, nothing’s really regulated there (United States). You can get anything in the States easily.

Although the level of trust with unknown brands from offshore countries varies, some women admitted that they were willing to try new things such as cookies or chocolate regardless of where they came from. Shoppers are daily confronted with new offerings, and while they might be wedded to certain brands, they are also tempted to experiment; the modern consumer has the benefit of selecting from an ever expanding array of items. This is both the joy of shopping and a potential minor peril.

As a consumer, we are vulnerable. You have to try something new. Otherwise, what can we have? The market, they always have something new. The older stuff we like, maybe it won’t exist anymore. So every day when we go grocery shopping – every time when we go shopping, I try to buy something like I used to, but always try something new. Then sometimes you like it, then you will keep it, go buy it. Otherwise, you give up. Sometimes I used to comment, “Oh, I waste money, I don’t like it and nobody likes it.” Then sometimes it’s a challenge.

Reaction to Food Fraud Disclosure

Most respondents were shocked to learn that this is occurring, and that it is going on to the extent it is – up to 10% of the food supply. This was extremely threatening information which prompted a reaction with some respondents. They place their faith in particular retail chains or the brands or the popularity of an item.

I think it comes down to what retailers you pick, too. There are some retailers out there who I never buy food from, like certain discount chains and dollar stores that I absolutely never buy food from, and I’m sure there’s probably a lot of tampered food on their shelves.

I knew there was some. We’re just saying when the gentleman said that, how prevalent it is, I was surprised to the extent it’s been tampered with.

My immediate reaction, both to the end part and the first page, I had no idea that it was so prevalent, this fraud, in the food industry, of \$10 to \$15 billion per year. Wow. I had no idea. So if something’s going on there, I’m glad they’re addressing it, but I’m confused as to what internal tagging – what this term is.

While it was unsettling to learn the magnitude of food fraud (\$10 to \$15 billion per year in the United States), some respondents reasoned that it was not surprising. The marketplace is populated by competing brands trying to appeal to consumers; given this context, some level of distortion or misrepresentation can be expected. This revelation tended to precipitate comments about processed foods that had shocked them when they had read the ingredient labels including Krispy Kreme Donuts, baked goods and canned fish. These revelations and food recalls are common occurrences – what was the consumer supposed to do? One particularly pragmatic respondent reasoned that manufacturers bend the truth in order to appeal to consumers, and this is an inherent by-product of marketing.

...but they will say what we want to hear, and they will say it in the proper verbiage. They'll say, written in the fine print properly to protect themselves, but it's what we want to hear, it's not necessarily the truth. And for that reason, that's why there's a lot of fraud in the industry and in other industries as well. I mean, I think that the whole concept of marketing in general is to promote, not to necessarily say the truth.

What systems are in place to protect consumers? Some respondents mentioned that 'government' inspectors ensure that restaurants and food service operations follow the regulations. There is an assumption that local public health inspections might be active in protecting the public against food fraud.

The solution to food fraud for a few respondents was to simplify or de-industrialize the food system, which means returning to local, grassroots sources. They prefer to establish relationships with their food suppliers by shopping at small-scale stores and farmers' markets. Relocalizing the food supply and distribution systems was their answer to food fraud, and in the process it helps support the struggling Ontario rural sector.

I'm just wondering if the idea that we're supposed to eat only things grown within 100 miles or something, I wonder if we're going to have to go back to eating more locally, so there's more control, so it's more natural. And even to pay more – if we have to pay a little higher for our food, but if we have the confidence that it is what it is to be and we're supporting our own farmers, I think I would be very happy with that.

The information about food fraud prompted a sea-change in some people's perceptions about food and how safe it is. In response, some respondents reflected back on recent shock news items such as the use of melamine in products manufactured in China or strange incidents of misrepresentation: a bogus version of Colgate toothpaste manufactured in Eastern Europe sold in Dollar Stores, and pseudo pashmina scarves selling for under \$10 – another example of a recent instance of consumer fraud. When they thought more about it, it did make sense to find a way of better protecting consumers. They reasoned that it was impossible for the Canadian government to inspect all food products.

You've got to rearrange your grey cells and think about it, the billions of dollars wasted, the fact that... On the tampering of the foods, I knew some was going on, but not to that extent.

TRACKING SYSTEMS

In order to aid discussion, respondents in Groups 1 and 2 were provided with a handout describing two common tracking systems – barcodes and radio frequency identification (RFID). Neither item generated much discussion. The presence of barcodes on packaged items is seen as method used to track products and not meant to directly aid consumers, while RFID tags drew a blank. Only a few respondents had come across this system in the course of work.

INTERNAL TAGGING

Introduction

The issue of internal tagging was explored using a series of steps. Initially, the facilitator introduced the concept, accordingly: “it involves adding or inserting a molecule, a molecular barcode, at the manufacturing stage, which means that the source and the identity of the product ingredients can be tracked from that point.”

The first set of focus groups, Groups 1 and 2, were introduced to the test concept using a series of three hand-outs (See Appendix 2). Reactions ensuing from this material indicated that the test concept should be introduced using more simplified written material, written for the general public. The subsequent two focus groups, Groups 3 and 4 were presented with a mock-up for a press release, *Health Canada approval for internal tagging technology*.

Before proceeding, it is important to note that the ability of the study participants to comprehend the concept of internal or molecular tagging varied considerably depending on their level of science literacy. A minority of respondents indicated, when asked, that they had studied science and/or that they were interested in it, however, many of the participants admitted that they were challenged in this regard. Consequently, the ability to read the test descriptions and to ponder the implications was severely constrained in many cases. Hence, the ‘science illiterates’ tended to react instinctively to the concept.

Groups 1 & 2

Initial Reactions Based on the Hand-out

The text presented many of the respondents with a great challenge – the density and inclusion of scientific terminology acted as barriers. It appeared that many readers stopped after trying to read it word for word and then resorted to scanning in search of key phrases. Some words sent them down negative routes, evoking concerns about molecules, manipulation and mysterious scientific processes with, they suspected, potentially negative outcomes. Examples of words, terms and phrases seemed to be particularly potent in triggering reactions to the concept:

In the next paragraph, it says “the technology,” and down about the middle it says, “These are short, unique combinations of DNA building blocks that can be chemically synthesized.” That set off alarm bells for me, “chemically synthesized,” because I’m looking for natural, organic products.

Well, it says it’s not genetic modification, but it sounds like it is.

Despite being somewhat confused and possibly ill at ease with the concept, some respondents indicated that disclosure is a positive sign. Even if the description of the process is beyond the understanding of many lay people, it indicates that transparency is appreciated.

But it’s good, because some people will want to take the time to read up on it, so I think, if they’re transparent and they offer this, then even though you and I don’t really – this isn’t going to be our bedtime reading. If people want to take the time to do the research, at least it’s available for us. So I think it’s positive.

Others, possibly more comfortable with the text subject or scientific terminology, voted for full disclosure even if it might befuddle the majority of people. They held that the facts should be made available, regardless of how much or little the general public understood them.

When you explained that it can be chemically synthesized, I’d like to know – okay. I understand it’s synthetic, but what is it exactly? If we’re like ingesting whatever it is, it’s good to know it’s synthetic, but it’s made of what exactly, to be more clear about it.

Reaction to Photo (Scale of a Molecule)

Respondents seemed to agree that the example leads them to believe that this molecule is large, sufficiently large to prompt concerns about the impacts that may result from their accumulation in the human system.

But if you take a lot, they're going to add up. What are they going to do to your internal molecular structure?

Groups 3 and 4

Initial Reactions to the Press Release: Health Canada approval for internal tagging technology

The level of comprehension was marginally improved by introducing the test concept using plain language; nonetheless, some respondents were more able to grasp the meaning than others, as this quote clearly indicates:

Participant A: Yeah. It's heavy going, because I don't know what a tag, what exactly it is.

Participant B: A molecular constellation of the chemical compound of a product. Everything has a molecular structure. Even this table has a molecular structure, and so tags, from what I'm getting, is they're saying that they can make these molecular tags which is a duplication of the natural product, if I'm understanding it.

Participant A: I can't understand it.

As noted earlier, some participants read the press release with relative ease while most of them found that it was beyond their scope of understanding. The latter group was divided into those who seemed to be willing to learn more and those who reacted against the proposed new ingredient tracking system. As the following quote indicates, this respondent imagined that the new technology would be presented as a product feature on the label. Was the consumer expected to understand this? What possible benefit would consumers derive from this new technology?

I think it's a whole lot of hooey to confuse a lot of people who are not familiar with internal molecular constellations and all of that. I'm not familiar with it. If you start producing this, could you imagine on a can, if it'd say something like that, consumers would say, "What the hell does that mean?"

However, a handful of respondents appeared to grasp the basics – although some people deduced that consumers would be alerted to the presence of internal tags.

I think it's good. I think it will benefit the consumers, as indicated here, because it is difficult to copy. So if you have the internal tag there, it's a sort of registered thing in a way that is meaning to say, "This product really has all these ingredients." So it's telling the consumer that there is no adulteration done on that – or if there is, then it is what it is.

Summary of Reactions to the Concept - Groups 1 to 4

Immediate reaction to the concept was scattered – some people seemed to instinctively respond positively, others were immediately uncomfortable and many simply seemed bewildered by it. In addition to being introduced into the unfamiliar field of science, possibly respondents were still reacting to the news that there is considerable food fraudulence in the industrial food system.

Mine aren't really positive. It reminds me of genetic adjusting or something, and just to have something internal, a molecule, it's sort of upsetting. It doesn't seem like it's a natural product anymore, because it's got that put into it.

I think it's a good idea. I don't have a problem with it. It's a better way of tracking it and knowing the origins. Everybody said they were concerned about that, so that's one way of identifying it.

But if you were able to track down an egg from where it comes from, then you could see, oh, the source is like guaranteed in everything, because you can track it down. So it's perfect, and you're not modifying anything, the DNA of anything. You're just inserting a molecule.

Positive Reactions

Here is a series of quotations illustrating positive reactions to internal tagging, based on a written introduction to the concept. These respondents seemed to be able comprehend the meaning of a molecular tag to the point of understanding its potential benefits. They understood that it was a pre-emptive measure against food fraud, protecting consumers against adulterated products before they were released into the mass market, and that it could be used to track items that did not belong in the food supply.

It'd be like a failsafe if something maybe went wrong.

If you got sick or something, they could track it. Maybe it was from something that was in that.

I think, once perfected, it's going to be great. I don't think they're going to roll this out until it's at a level where it's going to be researched and many hands making it viable for people, I think. I'm all for it.

I think it makes all the difference for everything: health products, any product. The other day I was having a discussion with a friend about organics. Is that really organic, or are they saying it's organic? If you're buying something which has a symbol of several stuff together and you keep thinking to yourself, is this really fresh? This is the way. If it works, it's a way of tracking and knowing for sure.

I think it's good for us to have it, not only as a guarantee for the consumer; it's also the things, the rule for the producers, they have to be careful and they are more careful for what they say they're promoting, because the consumer, we don't know. We just go with them. But if we find anything wrong, now there's a tag. They can be tracked. So the manufacturer has to be more careful to take more serious responsibility for what they produce or provide. So it's for both sides. It's a guarantee, I think.

Nonetheless, some of the respondents who were positively disposed to the technology could see that others in their group had reservations. They wondered if people could be persuaded that this technology is being introduced for beneficial reasons. Given the monumental task that the Canadian government has in monitoring the food supply, this technology could act as a useful tool for these purposes.

I think that, because it's a new idea and a lot of people are adverse to change, I think there's going to be a lot of people that are adverse to this (supporter of internal tagging).

Yeah. I think, though, that by making the purpose clear, I think that it's important to communicate to people that they're doing that in an effort to help what's currently going on, because I know right now in the U.S. (just to use the U.S. as an example), the FDA is way less strict than the regulations in Canada and things are widely available and accessible, and they do have a lot of serious cases with fraudulent activities happening. You buy a product, even legally at a pharmacy or whatever the source is, and it's questionable what's actually in that particular script or natural health product. So I think that, by doing this, it might be able to be preventive and cut down on that happening.

Internal tagging would protect the quality of products and provide assurance to the brand owner. Some respondents assumed that the internal tagging would provide an internal check for the manufacturer's purposes only. Others were unclear where the consumer came in on the issue – would consumers know that certain products they are purchasing have internal tags?

They believe that this technology could reduce food prices; at the very least it could result in cost avoidance by adding trust in the quality of food. A few respondents suggested that the upshot could be that people might be less likely to seek out costly local/organic food as a way of ensuring that they are buying quality. Coupled with brand loyalty, this extra defense would or could help contain food costs.

I think a lot of people can't afford to maybe eat locally, eat organic. It's going to be difficult for people. So I think, with technology like this, when that rolls out and it's implemented and tested thoroughly, it will reduce costs for people. I think you will be able to have brand loyalty, but you'll also be able to have product loyalty. You'll be able to pick up a

product, buy it, and know that it's gone through these checks and balances and it's going to be priced at a regular price. I think it helps, I think, overall.

It was hoped that the technology would protect consumers from manufacturers who make false claims; the products must live up to their ingredient claims. For some people, it was not a price issue; rather, it was about the veracity of claims. However, some respondents persisted in linking fraudulent ingredients with lower priced products or 'strange' brands sold in discount stores.

With all the hype over natural and health food, to me, I find that a lot of people, because it's such a big thing now, offer a lot of fraudulent things that aren't in the product. So I think even this would be good for consumers, so that way, whatever they state is in the product has to be in the product or they can't sell it to us. ...So with this, I think it's good.

Negative Reactions

Some respondents quickly linked internal tagging with genetic modification or weird science, which was seen as contaminating the food supply. This is a brand of 'scary' science that benefits manufacturers and food producers, not consumers.

It reminds me of genetic modification.

It reminds me of like corn with one gene of a fish in it or something. I don't know. It sounds very unnatural to me.

Given the assumed complexity of this technology, internal tagging was seen as a tool that would be used by "big agricultural business." Hence, it would not be affordable for small, local farmers/companies. This view persisted despite the introduction of a series of possible local, small-scale applications.

I think this kind of technology goes with big agricultural business or large natural products companies, and I'm more for the smaller, high-quality companies. I'm thinking of the farms they have in California. They have a lot of organic farms there and small farmers produce really high-quality things, and this high technology doesn't seem to go with that.

It seems like it's only benefiting big business. It's not benefiting...

Some people who were struggling to understand the concept equate internal tagging with bogus science. They questioned whether it was any better than the current faith they place in product claims that may or may not be true.

My daughter's a neuroscientist, and they're developing mice where you remove genetic markers to do research. I don't know. If she were here now, she would probably say it's snake oil. How much money do we want to put in this research?

Science may be viewed as a costly activity, hence some respondents concluded that internal tagging technology and testing would add to the cost of a product. The net impact on consumers will be higher prices, a point of some concern given recent food price increases. The solution, for some respondents, was that the financial burden should be borne by manufacturers. It was rightfully up to them to absorb the cost of using this new technology given that it protects corporate interests. An alternative approach, according to those who advocated 'natural' food, would be to direct the money to expanding organic and local food, hence replacing complexity with simplicity.

But the line of thinking. It can go from producing food technology, go back a little bit to our grassroots and promote, like you were saying, eating locally and allocate the money towards there and kind of going backwards a bit instead of going forward and modifying the food more and all that technology. I like the idea of going back to our grassroots and just eating—

Despite discomfort with internal tagging, there was considerable skepticism as to whether it would be effective in eradicating product fraud. Some respondents cast the net of doubt very wide and assumed that those who were bent on using inauthentic ingredients would find ways of circumventing the safeguard of the internal tagging system. It would appear that this conclusion was shaped by their inability to understand how the technology functioned.

Questions about Internal Tagging

The concept of internal tagging evoked many questions, usually from people who were either uncertain or initially discomfited by it. The points listed below assist in understanding respondents' reactions to the technology.

- How many molecules or tags would be required – one per product or one per ingredient? Does this mean that products would actually contain the tags (an indication that some respondents did not understand the proposition until it was explained to them by the expert team)? Some people remained convinced that the tags would stay inside the human body and not be expelled, prompting images of millions of tags lodged in the system.

It says here the tags will be present in negligible amounts. I don't understand. Are they putting something in? Are they putting tags in?

- What are the long-term human impacts? Has it been tested over a long period of time? Regardless, how do they know that it will not have negative effects at some point in the future? The long-term impacts on people who consume internal tags remains the leading concern about the technology. Mothers with young children imagine that over the course of their lives their youngsters would ingest, and possibly retain, "millions" of tags. Hence, it is hard for respondents with this mindset to view the technology as benign, let alone as something that would be beneficial. Some people were reminded of scientific missteps that had initially been heralded as positive.

They'll find out 20 years later, once we start having weird things happen.

We just eat so much that's so unhealthy for us now. I don't know. Maybe I should be disturbed by this. I don't know.

It's kind of worrisome that this is a really new thing. Have they tested it on humans at all? I'd want them to test it thoroughly on humans first, because even with prescriptions – there's a prescription that I'm taking, and I asked my doctor, "What are the long-term effects?" and her answer was, "You'll find out in 15, 20 years because there's no research because it's so new."

- On a practical level, how does it work logistically – that is, how will tracking be achieved? Can/will consumers be engaged in the process? Who owns the equipment to measure the tracking ingredients?
- How will it affect consumers, say in the case that the egg carton promises eggs with Omega 3? If this product feature is absent, how will consumers know that this is the case? Will product labeling indicate that internal tags are present?
- Regardless of their reactions to the technology, respondents agreed that proper regulation is critical to ensure that it is safely used. Who will be responsible for testing the technology; can the research source be trusted? How long will it be tested and will it be conducted over a sufficiently long period to fairly evaluate the longer term impacts?

Absolutely. Thalidomide. I mean, who's to say that whoever's doing the research is doing an honest and clear and proper research and not being paid off by big pharma, which happens all the time? We don't know. Big pharma has tentacles everywhere. I don't know.

- Can fraud be halted for good? Won't another generation of criminals 'pollute' internal tags? What is to stop technology 'leapfrogging' by dishonest manufacturers or suppliers?

Why wouldn't they steal this DNA molecule technology and sell it maybe to big pharma? Who knows? Or little pharma.

- Is this technology being used in other countries? Is Canada the first country to develop this technology? While Canadians are proud of their accomplishments, they also do take solace in knowing that others have pioneered and perfected new technology. No one likes to be a guinea pig, especially when it comes to something as essential as food.

- Confusion was evident. While some people followed the notion that the tags would help track ingredients, was it possible for the manufacturers to remove them prior to putting them into the hands of consumers? Others likened it to an expiry date present in all food, beverages and natural health products. Comparatively, what was this new internal tagging system meant to do?

- Despite providing examples of local applications which were meant to help dispel myths and clarify the potential application of this new technology, reservations persisted.

Yeah. We feel safe. The product has the time of the manufacture, the date. Now if you put the date up, the expiry date, now we trust you. We won't use after that date, but before that date we can buy it. I thought that's just similar to that, a guarantee of the product with the quality.

- Other ways of protecting food – Wouldn't tamper-resistant packaging address the problem of fraudulent ingredients? This in combination with a known, respected brand should be sufficient to address this problem. Is internal tagging necessary?

- Manufacturers must be able to find another solution to this problem that will not potentially affect people who consume their products. The risk-benefit equation is balanced in favour of users, not consumers.

It sounds to me like manufacturers are just trying to make other manufacturers accountable, and the onus is on them to almost call into question, "What are you offering?" "We're offering this. It's authentic. What are you offering?" There's got to be a different way.

- Impact on Integrity of Natural Products – The addition of this internal tag would defeat consumers' desire to take natural products; it will contaminate them.

- What is the benefit to the consumer – *What's in it for me?* This was a constantly recurring question posed by respondents.

- Informing the Consumer – Will the consumer be informed that certain products have internal tags? This led to the question of whether the public should be informed of the presence of tags – should it be labeled as such? Participants reacted to this question with confusion. Some reasoned that unless the labels identify the presence of molecular tags, shoppers will be none the wiser. Would that benefit the product or not? One group of women drew a parallel with house brands and name brands – were they substantially different or not? Was it worth paying more for the national brand, particularly given that the house brand may have the same ingredients and be made by the same manufacturer? How was the consumer going to benefit from this technology (and by inference fraudulent products were low-priced options) unless it was declared on the label? Respondents admitted that they sought out lower-priced options and 'specials'. Should consumers be alert to cheap products; should they assume that they are made with fraudulent ingredients?

Definitely, as a consumer, we buy the cheapest one if we see the ingredients are the same. Basically, the thing is, we are innocent. Educating the consumer is how it's going to be good for them. Unless the consumers are aware, the whole process is waste.

I don't understand how it will stop fraudulence, because the manufacturer's making this and he's getting it tested, and that's fine, and it's got its tag. But how does it stop somebody else making a similar sort of an article and selling it cheaper and so on? Does it stop the other guy? It doesn't stop the other guy from doing that.

This is good if they want to do that, but then, if they put this product on the market with these tags, somebody else is going to put the product on the market without the tags, and we still won't know the difference.

- Role of Government – Is government abdicating its responsibilities to protect the food supply by handing over responsibility to industry? Some people viewed tagging as a strategy that would lead in this direction. Could this potentially result in to another Walkerton (E.coli contamination in the town water supply)? Is it desirable to make manufacturers responsible for the integrity of their products? Most respondents agreed that the Canadian government (called FDA by one respondent) has a central role to play in ensuring the safety of the food supply. Further, will government inspectors ensure that the proper tags are being used? It took some time to explain that prior to introducing tagging, the government would ensure that it was safe and then the actual use of tagging will be the manufacturer's choice.

...saying if the FDA did the testing, quality assurance samples, on that one specific product that had that tagging, and then the FDA stamps it and says, "Yeah, it's okay," I'd be more confident in buying it.

Well, it's not only a health issue; it's also our tax dollars as well. How much do we want to really go into this, and how much of our tax dollars do we want to spend investigating this further if a lot of people aren't going to like this idea?

I think we should be happy that it's something that is being created here in Canada, and if it goes well, it's going to be sold all over the world. Or maybe I'm too naïve. I don't know.

- ▣ Impact of Canadian Government Approval – Will testing reveal all the impacts on human health? Some of the more questioning respondents wondered if this technology will be ultimately be found to be harmful once it has been approved, as has happened in the past with pharmaceutical products.

Well, they reassured women that hormone replacement therapy was beneficial, and it wasn't. So who can you believe?

Concluding Reactions to Internal Tagging

Yes, it makes sense

I think it would be a great thing to have. I think that certainly the food tampering goes on and has been going on for a long time, and we don't know. We hear a little bit about it in the paper. Every once in a while there's some product recalled or something, but there's a lot more goes on than what we're ever aware of, and this is one way that they can guarantee – that they can keep track of it and know that it's pure and hasn't been contaminated. I'm for it. I think it would be good. But I have no concern about my health. It's such a small amount that I don't think it would be – not at my age anyway. 20 more years, I'm sure.

I think it's a good idea, but as a consumer, as a mother, I would like to have more information. I'd like to know, whenever we have this in your system, how long we have this. Or since we digested it, it's gone. Every single information: their testing, their testing in human beings or just lab rats or whatever, and it's good for kids, it's not good for kids, just adults, every single possible information on it. But I think, since you're regulating, since you have it, it's good for everybody.

Not Certain

I thought it was a good idea in the beginning, but I don't think it's such a good idea now. What changed my mind? I don't know. Just adding something that's not natural to a product that you're buying because it's a natural product just to track it. I don't see any advantage. I just don't see how it's giving you more security as to what you're ingesting.

No, I don't like it.

I'm not for it. I think that we can control the quality of our products in a different way by researching the producers and just having them certified as really quality producers of natural supplements and so on, rather than adding something to the supplement itself. I'm just not for it, because it might have to go through a long testing and then... I don't know. I don't think we have long enough to test it to really say that it's okay for us, and it seems much more beneficial to the manufacturers, to protect their brands, than it is to us as consumers.

I'd just like for more research to be done about it, and if we have to accept it, then I'll go with it, but I'd prefer not to.

Reaction to Expert Input

Providing respondents with the opportunity to ask questions and receive detailed responses from the expert team was productive. It helped clarify some key concerns, although it did not necessarily change respondents' opinions about it. Nonetheless, they appeared to be impressed by the clarity of the descriptions and the experts' willingness to address their major concerns.

I don't mind it any more after listening. I don't mind it as much.

She certainly explained it quite well, I thought, and it was in a way that we could understand it a bit more too than reading it from the paper, and that does sort of give you comfort a bit. It puts you in a more comfortable zone when you feel you can understand what somebody has talked about.

It's also personal.

M'hm. It was a little more personal, and she was very good.

It's also good to know that there are potentially other options to be investigated. I mean, it's good that even they were able to tell us that there's the packaging possibility being investigated by other sources, by other research. So it's good to know that there are choices out there.

Written Reactions

Just prior to concluding the session, respondents were asked to complete a short questionnaire. Some sessions lasted longer than others and respondents filled it out at their own pace, which meant that not all of them were completed in Groups 3 and 4. Consequently, the tallies are less than the number that attended these sessions (18 in total).

Questions and Responses

1. Please list up to 3 natural health products you take below. Then indicate whether these products should have internal tags (below)

The majority of respondents either concluded that the natural health products they were taking should not have internal tags or they were uncertain whether this technology should be used – a total of 31 products (up to three products per respondent were listed) compared to a total of 19 by those who supported tagging.

Should the items you take have internal tags?	Yes		No		Don't know		Total	
	1&2	3&4	1&2	3&4	1&2	3&4	1&2	3&4
Groups:	1&2	3&4	1&2	3&4	1&2	3&4	1&2	3&4
Regular Users	6	6	6	1	9	4	21	11
	28.6%	54.5%	28.6%	9.1%	42.8%	36.4%	100%	100%
Occasional Users	5	2	3	1	5	2	13	5
	38.5%	40.0%	23.1%	20.0%	38.5%	40%	100%	100%
TOTAL	11	8	9	2	14	6	34	16
	32.4%	50.0%	26.5%	12.5%	41.2%	37.5%	100%	100%

Q3. Items that should have internal tagging:

When interpreting the numbers in the table, two words of caution are in order. First, one cannot infer from the sample to the general public due to the small and non-random sample. Second, the absolute numbers cannot be compared directly between groups 1&2 and groups 3&4, because they have different sizes. Thus, they are transformed into percentage figures that are based on the total responses for each user type in the three categories. They reveal that there is little difference between occasional users in groups 1&2 on the one hand and groups 3&4 on the other. Contrary to that, regular users in groups 1&2 are clearly less likely to “request” internal tags for their NH products than regular users in groups 3&4. Since there is only little difference in the shares of “Don’t know.” responses, the opposite applies to the “No” responses: Regular users in groups 1&2 are more likely to reject internal tags than are their counterparts in groups 3&4. Hence, the differences in the total group tallies are due to the differences between the regular users of the two sections.

Possible reasons for this pattern are that groups 1 and 2 received the technical, more scientific information material that triggered widely negative responses, while groups 3 and 4 received the press release style information material. Further, one of the respondents in the section made up of groups 3 and 4 happened to be an outspoken but credible proponent of the technology. Since recruitment to the individual groups was not influenced by the research team, this was not an intended manipulation of the focus group interviews.

Responses varied from “all” natural health products should have tags to none/“I don’t want this at all.”

A wide range of natural health products was mentioned, either using references to specific items or categories – i.e., supplements.

There was some overlap, with respondents listing vegetables and dairy in the natural health products category.

Food mentions in Groups 1 and 2 tended to skew towards protein items such as fish, egg yolks, cheese, yogurt, beef, and processed meat, while Groups 3 and 4 listed baked goods, all frozen foods, all packaged foods and all packaged foods. Respondents either listed whole categories of items or specific ones.

The beverage category was comprised mainly of juices and milk, with a few references to green tea and pop/Coke. It is worth remembering that the whole juice category came in for criticism on the topic of misrepresentation.

Natural Health Products Groups 1 & 2		Food		Beverages	
All	1	Fruits	1	Juices	5
Flex Seeds	1	Vegetables	2	Milk	7
Ginseng	1	Fish	2	Eggs	1
Protein Products	1	Canned Food	1	Soy Milk	1
Multivitamins	1	Processed Meat	1	Orange Juice	2
Vitamins	2	Acai (sic)	1	Organic Milk (No hormones)	1
Glugosamine (sic)	1	Protein Supplements	1	Green Tea	1
Mineral Supplements	1	Egg Yolks	1	Pop	1
Aspirin	1	Meat	4	Coke	1
Vitamin B	1	Yogurt	1	Beer	1
Vitamin D	1	Poultry	1	Soya	1
Any fish derivative	1	Flour	1		
Pain reducers	1	Cheese	1		
Joint remedies	1	Bread	1		
Dairy	1	Beef	1		
Vegetables	1	Wheat	1		
Supplements	1				
I don't want this at all.	1				

Natural Health Products Groups 3 & 4		Food		Beverages	
Boost	1	AU processed foods	1	Juices	4
Ensure	1	AU frozen foods	1	Energy drinks	2
Multivitamin supplements	1	Cookies	1	Pomegranate Juice	1
Vitamins	4	Chocolate	1	Orange Juice	1
Omega	1	Processing Meat	1	Ensure	1
Supplements	1	Frozen meal	1	Power Drinks	1
		Cheese	1		
		Any packaged foods	1		

* Comment: "I'm not sure any should have internal tagging but I think the best candidates are products that are endangered (sturgeon) or endangered in the wild (ginseng) to reduce poaching/ illegal harvest.

Q. Overall, is molecular tagging a good idea or not a good idea?

The summary chart of responses is incomplete, representing the opinions of 28 of the total 36 respondents. The majority of the participants, 12 out of 18, in Groups 1 and 2 were either uncertain or opposed to internal or molecular tagging, while almost all of those in Groups 3 and 4 who took time to indicate their opinion thought that it was "a good idea."

Overall, internal tagging is:	Groups 1 & 2	Groups 3 & 4
A good idea	6	9
Not a good Idea	3	-
Not sure/ don't know	9	1

*Number of people who did not respond in Group 3 & 4: Eight

Q. Please explain (choice of A good idea, Not a good idea or Not sure/don't know)

Respondents provided written comments indicating their reason for selecting one of the three options. The reasons listed below echo the remarks they made in the session.

Overall, is internal tagging a good idea, not a good idea, or not sure/ don't know? Please explain. Group 1 & 2
Good Idea:
Once tested thoroughly and implemented it will serve the greater good of the general population. It is 'forward thinking' and encourages accountability.
After all the questions been answered yes, of course.
Protection against tampering with food and drugs and ensuring good quality products.
I really like the idea. We need to protect quality products and be able to identify them.
Improve food safety.
Sounds like a good idea, but needs to be structured more.
Not a Good Idea:
1) Should focus on other ways to prevent fraudulent activities that do not require modifying food. 2) The technology will eventually be duplicated to be used in fraudulent activity.
Organic health products are preferable to products that have been molecularly tagged. We should be confident that the manufacturer is a high quality producer rather than having this intrusive technology.
I think it is tampering with a natural product.
Not Sure:
My initial reaction was that it is not a good idea. After hearing a more detailed explanation of the process (verbal) and hearing the examples of the situations it would be (sic) I am not sure it is a bad idea.
I need this idea to be compared to other alternatives and also I want the feeling of being safe at what I'm consuming.
Not enough research done yet.
Still unsure if there would be any negative effects to my body.
Too early, to know if safe. Are there other alternatives?
Don't know if it is harmful to human's health.
There has to be much more tending done to be sure it is not harmful to the population.

Overall, is internal tagging a good idea, not a good idea, or not sure/ don't know? Please explain. Group 3 & 4
Good Idea:
Will help getting rid of fraud & we will cut what is mentioned.
It gives us the true facts about what's in the product.
This way hopefully consumers get what they are paying for!
One side it protects business from fraud, on the other side, it protects consumers as well.
Sounds good.
If it will prevent fraudulence, yes.
Not Sure:
To make sure you are taking what the label indicates.
Label states what's in the products.

Q. Please rate molecular tags using a 10 point scale – 10 is the Highest Confidence and 1 is the Lowest Confidence. The average confidence ratings for Groups 1 and 2 were lower on all points, based on responses from all the participants, whereas those for Groups 3 and 4 were much higher for each of the items but were based on a smaller number (nine out of eighteen).

Confidence Rating internal tagging: 1 to 10 Groups 1 & 2 – Regular & Occasional Users	1	2	3	4	5	6	7	8	9	10	Don't know	Rating Average
It will improve food safety.	3	-	1	-	4	2	3	1	-	3	1	5.7
It will be properly tested prior approval.	2	-	-	1	5	3	2	3	-	-	-	5.4
It will improve food quality.	3	1	-	1	3	1	1	3	1	1	1	5.3
It will bring economic benefits to Canada.	3	-	2	-	7	-	1	1	-	1	1	4.6
I won't mind buying products with it inside.	3	2	1	1	4	-	2	2	1	-	1	4.6
It will increase trust in food production.	3	1	2	-	6	1	-	2	1	-	1	4.5
It will have wide consumer appeal.	3	2	-	3	6	-	2	-	-	-	1	3.9
It is a safe technology for now.	7	1	1	-	5	2	1	-	-	-	1	2.8

* All 18 participants responded to the first and last item. Between 16 and 17 responded to the remaining items.

Confidence Rating internal tagging: 1 to 10 Groups 3 & 4 – Regular & Occasional Users*	1	2	3	4	5	6	7	8	9	10	Rating Average
It will increase trust in food production.	-	-	-	-	1	-	-	2	3	3	8.7
It will improve food safety.	-	-	-	-	1	-	1	3	2	2	8.2
It will be properly tested prior approval.	-	-	-	-	2	1	1	1	3	1	7.6
It will improve food quality.	-	1	-	-	1	-	1	3	2	1	7.3
I won't mind buying products with it inside.	-	1	-	-	2	-	-	2	2	2	7.3
It will bring economic benefits to Canada.	-	-	-	-	3	2	-	3	1	-	6.7
It is a safe technology for now.	-	1	-	-	6	-	-	-	1	1	5.7
It will have wide consumer appeal.	-	-	1	1	2	4	-	1	-	-	5.4

* Number of people who did not respond: nine respondents

Reaction to the Research

Respondents were invited to comment on the research. While what they had learned in the course of the session might have been complex or potentially alarming, were they pleased to have been invited to discuss this new technology? Generally, participants indicated that they were surprised to have been asked to comment on the subject, despite the insight into food fraud.

That's fantastic actually, that they're asking us way before testing.

Before literally, given that we have absolutely no control over it. So good thinking.

APPENDICES

APPENDIX 1 – DISCUSSION GUIDE AND FEEDBACK FORM

Jan 19, 2010

Discussion Guide- Product Safety In-depth Study

Facilitator's Introduction

An in-depth study is being conducted among people who buy natural health products. A total of four sessions are being held to examine initial reactions to a new development that could be used to improve the safety of natural health products and processed food and beverages. This study is being funded by the federal government; Universities of Guelph and Saskatchewan are involved in developing the new system.

Everyone is invited to participate and express your reactions and opinions. There are no right or wrong answers; individual opinions are respected. Nor are we seeking consensus. The proceedings are being recorded for research purposes only. Also, these sessions are being viewed by other members of the research team. We may be calling on them for information at some point in the discussion. All comments are confidential and participant names are not included in any research documents.

SECTION 1

Warm-up

Respondents were invited to introduce themselves and describe the size and composition of their household. Then the natural health products that they use were explored briefly to help determine the scope of products they are taking.

Introduction of the Issue of Authenticity

Is there any concern about the quality or authenticity (genuineness) of the natural health products that are generally available and that they are taking? Any specific product or ingredient concerns? Briefly, expand discussion, if not mentioned, to concerns about quality and authenticity of food they purchase.

Awareness/Familiarity with Existing Technologies

As far as they know, what methods are currently used to ensure that products are what they say they are? If not mentioned, make reference to barcodes or radio frequency identification (RFID) tags. Now thinking along these lines, what products (food and natural health products) come to mind? Which ones in particular would they want to know are made with authentic ingredients – just focusing on natural health products at this point?

Will provide written and graphical material to explain??

SECTION 2

Presentation of Test Concept – Immediate Reaction

Initially, the moderator briefly introduced the concept of “internal tagging” – “It involves adding a molecular barcode at the manufacturing stage, which means that the source and identity of product ingredients can be tracked from that point.” Immediate reaction to the concept? Without going into explanations about it, does it sound like a good thing to do or not? What concerns, if any, do they immediately have about it? Noted any perceived references to existing technology – positive, neutral or negative.

A list of technical questions were kept – University of Guelph team members were invited to answer them at an appropriate point in the proceedings.

Reaction to Print Information

Distributed colour copies of *Description of Internal Tagging Technology*. Asked respondents to read it and underline points that stand out – can include words/phrases that are confusing or questionable. Also, highlight the key information points – what has the most meaning for them?

Invited participants to discuss their reactions to this print item:

- Immediate reaction - what, if anything, stood out?
- Is this familiar or new?
- Any words or phrases that were hard to understand? Caused concern?
- Key phrases/words?
- The visual – helpful or not? Reaction to the chart.
- Who was this written for – them or technical people?
- Anything missing? Key questions not addressed?
- New learning that resulted from reading the hand-out?

Internal Tagging – Good Idea or Not a Good idea?

Based on this information, is molecular or internal tagging a good idea, not a good idea or is it still too difficult to comprehend in order to comment? What do they like/dislike about it? Any remaining concerns or questions?

SECTION 3**Product Scope and Types**

Just based on what they now know, what types of products could have molecular tags? Made a list on a flipchart of suggested products. Review list – should products containing molecular tags be labeled accordingly? Does this include all products listed?

Labeling Product Categories and Priorities

Further, going beyond the products identified above, should all processed food and beverages be labeled? What about natural health products?

Is there a priority in terms of labeling products – which categories are most important, less important and not very important? Natural health products or food first? Then focus on specific items:

- Omega 3/6/9 supplements
- herbal supplements (echinacea, ginseng, garlic)
- dairy/milk
- meat
- fish (farmed and wild)
- fresh produce

Unanswered Technical Questions

Addressed technical questions.

Users of the Technology

Introduced these examples to help evaluate who/what sectors should be given priority in using molecular tagging. Which sectors possibly pose a risk for consumers? Which ones would provide the most benefit? Introduced the following and discussed:

1. Ontario ginseng farmers have invested in an extraction facility to produce high quality extract to be sold through farmers' own brand. Internal tagging is seen as a means to protect this investment against plagiarism and consumer fraud by low quality manufacturers.
2. Ontario fishers want to open export markets in the US for sturgeon meat and caviar; worldwide, this species is listed as endangered but viable populations exist in Lake Huron; increased returns will partly be invested in improved wild stock management, monitored by the Ontario Ministry of Natural Resources; internal tagging is seen as a means to curb the entry of illegal sturgeon meat and caviar into the supply chain.
3. SunRype (Fruit to Go, Apple Crisps, Fun Bites, Mini Bites, apple sauce and apple juice and mixed fruit juices) wants to introduce a further layer of brand protection to prosecute brand plagiarism and consumer fraud.

Trustworthy Information Sources

What organizations or individuals would they trust on this issue? Where would they turn to for facts?

Summary Discussion – Internal Tagging

Now that they have had time to think about it, does molecular tagging make sense and have benefits for consumers?

What, if any, concerns remain about it?

Self-completion feedback form/questionnaire/ sign-up for summary of results

Thank respondents for their valuable assistance. Invite further comments or questions be directed to helene@informaresearch.com

Feedback Form – Product Safety Study

Your name: _____

1. Please list up to 3 natural health products you take below. Then indicate whether these products should have internal tags (✓ below)

Regularly/On an on-going basis: Please list 3	Internal Tags? Yes	Internal Tags? No	Internal Tags? Don't Know
1.			
2.			
3.			
Once in a while/Occasionally: Please list 3			
1.			
2.			
3.			

2a. Overall, is internal tagging:

A good idea Not a good idea Not sure/don't know

2b. Please explain. _____

3a. What, if any, natural health products, food and beverages should have internal tagging? Please list up to 3 items below.

Natural Health Products	Food	Beverages

4. Please rate internal tags using a 10 point scale – 10 is the Highest Confidence and 1 is the Lowest Confidence in terms of the following statements:

It will improve food safety .	<input type="checkbox"/>	It will improve food quality.	<input type="checkbox"/>
It is a safe technology for now.	<input type="checkbox"/>	It will have wide consumer appeal.	<input type="checkbox"/>
It will increase trust in food producers	<input type="checkbox"/>	It will be properly tested prior approval.	<input type="checkbox"/>
It will bring economic benefits to Canada.	<input type="checkbox"/>	I won't mind buying products with it inside.	<input type="checkbox"/>

Thank you for your assistance. Your opinion counts!

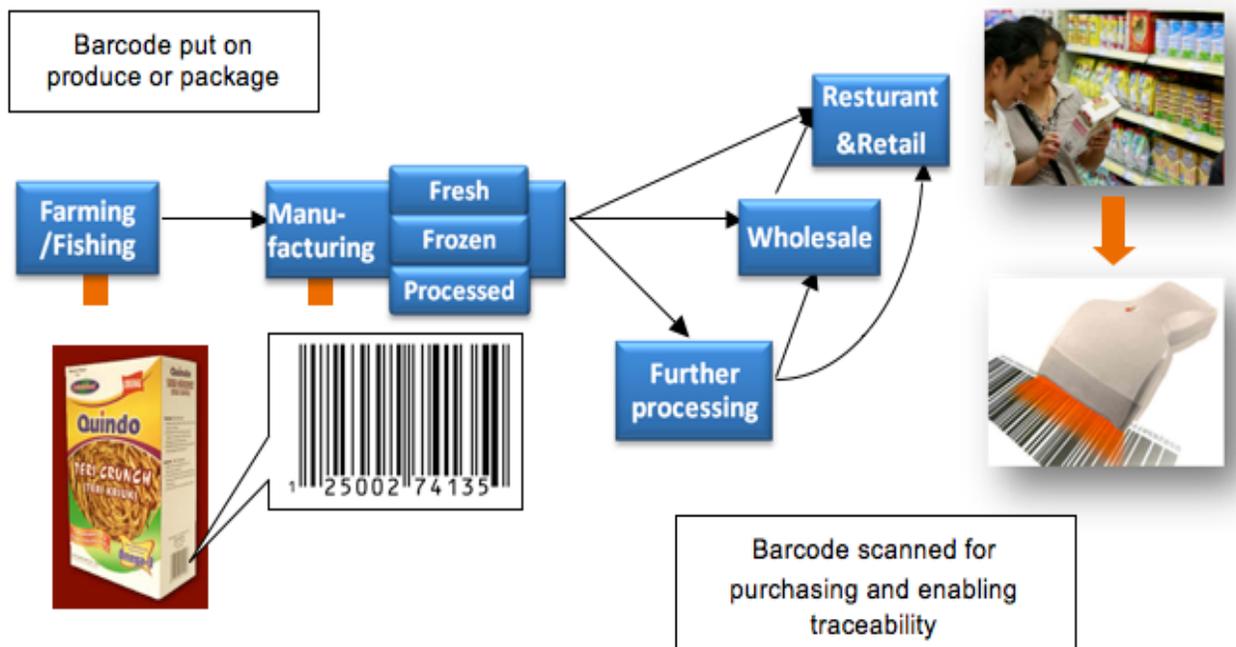
APPENDIX 2 – CONCEPT DESCRIPTION MATERIALS – GROUPS 1 & 2 AND GROUPS 3 & 4

Groups 1 & 2

Barcodes on produce, packaged products, boxes and palettes

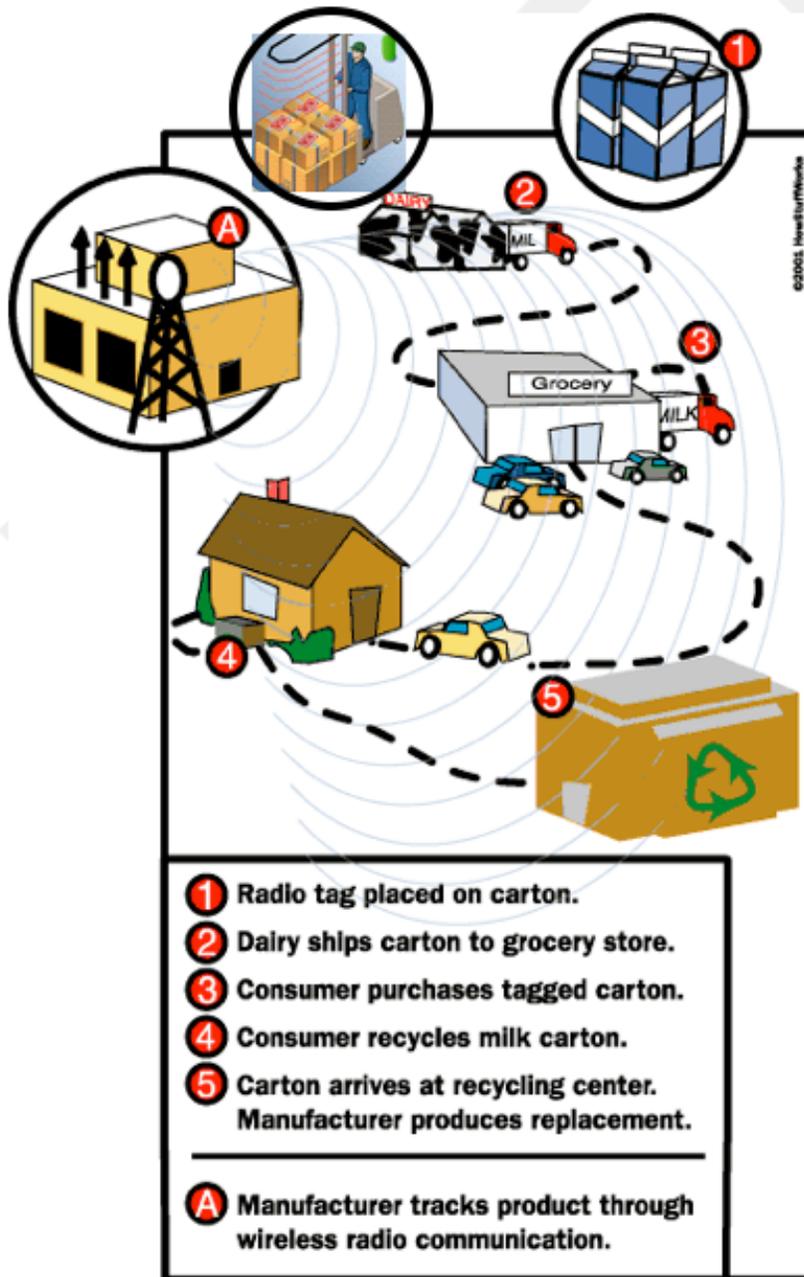
Barcodes have become a widely used technology for unique product identification and tracking and tracing. In order to receive a unique product identity code, the producer or processor needs to register the product with GS1, a global not-for profit organization that assigns and keeps an inventory of unique product codes.

These codes are printed on labels that are then applied to individual produce items, e.g. Ontario greenhouse tomatoes, product packages, product boxes or palettes. The labels can be scanned at any subsequent stage of the supply chain of the particular food or natural health product. Most people in North America with such scanners at retail check outs but this scanning of barcodes is also standard practice for transactions between businesses. With the scanning of products, boxes or palettes at various locations, a trail is established that can be followed in later analysis. The information is typically fed into inventory management systems but can also be made available to other stakeholders in the supply chain, including customers.



RFID tags

Radio Frequency Identification tags serve the same purpose as barcodes on individual products, product boxes, palettes or whole truck loads. However, they do not require an additional scanning activity. Instead, when they pass a reading station, e.g. at the entrance or exit of a warehouse, they send or reflect a signal that is automatically recognized to identify the particular product lot. This information is feed into a computer system and can then be made available for monitoring or analysis to supply chain stakeholders, including consumers, and government. The increased speed of data collection and reduced labor requirement comes at higher cost for reading stations and the tags themselves, as compared to the barcode system.

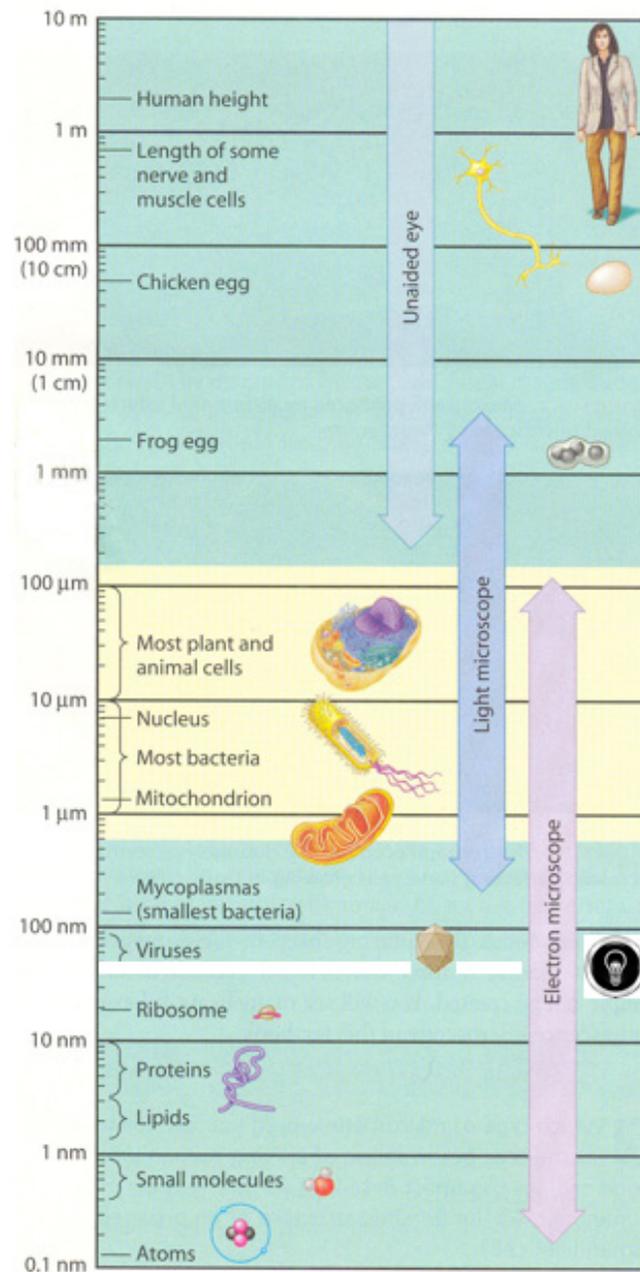


Tag added

Description of Internal Tagging Technology

Purpose

The objective of this research is to develop a tagging system to provide consumers with a safe and authentic supply of foods and natural health products. It is intended to help protect consumers from fraudulent activities such as substituting genuine ingredients with less expensive and possibly illegal substances.



Source: Campbell, N.A., J.B. Reece, M.R. Taylor, E.J. Simon and J.L. Dickey: Biology - Concepts and Connections, 6th Edition.

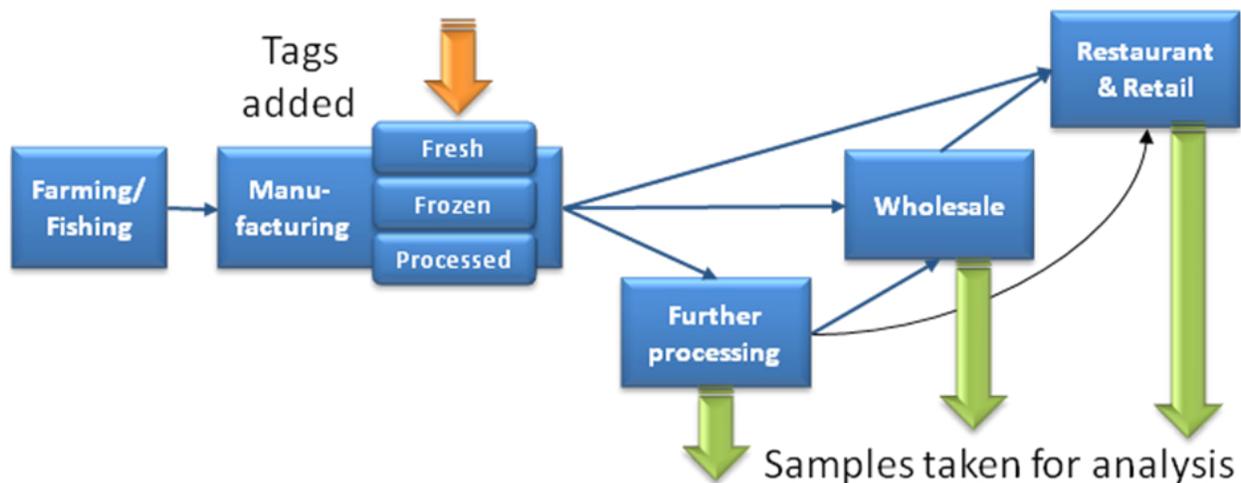
The technology

The idea is to add a “molecular barcode” to a product at the manufacturing stage. Currently, two different types of material are considered for these tags. The first are so-called oligonucleotides. These are short, unique combinations of DNA building blocks that can be chemically synthesized to yield a small, inert piece of DNA that does not match with any known stretch of DNA that might otherwise be found naturally in the food product (all species have DNA in their cells). This process is not genetic modification, as it does not alter the DNA of the food product.

The second are so-called oligosaccharides which are a class of carbohydrates that are naturally present in most foods. Using a process called controlled hydrolysis, which is similar to that which occurs in the human mouth, stomach and gastrointestinal system, unique oligosaccharides are produced from starch (from corn/wheat), inulin (chicory/Jerusalem artichoke) and pectin (apple/orange). Both types of material could be added in very small quantities to foods or natural health products equivalent to 1 to 5 millionth of the product’s weight. The white line in the adjacent graph illustrates the size of the internal tags of 30 to 40 nanometers.

Tracing and analysis of samples

The products “tagged” with such a molecular barcode can be monitored throughout the entire supply chain, from manufacturing to final consumption. Established methods of analysis allow measuring how much of the tag is in a sample of the product. It can thus be determined if the product was substituted or diluted with another substance. This careful monitoring is an important step in the overall process of ensuring a supply of safe and authentic food and natural health products.



Authorization/Approval of technology

Prior to application in foods or natural health products, the tagging technology would have to undergo a review process and meet all regulatory requirements as administered by Health Canada. Under these regulations, the technology is considered a processing aid as the intrinsic characteristics of the food will be unaltered, and the “tag” would be present in negligible amounts in the finished food product. Application for approval of this technology will be made to the Bureau of Chemical Safety, a division of the Health Products & Food Branch of Health Canada.

Groups 3 and 4

Health Canada approval for internal tagging technology

21-Oct-201X

The Bureau of Chemical Safety, a division of the Health Products & Food Branch of Health Canada, has given processing aid approval to an internal tagging technology developed jointly by the Universities of Saskatchewan and Guelph, Ontario.

Health Canada gave the green light for the use of internal tags six months after an application had been submitted for the patented technology. In the explanation of the approval decision, it was stated that the technology is considered a processing aid as the intrinsic characteristics of the food will be unaltered and the tags will be present in negligible amounts."

How does it work?

Materials that occur naturally in most foods are used under controlled conditions in the lab to synthesize molecular tags. The researchers point out that this process is not genetic modification, as the genetic material of the food product remains unaltered. The synthesis in the lab allows producing unique tag constellations. Manufacturers or input suppliers can add these to products or individual ingredients in very small amounts – comparable to one grass stem on a football field.

Is there a need for this technology?

Economic food adulteration includes mislabelling, dilution and substitution with inferior material. Many cases of these misrepresentations go unnoticed so that it is hard to estimate the annual damage. For the US, the consultancy A.T. Kearney reports that "[In] recent years, more than 150 instances of food and consumer product fraud have been documented at a projected cost to the food industry of \$10 to 15 billion per year, plus human pain and suffering, and loss of consumer confidence. Food and consumer product fraud, or economic adulteration and counterfeiting, is increasingly a critical problem for the food and consumer products industries."

Who will benefit and what are the cost?

The technology has been greeted by producers in the food and natural health product industries. The Consumer Goods Marketing Association commented that "The internal tags provide an additional layer of protection against plagiarism and consumer fraud by low quality manufacturers. Although consumers can never directly observe this assurance, the tags make it much more difficult to compromise the authenticity of a quality product, because the technology is difficult to copy. So consumers could have more confidence that the food items they purchase are free from adulterants, are from a certain country of origin and from a certain manufacturer." According to the research team, samples can be taken and analysed at low to no additional cost. This makes this method affordable for small producers and processors so that they will have access to more cost-effective means than currently available, such as tamper-proof packaging.

Are there any health concerns?

From the early development stages on, the research team elicited responses to this technology from consumers. Concerns had been primarily expressed about possible health impacts from ingestion and the lack of clinical tests. The approval panel pointed out that the nature of the materials, precautions taken, such as, e.g., a routine database check to avoid synthesizing tag constellations that match with known stretches of DNA, and the negligible amounts applied made any issues highly unlikely. Therefore, the panel concluded there were no safety concerns for consumers.

APPENDIX 3 – Q & A WITH PROFESSOR ANDREAS BOECKER AND AMANDA NAAUM

GROUP 1

Facilitator: I would like to introduce you to Andreas and Amanda. They're here to answer some technical questions, okay? So starting off, one of the key questions was, "All these little molecules floating around inside me, do they have to be there?"

Andreas: Do they have to be there, or is it a health issue? I mean, if you want to...

Amanda: We don't actually foresee any very likely health issues. It's something that would have to be regulated through Health Canada, as you guys were discussing, to see whether there are going to be any detrimental effects to it, but there's not any clear reason that there would be an effect of it. It's extremely low amounts, and it's made up of stuff that would already be in your food. There's DNA in all food really, so it's just something extra that's added to it, and we're not expecting it to have different effects than normal DNA in your food would have.

Facilitator: So it's not radioactive, and going through airport security you won't...

Participant: But if you're adding it to natural food, it's not natural any more.

Participant: Right.

Participant: Exactly.

Amanda: It is made up of natural things, so when you guys were talking a little bit about the chemicalness of it, basically that just means that we're able to, in a lab, make the same thing out of the same molecules, but we get to make it in whatever sequence we want it to be, versus taking it out of something else and putting it in a different product. So we could extract it from somewhere where it already existed, but instead we're making it in a laboratory setting.

Participant: What is the advantage to us for ingesting it?

Amanda: There's not an advantage, and we're not saying that this is going to have specific health benefits, but what we're saying is that it's very unlikely to have health – be detrimental to your health, and that will of course be tested.

Participant: I always hear that about things – I mean about drugs – and then often they are found to be detrimental, so we just have to believe that.

Participant: We're skeptical.

Participant: When you say unlikely, it's because you guys still don't have anything conclusive.

Amanda: This is extremely new. We haven't done any of this testing before, so we're just kind of trying to gauge your response to the idea of using this. The testing to see whether it would actually be detrimental will have to come later. Just in terms of perceived possible issues, there don't seem to be any. So it's not inherently toxic or has any negative impacts like that.

Participant: We were talking about ginseng, and you guys are using like a molecule of ginseng and putting the tag inside it, so I'm not having anything besides ginseng. Is the ginseng modified?

Amanda: We're not actually modifying the ginseng itself. So we'd be adding a molecule that was not in ginseng to it, because with traceability, we want it to be something that wouldn't be in the ginseng so we can automatically tell this is where that came from because it's not always going to be here. It's made up of DNA molecules that you can find naturally occurring, but it's going to be not ginseng, but it's going to be in very, very small amounts. So the picture of

the penny, that little drop, that much would be in one litre of extract. So a bit in a litre of ginseng extract that would then be put into pills.

Participant: Are any other countries using this technology right now?

Amanda: It's brand new. We're just starting to be developing it.

Participant: So let's say the reason why you put it in, you want to track. Actually, the manufacturer, when they buy the different things, they have already labelled everything from where, from where. Then, if anything wrong, they can just go back to see which one is wrong. Why you have to invest that much money to put the ginseng inside to test? Actually, that's the task of the manufacturer or the producer. If they get the wrong material from A or B, they already know it. Like ginseng, I use ginseng. Let's say if you buy ginseng, the manufacturer, the producer has to guarantee with the good soil, good fertilizer. They already have the tracking system there. That's my understanding.

Amanda: This is kind of a different way of doing that. Usually the tracking systems that we have – you guys looked at it at the beginning with the barcode or the radio labels – that's all going to be on the external packaging, which is beneficial, but this is one step further. By putting it inside, it makes it a lot harder to tamper with. So we're not saying that there's never going to be tampering, but it makes it that much more difficult for somebody to say, "This product came from this farm, and we're going to put a barcode on it that says that." It's a lot more difficult when you have this tracking device that's actually inside of the product that can't be easily taken out or removed, changed or altered.

Participant: But how will we know when we are ingesting these products and we've purchased these products and they're in our home? We aren't going to have the resources or the ability to be able to track that. So I see the point why at our level, the consumer level, by the time it's in our home, we can't trace it.

Facilitator: Are you suggesting why even tell us about it? Why don't you just do it?

Participant: No.

Chorus: No, no.

Facilitator: Because lots of things are done without consulting the consumer if it's deemed to be benign or will have no negative health impacts. Is that correct possibly?

Andreas: I'm not a natural scientist here.

Facilitator: No, but thinking theoretically, I think...

Andreas: A lot of food additives have been authorized without consulting consumers, that's pretty sure, and it's part of the authorization process that determines where there's a threshold that's stepped over so it has to be labelled, for example.

Facilitator: Well, for instance, a lot of the food that we buy is genetically modified, or ingredients have been, and we have no clue. It's not labelled as such. We don't know.

Participant: Here in Canada, but if you go to Europe, you have everything labelled.

Facilitator: Wow.

Participant: That's good control for the company, the producer, but not the finished products.

Facilitator: Different issues.

Participant: How many buy it? What is the percentage of foods that are being tampered with? Why is this such...

Andreas: The damage in food done in North America goes into many millions. It's very difficult because we cannot estimate because so much goes on unnoticed, and that also relates to the question "Can the consumer have it tested him or herself?" The technology will never become so cheap that you could simply put it into a scanner in your home and find out about it, but those who have a vested interest in protecting, for example, the ginseng Ontario brand or a particular brand, they would take care of the testing and analysis. Worldwide, it's certainly many billions of dollars that are being caused in damage because of tampered food, because it can be very lucrative to replace valuable ingredients with lower value and lower priced ingredients.

Facilitator: I think most of us, though, are not aware that this is going on, right, this tampering?

Participant: But isn't that being done by a lot of the manufacturers themselves? So wouldn't they be able to tag the fake stuff, too, and say, "Oh, yeah, this is real, too," and then just take it?

Participant: Government has to have a strict policy for the producer and the manufacturer.

Andreas: Very difficult question, because you're going into a criminal element there, and if they're really concerned about their brand value, they'll be very, very cautious about this. And that's one of the difficulties that we face in a very let's say complex and dynamic food chain, that you have many entry points into the supply chain, and it could be the wholesaler who's done it and replaced or opened up packages and resealed them. This all can happen, yeah.

Facilitator: I think we've answered, yes, the technical questions?

Participant: I think so.

Participant: Thank you.

Participant: I'm not eating any more.

Andreas: Sorry about that.

Facilitator: I think until the next meal. Thanks a lot.

Chorus: Thank you.

GROUP 2

Facilitator: I'm going to introduce you to Amanda and Andreas.

Andreas: Good evening.

Facilitator: They're our experts.

Andreas: Throw it at us, please.

Participant: I was just wondering how the molecule passes through the body. You know why? It's just a stupid idea at the back of my head. You've seen (inaudible) where something is done and people – there's morphing. It wouldn't be anything like that, right? It hasn't been something that's tested.

Amanda: It hasn't been tested just because it's so new. Before it did get implemented, it's something that does need to be looked into, and probably Health Canada would become involved in making sure that it is safe. There's not any foreseeable issue that would arise – things like binding to your own DNA, things like that. Very, very unlikely. There's never a 0% for anything, but pretty much it's not going to happen.

There's two kinds of options in terms of digesting. There is DNA in all our food products anyways, because every species that we get food from has its own DNA, so that's been in your food products. So this is a synthetic equivalent

to that DNA. So it's the same as when you get a vitamin, it's not actually extracted from an orange when you're getting vitamin C. They're making it in a lab, but it's chemically the exact same and it acts the same way.

So essentially what happens with digestion is usually a portion of the DNA that you eat will be digested, and then you actually re-use those building blocks as you replicate your DNA. But these would act in the same way. And if that does happen, then they'd be broken down into their individual components, so they'd be used the same way those components would be used from any DNA.

The other option is that, because it's such a short fragment of DNA, that it wouldn't necessarily be fully digested and pass through. In that case again, there's not really any contact with your own DNA – at least as it's in a whole piece.

So those are kind of the two alternative possibilities that we'd be looking at.

Participant: And just in terms of the DNA, would it be something that exists already, like say the ginseng example? Would you put something like a piece of sugar DNA, or is it something completely new in terms of it?

Amanda: It would be completely new. So we're actually looking at generating what would be a random sequence based on the four possibilities at each location, and then that is screened against a database of known DNA samples. So we look at DNA from different kinds of food to make sure it's not in a different food, so we avoid problems with potential allergies, we also avoid problems with being able to detect it. So we want it to be a unique tag; otherwise, we're not going to be able to tell if it's just contamination from another food product that could be processed there as well.

The other thing we look at is whether it matches any known toxic chemical that might be produced by that DNA, that it's not matching with any kinds of bacteria, not matching up with any prions (stuff that causes mad cow disease, things like that), sequences that we do know, that we're able to say this is definitely not that sequence.

Facilitator: Wow. That is it. That's very impressive. I know Jamie and Elizabeth can understand this. The rest of us are truly...

Participant: It's almost like a microchip, right?

Amanda: Yeah. What we're really trying to get at is taking the barcode that would be on the package, which is currently often used, and translating that information into a short DNA sequence that's unique. So you're still getting all the same information out of that DNA sequence, but instead of having it on a package which is really easy to tamper with, we're putting it in the food. So, yes, fraudulent practices are still possible, and people might start thinking this, but it makes it exponentially more difficult for that to happen. So that's why we're trying to implement this technology.

Participant: So if this is this technology, are you aware of any others that are being researched at this time?

Amanda: In terms of other molecules being used or other ways of improving...?

Participant: Other ways of improving anti-fraudulent measures?

Andreas: There's some tamper-proof packaging. There have been a number of cases of high-quality producers of fish and seafood products in the EU who implemented an electronic traceability system with tamper-proof packaging. So in the end, it might be a cost benefit analysis: which will be more effective, or which means will be more effective and more acceptable? So they have made very good experiences, but it's also a question of cost, because these tamper-proof packages are very expensive and they are typically reserved for high-end markets and not for, let's say, middle markets or...

Participant: General public.

Andreas: General public, yeah. So it's a very specialized market.

Facilitator: Well, on that point, Andreas, that gives me an opportunity to ask you, will this technology (and I know it's early days) be affordable? We're seeing here the fisher persons from Lake Huron. Presumably that's a small-scale business. Will it be affordable to local enterprises, local food producers?

Andreas: Well, there's typically another component with it: You would have to have an electronic traceability system to document all the information and pass it on to maybe even regulators if you co-operate, especially with endangered species. So it seems to be that the electronic traceability system is more expensive, the more expensive component of it. Maybe you can say something about the cost of analysis.

Amanda: Sure. So in terms of actually the scanning method that we use to recover these, that's where most of the cost is going to be generated. So we're looking right now at where technology's sitting. For the nucleotides, it's going to be about \$1 up to possibly \$3 per sample. So every time you test it, that's how much it's going to cost the company.

In terms of all those saccharides, it costs about \$50 to \$100 every time you fire up the machine that reads the tag. So what we're trying to do is actually, especially with all of the saccharines, but also with all the nucleotides, is combine it with the authentication methods that are already going to be in place. So test that they're already going to run at these different locations, and also then traceability and authenticity at another level.

Oftentimes, if it's sturgeon, for example, they have basic techniques that they're going to use to say, "Okay, we're going to try and test where this came from, or whether it's the correct item already." So if that is implemented, the cost is going to again be negligible, because there is no added cost to it. So it's not expected to actually raise the cost of the food to the consumer, by very little if at all.

Participant: But you'd still have the barcode and the lot number still. That wouldn't change. This is just additional security.

Andreas: Yeah.

Participant: What about if I order a pizza (there's pepperoni, all these different ingredients) and I get sick. How does that get traced?

Amanda: Depending on how widespread this becomes, if the producers of your pepperoni chose to tag their pepperoni in this way, you'd be able to test the pepperoni to see if that's what made you sick. And then, again, whichever ingredients were tagged, you'd be able then to trace those back. The other ones, you're relying on paper records which can be tampered with or packaging and things that are a lot more susceptible to human error like that. So there's still obviously a way to trace these things now, but this is one step further, basically.

Participant: But this won't be mandatory for companies? This is the companies that want to...

Amanda: They choose.

Participant: They choose to do this.

Andreas: They choose this, yeah. And at least for the foreseeable future, it's not anticipated to make it mandatory. It's at the discretion, for example, of an input provider to maybe protect against manufacturers or processors who claim that they use this high-quality input, but in the end do not. They can use this tagging to show, "Okay, you claim that it is in your product, but it actually is not." And it's invisible. It needs much more sophistication to copy this technology, and that's why it's investigated as an option.

Amanda: And presumably only the company using that tag would know the sequence of it, so it would be very difficult for an outside company to actually be able to generate the same tag, even if they had the technology to do so.

Facilitator: Is that it for questions?

Participant: Who came up with this idea anyways?

Andreas: People from Saskatchewan. I think they're project leaders from Saskatchewan.

Participant: They just sat there, “Let’s do molecules.”

Amanda: I’m actually doing all the nucleotide testing. We started with apple juice right now, and we’re looking at putting that in and whether it can be recovered and how accurate and sensitive the technique is, so we’re able to put the very smallest amount possible in a product.

Andreas: The Saskatchewan people are working on the oligosaccharides. That’s why we don’t have the expertise here, but it is so that oligosaccharides are even – how can I say? – proven to have a health benefit in terms of improving digestion. But my role in this is taking care of the social sciences part in terms of going into the consumer studies and taking the research to the next step of getting a more representative sample. Thank you very much.

Participant: Very interesting.

Facilitator: Were there any other questions? That’s about it?

Participant: To be honest, I’m not as scared any more after listening to you guys, because I heard DNA, but then when I think about it, chicken has DNA and all the other things.

Participant: Everything.

Participant: Everything has DNA, so it’s not as scary any more for me, the molecule.

Amanda: And we’re not changing the DNA of the product, so that’s kind of the difference between that and genetic modification. The DNA of whatever chicken it is, it’s going to stay exactly the same. We’re just adding this addition to it, outside of the DNA that would be in its cells, its own.

Facilitator: We’re seeing a rewrite.

Participant: One last question. In terms of long-term study effects, or long-term study and effects, how are you going to be able to do that if you’re looking for potentially the option of having manufacturers or whomever would employ this technique – how could you safeguard with some sort of long-term study?

Amanda: I think that that’s going to all be determined by Health Canada regulations for it, so whatever they mandate to the companies, that this can or cannot be used after X number of years of trials, whether that be on mice or... So clinical trials, I’m not familiar with the full process, but it would basically come down to the guidelines that we have laid out.

Participant: You don’t test on dogs, though, right?

Facilitator: This is a dog owner.

Andreas: We won’t put it into pet food or dog food.

GROUP 3

Facilitator: Now, are there some technical questions that we should get our experts in? Would that help resolve some issues here? It’s very easy. Should I ask them to come in for a few minutes?

Participant: Sure.

Participant: Reading this makes me feel really stupid.

Participant: Yeah.

Participant: I just feel like an idiot.

Participant: It's mumbo-jumbo. Get to the point, right?

Participant: It's scary.

Participant: It's not reader friendly.

Participant: It's so wordy.

Participant: What's nano technology?

Participant: I just can't really get it. What's (inaudible)?

Participant: Just knowing the authenticity of the product, I guess, that what you're drinking is really what...

Participant: It's like a microchip now as opposed to...

Facilitator: This is Amanda and Andreas from the University of Guelph, and they are the experts.

Participant: Hi.

Andreas: May we say a little bit about ourselves first? We know that you are the scientists – the social scientists.

Amanda: I am working on my master's degree at the University of Guelph, and I am working with developing one of the kinds of molecular tags that we are trying and testing how well it functions as a tag, so how well we're actually able to detect it or not detect it in some different foods.

Andreas: And I'm with Food Agriculture and Resource Economics Department, and we are in charge of eliciting the consumer response, and part of that is creating confusion, as you've just experienced.

Facilitator: I think there was – the last question then you were asking was, will we know it's in the food? How big is it?

Participant: Is it going to be labelled?

Amanda: That is something that probably the company who is using the tag will have to decide. So it's mentioned in your little write-up that, in this hypothetical situation, it would be approved as a processing aid. So I think that, legally, those are not required to be labelled on an ingredients list, for example. But just based on the improved consumer response for companies using it, I would think that they would want to tell their customers about it, because for you guys, that means an additional way of knowing that you're getting an authentic product. So when you get this product from whatever company, you know that these ingredients are legitimate, they came from suppliers, and that company, before manufacturing it into their own product, has tested their supplies, so you know what you're getting essentially. So I would imagine it's something they would want you to know versus trying to hide it.

Participant: Can you tell us a little bit about the process, how this works?

Amanda: Sure. So basically, it's added in extremely small quantities, the tag. Basically, an individual, one of these molecules you would need an electron microscope to even see, and we'd be adding a few of them, so a little drop in a litre of apple juice, for example, just in terms of amount, and that would be a few of these molecules.

To get them out, they undergo a different process. Depending on what type is used, there's a couple of different ways of doing that.

Participant: Of getting it out of the product?

Amanda: Yes. Of actually reading the tag, so to speak. So essentially, this would be replacing your general barcode scanner type device. It's a little bit more complex than that, so it wouldn't be as quick, but it's going to contain the

same type of information. For some of them, they are designed that, when a fluorescent tag is added to it, if it's the specific sequence it's looking for, it's going to bind, and that will show fluorescence, and you'll be able to tell how much of that tag is in your product. Certain other ones would show up on a chemical-type analysis of here's how many parts per million or something like that of this that is in there. So those kinds of ways of actually determining it's there.

Participant: Sorry. I have lots of questions. And the aim of this is for not consumers to know what they're getting, for manufacturers to know that their suppliers are giving them legitimate ingredients? It's at that level?

Amanda: It's kind of twofold. It would essentially be implemented at the manufacturing stage. The benefit to the consumer is then that they have a greater safeguard in that they are getting an authentic product. You were told a little bit about how much it costs companies when their products are adulterated. So if a supplier wants to know a layer down the line of the manufacturer put their product in this new product that has it in it, they're able to tell that their product was used in this other product, they're able to tell how much of it was used and whether that was how much they were told it's used. So if it's somebody making apple juice concentrate that's then diluted at other companies, and you're getting a bottle that says 100% apple juice, they can go back and check that the company in the middle who did the dilutions did it the correct way and that you're actually getting what you're paying for.

So essentially, it's twofold. The company is saving money but, by proxy, you are as well, because that \$15 billion is transferred to the consumer essentially in higher prices of the food products. Is that helpful?

Participant: Any side effects that we know of?

Amanda: No. Not that we know of. This is a very, very new technology. It hasn't been tested in clinical studies or anything like that, but just based on the nature of them; it's not thought that there's going to be any ill effects of any kind. There's not any reason to believe that there would. They're not toxic. They would be digested as – each of them is actually derived from different naturally occurring products already. They're chemically synthesized, but they're therefore chemically identical, so they would be processed in your body the same way, which is safe. They don't accumulate in the body or anything like that, so you don't have to worry about how much of these am I going to be ingesting if they're in every single thing. They would be either digested or passed through, and that would be something that would be tested in clinical trials, but one of the two.

Participant: So is this to just again prevent obviously Maple Leaf, like all these issues? I mean, it's a way of trying to, well, safeguard your food, because people want to know what's in your food.

Amanda: Yeah.

Andreas: The crisis with Maple Leaf probably would not have been prevented with this. For this, you would have quality assurance measures in place, because that was not a deliberate substitution of an authentic and genuine ingredient with a cheaper one. It was a mistake...

Participant: Contamination.

Andreas: Contamination at the processing plant. So that could only be detected by quality assurance measures, but not through a tag.

Participant: So the point of the tag – I guess I'm just trying to...

Andreas: The \$10 to \$15 billion that we referred to is basically that companies further down the road, behind the manufacturer, between the consumer and the manufacturer, replace the more valuable ingredients and put less valuable stuff on the shelves, for example. And these companies who have invested in their brand but also in the quality have now a more effective means to identify these adulterated and also prosecute them. So that's the idea behind this. From that, of course, the consumer would also benefit through a higher level of assurance of getting what is actually promised on the label.

Participant: And you will be doing more tests? There will be further clinical tests before you set this all out?

Amanda: Yeah. I think it would have to be something that goes through Health Canada. So essentially, they can decide to approve it or not approve it based on what they perceive the risks to be. They might mandate that there be clinical trials. They may not, depending on whether many experts that would know how it would react in your body more exactly than I do (I'm not a physiologist), they might be able to give a more expert opinion, and if it's essentially that there's nothing perceived that might happen, they might do it without clinical trials. I'm not sure what the regulations would be, but there would be some governing regulations about actually using it.

Participant: But it said here that they have given the green light, right?

Amanda: This is kind of a hypothetical. If it turns out to work and we do get it patented, then hopefully something like that will be coming out.

Facilitator: Yeah. This was created just for the research.

Andreas: About adulteration of this kind, or about...?

Participant: Yeah. This is in the U.S., right? In Canada, are we really concerned about adulteration?

Andreas: It can happen here, too.

Participant: It can happen or it is happening?

Participant: Do we have figures?

Amanda: That \$15 billion is I think just for Canada.

Participant: No, it's U.S.

Andreas: No, it's for the U.S.

Participant: They have so many more people than us and production.

Andreas: Yeah. Well, if you would take a tenth of that, you would have the Canadian equivalent. It's very hard to estimate because people don't get sick like in the listeria case, and so they mostly go unnoticed. And that's one of the key problems, to come up with estimates what's the actual amount. And companies where this happened, they don't want it to appear in the news because it will compromise their brand reputation.

Participant: Okay. So say, for example, they have these tags in here. Is someone literally going to randomly go to a Metro, pull out a box of Cheerios and make sure that it has the right tag to make sure that that's not counterfeit?

Andreas: They already do this, the manufacturers, yeah.

Participant: Like random sampling?

Andreas: Random or sometimes targeted sampling when they have information.

Participant: So if someone's counterfeiting this product isn't there an easier way than tagging the entire supply? Can't they look at the box? Obviously if they're going to counterfeit the product, they're going to counterfeit what it's contained in, and couldn't you have counterfeit detectors who could look at the box and say, "Okay, there's something fishy here," and then go from there?

Andreas: Yeah. That's exactly the point. Each processor or manufacturer would have to decide, in the cost-benefit analysis, which way they want to go, and the boxes can be copied very quickly and very precisely. This new technology, if it can really be applied at hardly any additional cost, it would be very effective in terms of the cost per unit that is sold.

Participant: So there's no other way that they can tell.

Andreas: They already have this in place. They have methods of authentication, but let's say the other side is catching on.

Participant: I see.

Participant: So the possibility of tampering then is very minimal?

Andreas: It's reduced.

Participant: Reduced.

Andreas: How much of a reduction that is, we can't say. I would be looking into the future, but it would certainly have an increased effect on the assurance.

Participant: So this is basically a cheaper way to find out if that Cheerio is a real Cheerio, but there actually is a way to find out if that Cheerio is a real Cheerio now.

Andreas: They could already do that, yes. They already do that. They have methods of authentication, and adding on one more layer of this authentication in the whole process would not make it more expensive.

Participant: I think that's great.

Andreas: It's like adding a new safety feature to a car.

Facilitator: Okay. Time is marching on. Thank you.

GROUP 4

Facilitator: I would like to introduce you to Amanda and Andreas. We have a list of questions here. Maybe I'll start... Are they putting something in it? What are these labels, tags?

Amanda: Yeah. So we are putting something in it, and the idea is that, as you guys were discussing, it's really easy to alter packaging, so we want to make it a little harder to produce these counterfeit items. So there are alternatives available like tamper-proof packaging, but what we're looking at doing is making something that is a cheaper alternative, something that can be done more quickly than these kinds of traditional safeguards to package tampering.

Andreas: And those who want to engage in fraud, they don't see the safeguard. It's invisible. It's much more difficult to obtain the technological knowledge, and it would give the manufacturers the opportunity to sample at any spot in the food chain on a regular basis.

Participant: It's just like when you write a cheque. On the cheque there's like watermarks so you can't reproduce a cheque, for example, for fraud. So what you're saying is it's the copyrighter.

Andreas: Yes. It's another safety layer.

Participant: But how does the consumer know this if it's on the label and it's invisible? How do we know to buy it or not buy it? You may know, as a manufacturer, but how does the consumer know that we're buying something that's fraud as opposed to the real thing?

Andreas: That's exactly why we're doing this research, to find out what would be the right approach from the manufacturers' perspective to inform consumers, put something on the website. But it won't be possible to educate all consumers, as was mentioned here, because they might not be interested, but to provide the information to have a transparent approach to this, because there's going to be an increase of let's say molecular technologies that are going to be applied in the food industry, and so that's a very basic concern for the suppliers, too, and the manufacturers.

Facilitator: And that leads us to another question: “A molecule is a natural tag.” Could you please explain a bit?

Andreas: She’s the science expert, I’m the economics expert.

Amanda: I’m actually working with one option for the molecular tags, and we’re as a group looking at two. So another group is looking at a second option. So the two that we are looking at right now are – the first are called oligonucleotides, and that just means a really short piece of what would be DNA building blocks. So what we’re trying to do is – your food always has DNA in it. So if you’re buying a chicken, it’s got its chicken DNA. What we want to do is – what we’re able to do is actually make in a lab a chemically identical DNA piece, and we want this tiny little fragment of it to be something that you wouldn’t normally find in the juice. There wouldn’t be anything dangerous or toxic, but something that is a unique tag so that when you recover it, you can tell this is where it came from. So this company was able to do that, make their tag sort of encoded with whatever information they want in the different basically tinier molecules in the molecule.

Participant: What would the composition of the tag be?

Amanda: They’re called nucleotides, so that’s what our DNA is made up of and any object’s DNA is made up of. So there’s four possibilities for each one and they’re different base pairs is what we call them. So there’s four options for each location on it, and we’re looking at about 100 base pairs, which is really, really, really tiny. So that’s what it’s made up of. And then, because we’re able to make this in a lab, we can make it whatever sequence we or the manufacturer would want it to be.

Participant: But you don’t put tags on the box. It’s not labelled that this has a tag in it.

Amanda: It might be, so that would be something that the manufacturer would decide.

Participant: If it’s not labelled, then how would we know? Would the public know anything about this at all?

Andreas: It would depend on let’s say the manufacturer’s press strategy, or if they want to take a co-ordinated approach as a whole industry and say, “This is what is being done to safeguard the high quality of our branded products,” they could inform the public. But that is part of the let’s say industry or manufacturers’ strategy that they would then take in the end. It’s something that...

Participant: How is the consumer affected by this?

Facilitator: What’s in it for me? That’s our number 3 question.

Andreas: You mean physically affected possibly, or in terms of the benefits – possible benefits?

Participant: Well, in any way. In any way. What’s in it for me?

Amanda: Well, essentially what we’re hoping to do is actually bring down the costs of doing this kind of authenticity testing. Currently...

Participant: Wait a minute. Already there isn’t a cost.

Amanda: Yes. So when we’re talking about the current checks and balances that the government imposes as well as the manufacturers themselves impose, that all comes at a cost. Currently it’s fairly expensive to do. It takes quite a bit of time oftentimes. Most manufacturers aren’t able to afford to have the facilities themselves. They have to send it out and wait for results to come back, so it can take a long time. What we want to do is essentially streamline the process and make it something that is going to cost a lot less, which eventually would be triangulated to consumer cost – or consumer benefits of reduced costs of product.

Participant: But initially it would cost more.

Amanda: Not necessarily.

Participant: Only a long way down the line would it cost a lot less.

Amanda: The particular molecule that I'm working with, the actual equipment that's used to test it costs significantly less than the equipment that was used.

Participant: All right, but you've got to make this equipment.

Amanda: The equipment already exists, so there is a platform, so to speak, a machine that already is able to read this kind of information. We're just trying to use it in a different way. So it's already there and it is available.

Participant: And the manufacturers have this...

Amanda: The manufacturers wouldn't, but they would have access to it. They might choose to send it out to another lab. The platform machine that I'm working on is actually something that's portable. It's this big, a tiny little thing.

Participant: Like a laptop computer?

Amanda: Yeah, and it's very easy to run, so that's another thing that we're looking at. We don't want them to have to employ really expensive scientist people to come in and do it. What the platforms will hopefully eventually be able to do is, there will be a little bead with all the reagents that you need to get it in, and you would add your sample from the food to it and put it in the machine, and it will essentially spit out the result for you: "Yes, it's there, and this is how much there is there," or "No, it's not there at all." Therefore, red flag. So it will be a very, very simple process, and essentially not provide an added cost, but rather a reduced cost.

Participant: Because right now manufacturers do test.

Amanda: Yes, they do.

Participant: Right. So it's just making it unique that they can pick up easier the identity of their product.

Amanda: Right, so they're able to get an answer a little bit faster. So if they have to do a recall, they don't have to wait a week for their results, or even three days. They can get results in an hour or two hours, because they have the facilities there to do it. A technician who would normally be doing their regular quality assurance would be trained on this other machine, and it's a very simple process, so they would be able to run it themselves very quickly. And also, what they're going to also be able to test is their supplies coming in before they actually manufacture their final product. So if we're talking about the chocolate that was in those cookies, if they had had the capability to test that as it came in, they would not only be able to (a) get a red flag if there wasn't a tag there, or (b) if there was a tag and they noticed a problem down the line, they immediately can find out where that product came from because it had been tagged. So even if the company tagged a fraudulent product, they're able to tell a lot faster.

Participant: But then would everything that goes into a product, everything would have a tag.

Amanda: Potentially. So that would again be up to the manufacturer and would depend on some different regulations.

Participant: There would be sugar and flour and this and that.

Amanda: M'hm.

Andreas: It would depend on how lucrative it is for fraudsters to try to replace this. So basically it boils down to a cost-benefit analysis for let's say key ingredients or even for key products where it is worthwhile engaging in this for fraudulent activities.

Facilitator: Sophie, you had a question?

Participant: My concern is you said that these little tags are non-toxic, etc., but what about long-term? My son's one. When he's 30 and he's eaten a million of these tags, what is that going to do to him?

Amanda: I can't answer for sure. There's never a 0% risk for anything. We haven't obviously done any clinical trials because this is really just developing. I cannot imagine a scenario in which there would be ill effects just because these things are essentially chemically identical to things that your body is exposed to every single day.

Participant: But it's chemically identical. When you're talking like chemically identical and natural source, it's two different things. So you're talking a build-up over X number of years. I might not have 30 years in me, but my sons do.

Amanda: My answer to that is kind of two-fold. First, it being chemically identical – when you buy vitamins, oftentimes those are synthesized in a lab. Things like aspirin and stuff like that have natural sources initially, but then are synthesized in a lab, so they have the same effects on your body because their chemical structure which gives them those properties is exactly the same. So we are expecting it, and there's no reason that it shouldn't behave the exact same way in your body.

So the way that it would behave in your body, it would not accumulate, so there's not a risk of repeated exposure, because it's not going to accumulate in your body. What usually happens to the DNA that you ingest is some of it is broken back down into those building blocks, and you actually need them to regenerate your own DNA for yourself. So skin cells that come off that need to be remade, you actually use those back up. And not all of it is broken down, and the rest passes through you. So there's not an actual build-up of these.

Participant: See, I would be concerned that these tags are going to alter your DNA in some way. I mean, if you think about free radicals that are floating in your body, how do we know that this isn't going to act like one, a build-up 10, 15, 20 years down the way?

Participant: You know, we don't know that with anything. Like laser eye surgery, people do it, it improves their eyes today. Will they be able to see in 20 or 30 years from now? Who knows? It's the same.

Participant: Well, it's been 20 years since that's come out, so we kind of know.

Participant: Okay. Well, but it's still a new concept compared to other things, so no one really knows. I mean, it's something... I hear what you're saying, I hear what you're saying. I agree with what you're saying, but in order to try a new concept, what she's saying makes sense. I agree with you, because you always have the doubt. People who take medication, are there side effects 20 years down the road? Who knows? 20 years down the road we'll know. But we can take a survey and you do an analysis of X amount of people and you check out what the repercussions are. So there always is the risk of trouble. I'll use that term.

Participant: I'm not liking your answer. I think that you've answered very well, and obviously it's your field of study, but as a consumer, as a mother, I'm really sceptical of everything.

Amanda: Yeah, and as I said, there's never a 0% probability of anything happening, but what we can really do is make sure that there are physiological experts who know exactly how this is going to behave in the body to decide whether it's going to be used or whether they would then suggest clinical trials over X many number of years to see what the effects are over a little while at least before they're implemented. So that's not being ruled out completely. If it's deemed necessary or should happen, then that will definitely happen, and that'll just depend on how Health Canada decides to regulate these tags.

Facilitator: And there's one final question: As Canadians, we tend to believe that the Canadian government is protecting us, doing a good job at it. What is the role of government in this new technology?

Andreas: The first step would be the authorization process. With the development of this technology, we're not even close to submitting anything for approval, because it is still in the beginning stages. If that is coming nearer, there are a set number of probabilities or options how to submit a proposal for approval, and then Health Canada would specify what is needed to support this approval, so what type of evidence. They might require clinical studies for a number of years. That's what we don't know yet. So that's the first step.

In subsequent years, given that this approval will be granted, they would probably follow any sort of indication that there might be some health concerns about that, and they would closely monitor that as part of monitoring food technologies as it is done today. But I think, after the authorization process, it's like food ingredient or a food additive or, as is described here, a processing aid, the same regulation would apply to these.

Facilitator: Okay. Standard tracking. Any last questions? Have we pretty well exhausted...? Thank you very much.

Chorus: Thank you.