



Consumer, Food Values and Changing Markets
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The Future of Farms and Food in Canada

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Overview

The development of novel technologies in food production, processing and marketing has become a matter of some debate.

The issues regarding the consumption of foods produced by novel technologies include :

Concerns over the future of these food supplies (Baker and Mazzocco, 2002, Hu et al, 2004, Hu et al 2006, Larue et al, 2002)

Fear of consumption (Cox & Evans, 2008)

Public opinion and awareness, public acceptability, social controversies (potential risks and benefits (Bouwmeester et al., 2009; Boyce, 2009; Busch, 2008; Dunkley, 2004; Hallman et al., 2003; Ronteltap et al., 2007; Turk et al., 2007; Onyango and Govindasamy, 2004; Vandermoere et al., 2009)

Health and environmental risks, social risks, benefits and regulation views (Besley et al., 2008; Erdem & Rigby, 2010)

Public trust (Costa-Font et al., 2008; Siegrist, 2000; Siegrist, 2002; Visschers et al., 2007)

Ethical and moral concerns regarding acceptance (Sheetz et al., 2005, Vandermoere et al., 2010)

Consumer Choices

Understanding the reasons why consumers feel the way they do about certain types of foods can help new product development and adoption.

In many cases we know what, in general, segments of the population want and we can respond but we are never sure exactly what the rationale is.

Certain types of novel foods can have the unfortunate effect of stigmatizing other foods – again understanding why can ameliorate some of these impacts

- **The previous studies have indicated**
 - A general lack of awareness and understanding of new food technologies (their presence and applications)(Vandermoere et al., 2010; Hallman and Aquino, 2003; Onyango et al., 2006; and Waldron et al., 2006)
- A broader examination of Canadian views of food technologies in general can help place the debates about GM, including cloning and nanotechnology (only a few).

Food Neophobia/ Food Technology Neophobia

The term **Food Neophobia**:

defined as the reluctance to eat and/or avoidance of novel foods.

Food Neophobia Scale (FNS) measures a person's fear level towards willingness to try new food (Pliner and Hobden, 1992).

Tuorila et al(2001) suggest that food neophobia is not a cultural, but an individual experience.

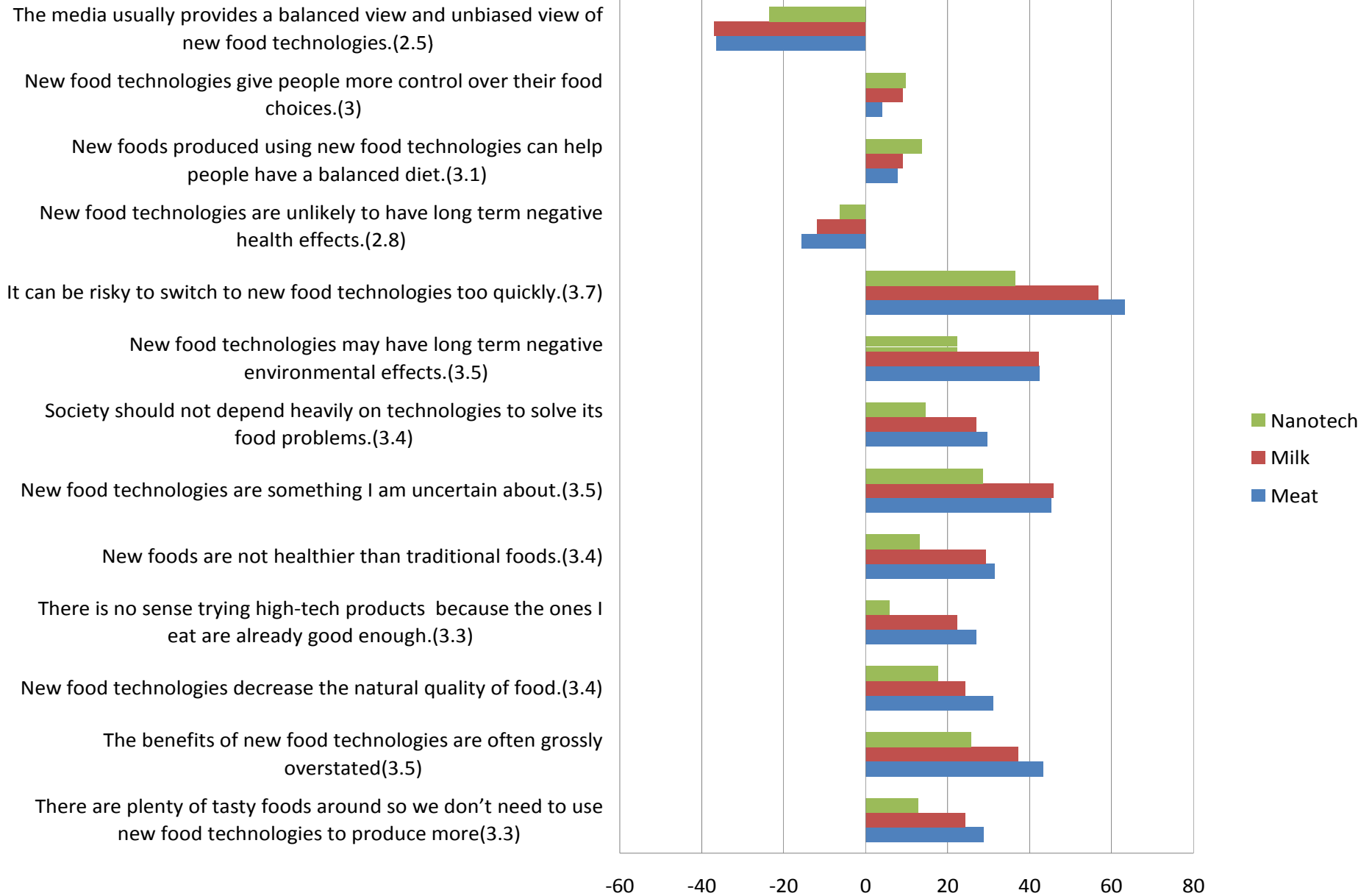
Cox and Evans (2008) examined the role of consumer **food technology neophobia** in affecting consumer food purchasing decisions in Australia. They developed a scale that more accurately describes fear of technologies in food rather than the foods themselves.

Assessing Canadian Views of Food Technologies

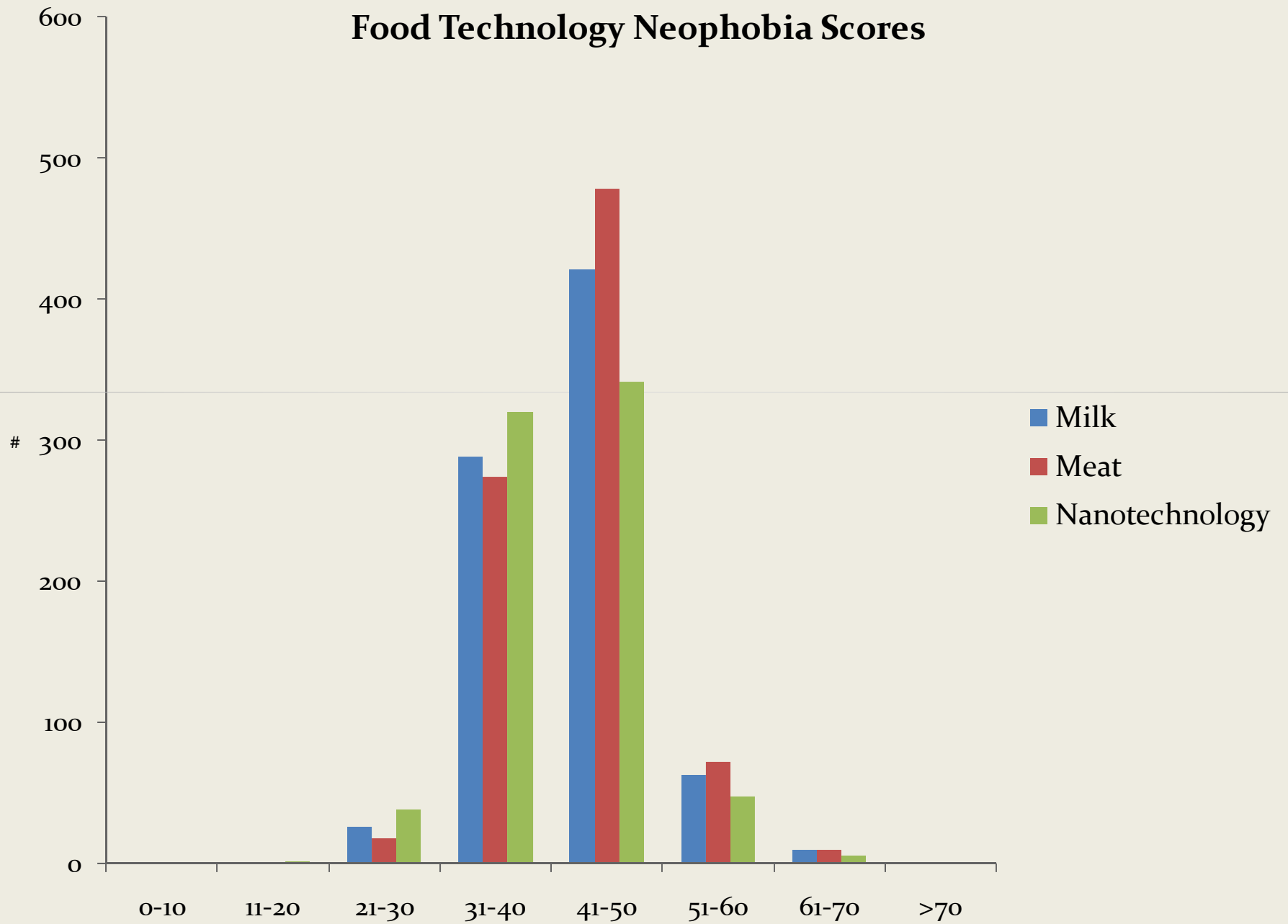
- Using the scale developed by Cox and Evans – investigate Canadian views at a particular point in time – conduct in the context of an examination of consumer interest in nanotechnology applications and cloning.

Net Agreement Percentage, National Canadian Survey 2010

(Mean Score in Paratheses)



Food Technology Neophobia Scores



Method

- The preliminary analysis of the FTNS:
 - Highlights that Canadian consumers are less neophobic as compared to Australian sample (21-88) in Cox and Evans (2008) study.

Neophobia Scores Range, Mean, and Standard Error

| | Range (Min-Max) | Mean | SE |
|----------------|-----------------|-------|-------|
| Clone meat | 13-65 | 43.1 | 0.212 |
| Clone milk | 19-65 | 42.65 | 0.23 |
| Nanotech Juice | 18-65 | 41.26 | 0.243 |

FTNS Summary

- The results of three national Canadian surveys on the application of FTNS indicated that:
- The FTNS proves robust and seems to be consistent across samples of the population, some proportions of Canadian population are more likely to consume food produced by novel technologies.
- Findings showed strong consistency regardless of type of novel technology implying that Canadian populations would respond to any kind of newly developed technology in food industry in a similar manner.
- The scores in each survey showed less neophobic behavior for Canadian population as compared to Cox and Evans (2008) sample, The Cronbach's Alpha coefficient indicates high internal reliability of the scale.

Application to Cloning

- USDA has established that cloning is a safe procedure – the application of cloning in Canada has moved more slowly.
- Unlike the US the Canadian organic standard does not allow products from cloned animals.
- Surveys conducted in early 2010

COMPARISON OF RESULTS NATIONAL SURVEYS US and CANADA

| | Percent Disagree | | Percent Neither Agree or Disagree | | Percent Agree | |
|---|------------------|-----------|-----------------------------------|-----------|---------------|-----------|
| | <i>Canada</i> | <i>US</i> | <i>Canada</i> | <i>US</i> | <i>Canada</i> | <i>US</i> |
| <i>I am willing to eat meat from cloned animals</i> | 40.6 | 43.2 | 25.2 | 26.0 | 34.2 | 30.8 |
| <i>I am willing to eat meat from the offspring of cloned animals</i> | 40.4 | 43.0 | 24.7 | 26.1 | 34.9 | 30.9 |
| <i>I am willing to consume milk products from cloned animals</i> | 41.3 | 44.4 | 24.0 | 24.8 | 34.8 | 30.8 |
| <i>I am willing to consume milk products from the offspring of cloned animals</i> | 40.6 | 43.0 | 24.3 | 25.7 | 35.1 | 31.3 |

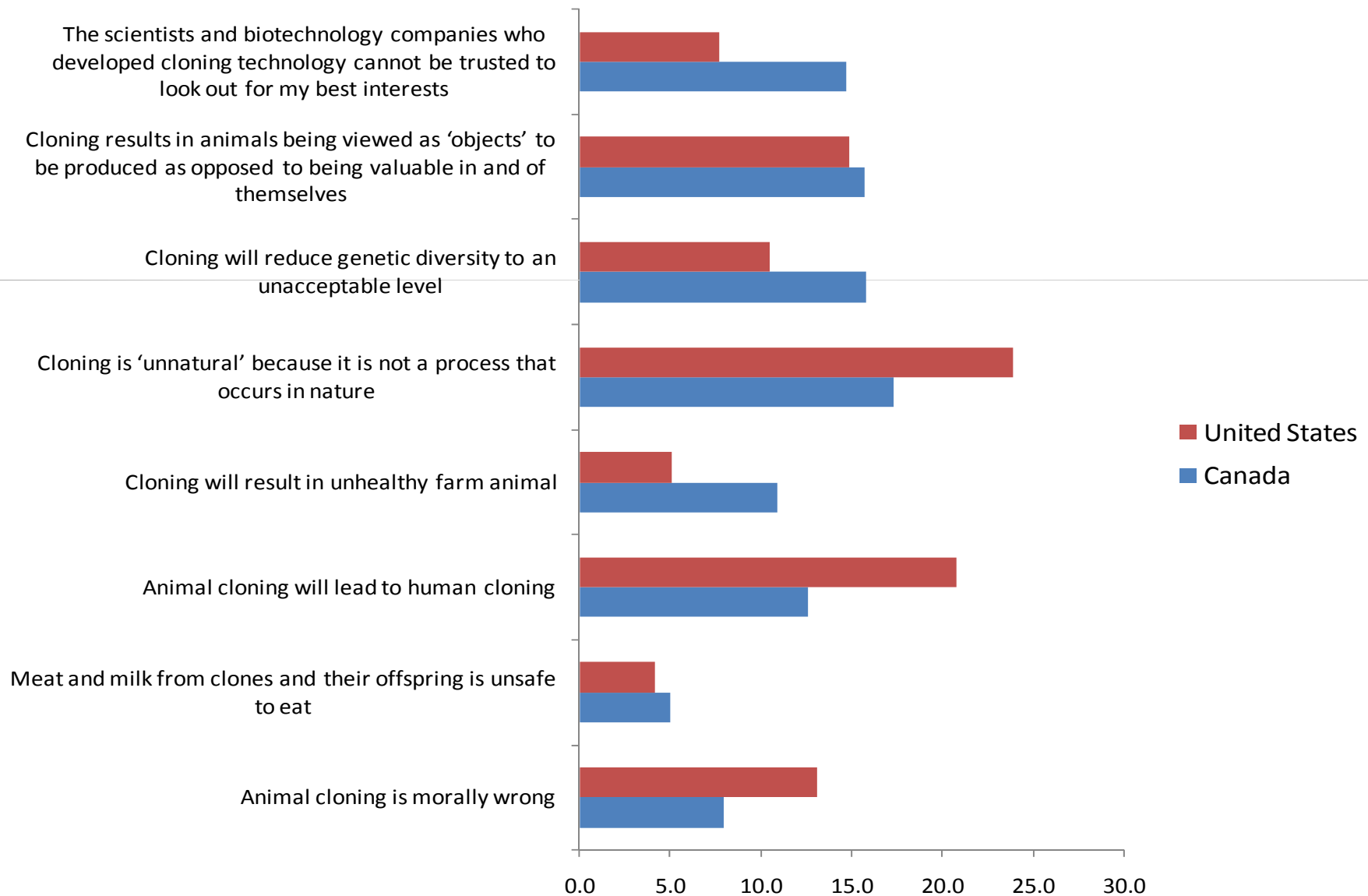
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| | <i>Canada</i> | <i>US</i> | <i>Canada</i> | <i>US</i> | <i>Canada</i> | <i>US</i> |
| | <i>Some of the meat currently sold in grocery stores is from cloned animals or their offspring</i> | 37.6 | 27.4 | 46.4 | 57.5 | 16.0 |
| <i>Animal cloning is unacceptable</i> | 40.0 | 34.4 | 27.6 | 33.7 | 32.4 | 31.9 |
| <i>Animal cloning will result in beneficial outcomes to me</i> | 34.7 | 35.8 | 42.6 | 43.6 | 22.7 | 20.6 |
| <i>The meat from cloned animals is safe to eat</i> | 21.3 | 29.2 | 40.8 | 41.2 | 37.9 | 29.6 |
| <i>In general, the meat and milk I buy from grocery stores is safe to eat</i> | 6.3 | 10.3 | 19.0 | 26.1 | 74.8 | 63.6 |

Why are People Concerned?

- “Which of the following two statements best describes your views toward animal cloning? X or Y?”
 - Animal cloning is morally wrong
 - Meat and milk from clones and their offspring is unsafe to eat
 - Animal cloning will lead to human cloning
 - Cloning will result in unhealthy farm animals
 - Cloning is “unnatural” because it is not a process that occurs in nature
 - Cloning will reduce genetic diversity to an unacceptable level
 - Cloning results in animals being viewed as “objects’ to be produced as opposed to being valuable in and of themselves
 - The scientists and biotechnology companies who developed cloning technology cannot be trusted to look out for my best interest.

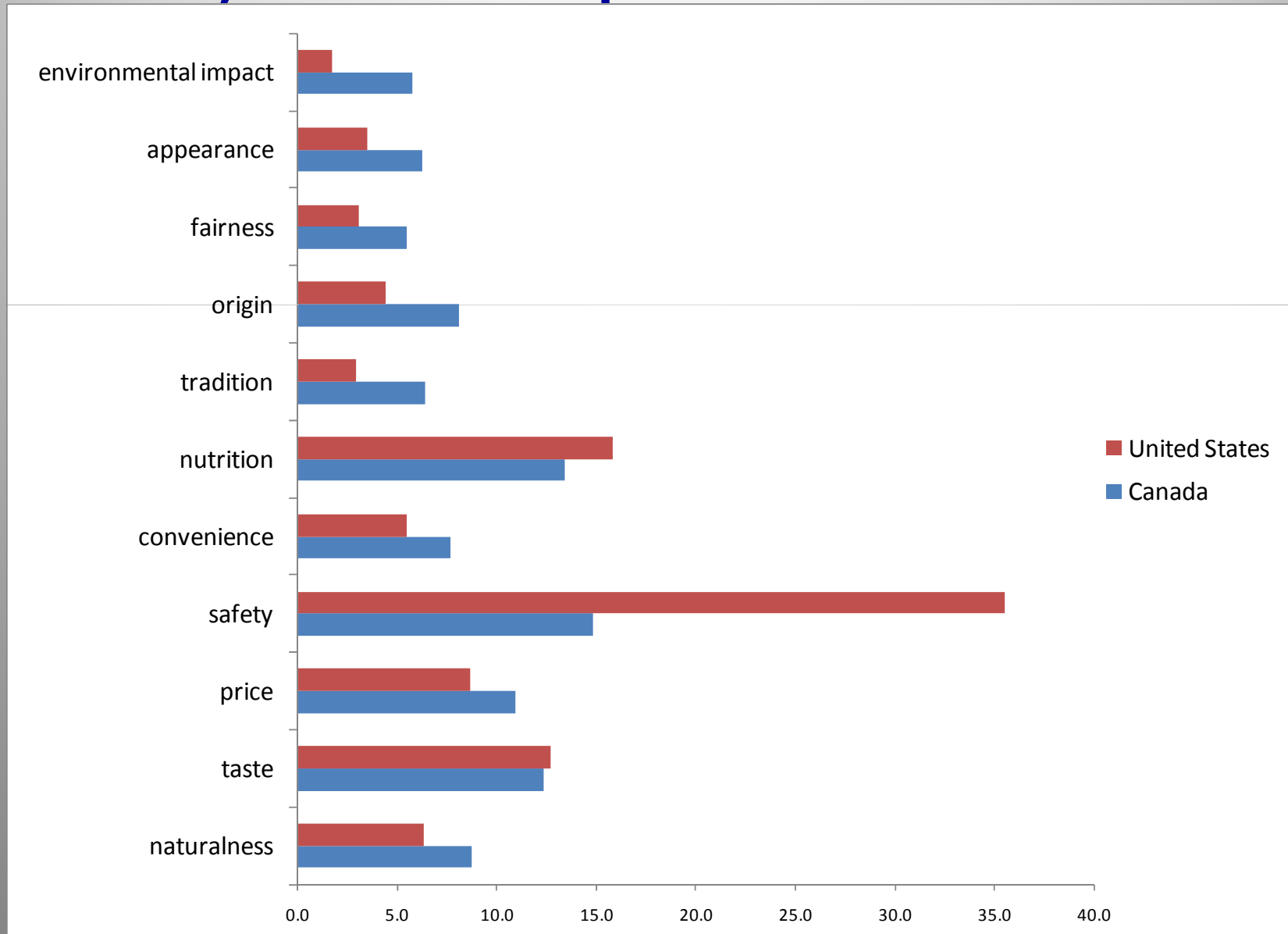
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Why are People Concerned?

- Do cloning concerns related to “food values?”
- “Is X or Y more important when you purchase foods?”
 - Naturalness (extent to which food is produced without modern technologies)
 - Taste (extent to which consumption of the food is appealing to the senses)
 - Price (the price that is paid for the food)
 - Safety (extent to which consumption of food will not cause illness)
 - Convenience (ease with which food is cooked and/or consumed)
 - Nutrition (amount and type of fat, protein, vitamins, etc.)
 - Tradition (preserving traditional consumption patterns)
 - Origin (where the agricultural commodities were grown)
 - Fairness (the extent to which all parties involved in the production of the food equally benefit)
 - Appearance (extent to which food looks appealing)
 - Environmental Impact (effect of food production on the environment)

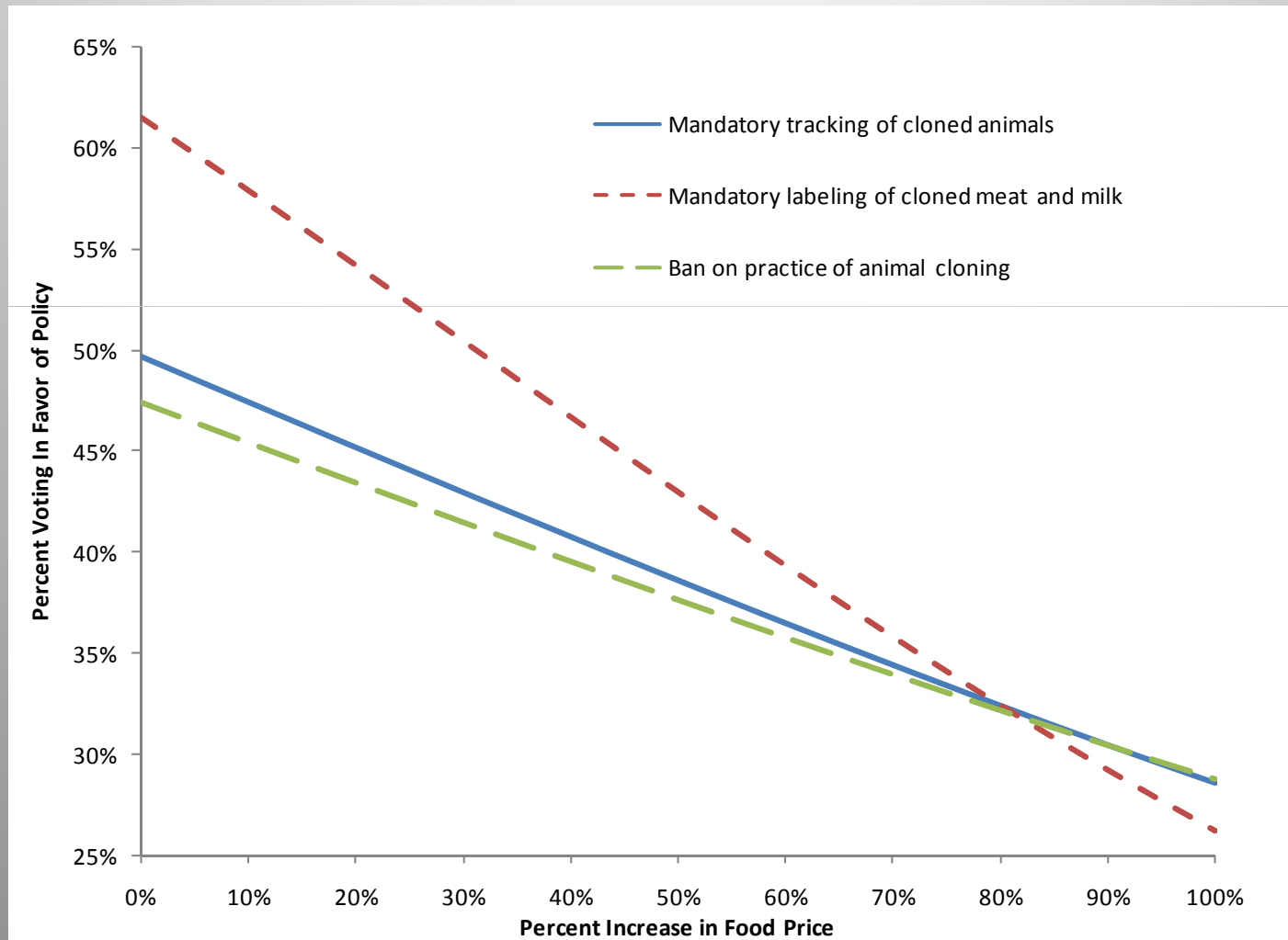
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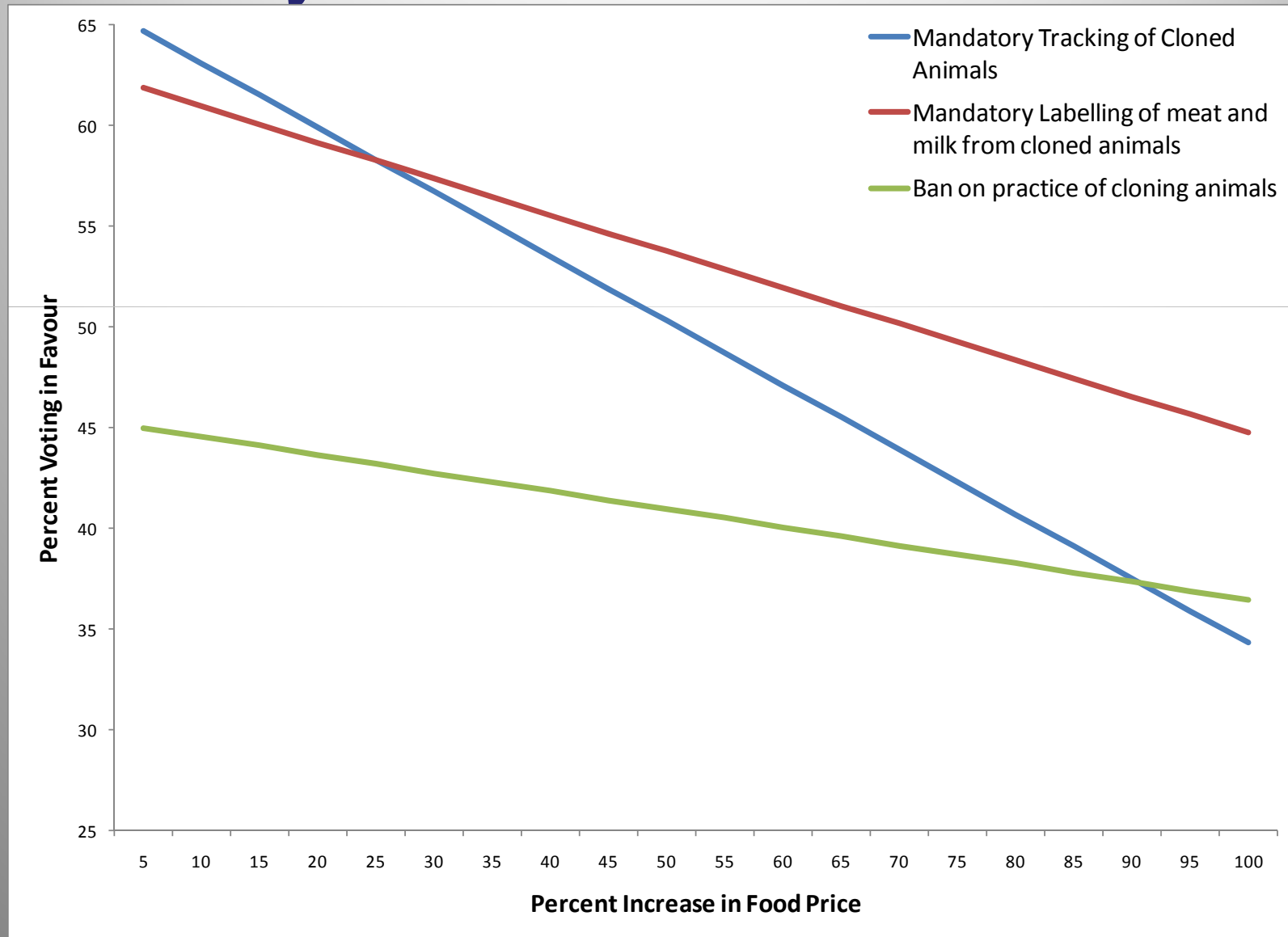
Policy Preferences

- Three contingent valuation questions
 - Suppose the next time you went to vote, there was a referendum on the ballot that would require the Canada/U.S. government to implement a policy that required a tracking system on all cloned animals. Would you vote in favor of this policy if the policy would increase the price you would pay for meat and milk products by $X\%$ due to the added enforcement and oversight required by the policy?
 - Suppose the next time you went to vote, there was a referendum on the ballot that would require firms to place a label on all meat and milk products derived from cloned animals or the offspring of cloned animals. Would you vote in favor of this policy if the policy would increase the price you would pay for meat and milk products by $Y\%$ due to the added enforcement and oversight required by the policy?
 - Suppose the next time you went to vote, there was a referendum on the ballot that would ban the practice of animal cloning altogether. Would you vote in favor of this policy if the policy would increase the price you would pay for meat and milk products by $Z\%$ due to the added enforcement and oversight required by the policy?

Policy Preferences: US



Policy Preferences: Canada



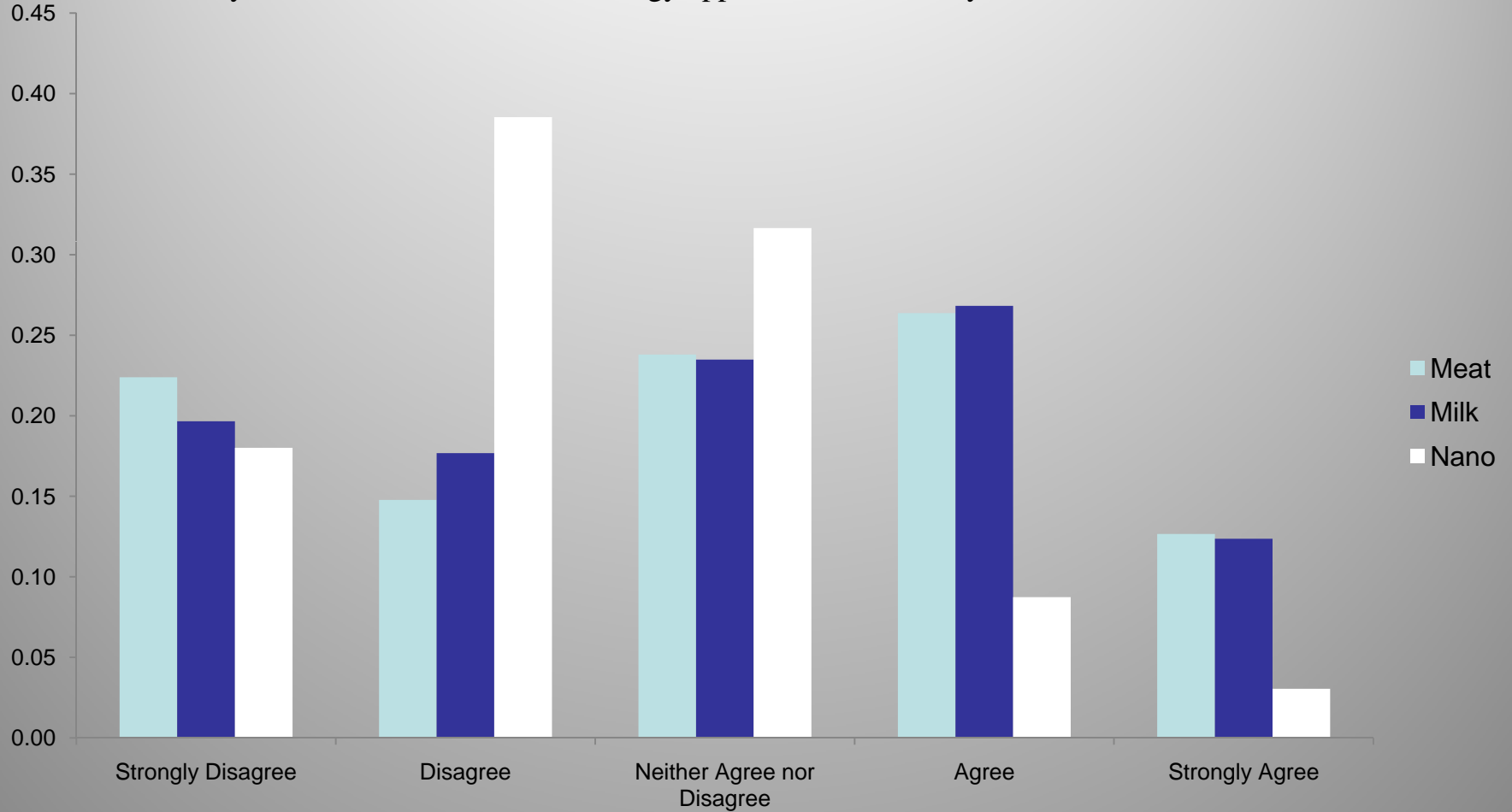
Describing Attitudes Using the FTNS

- An **ordered probit** regression was developed for a question from each survey separately.
- A measure of the FTNS (food technology neophobia scale) is considered in the regressions as an **independent variable** as well as
- socio-demographic variables.
- The statements
- ‘if I learned that the meat products I regularly purchase came from cloned animals, I would continue to buy the meat products as usual’ for meat from cloned animals,
- ‘If I learned that the milk products I regularly purchase came from cloned animals, I would continue to buy the milk products as usual’ for milk from cloned animals, and
- ‘How beneficial do you consider these nanotechnology applications to be for your health?’ for juice produced with nanotechnology are considered as **dependant variable** for each regression, respectively.

If I learned that the meat products I regularly purchase came from cloned animals, I would continue to buy the meat products as usual

If I learned that the milk products I regularly purchase came from cloned animals, I would continue to buy the milk products as usual

How beneficial do you consider these nanotechnology applications to be for your health?



Odered Probit Regression in Three National Canadian Surveys

| Parameter | Estimates (Meat from Cloned Animals) | Estimates (Milk from Cloned Animals) | Estimates (Juice Produced with Nanotechnology) |
|-----------|--------------------------------------|--------------------------------------|--|
| Gender | 0.161** [0.076] | -0.217*** [0.0786] | 0.377*** [0.0802] |
| Age | -0.036 [0.0275] | 0.015 [0.0275] | -0.118*** [0.0291] |
| Trust | 0.167** [0.0777] | -0.060 [0.0623] | -0.038 [0.0872] |
| Education | -0.065* [0.039] | 0.003 [0.040] | 1.16 [0.0420] |
| Rural | 0.009 [0.1060] | 0.107 [0.108] | -0.73 [0.1154] |
| Neo 1 | -0.752*** [0.0444] | -0.676*** [0.040] | -0.439*** [0.047] |
| Quebec | -0.067 [0.75] | 0.109 [0.091] | -0.396*** [0.110] |
| Constant | 1.18*** [0.196] | 1.35*** [0.272] | 1.400*** [0.211] |

Note: 1. ***, **, * = Significant at 1%, 5%, 10% level.

2. Neo 1, is the first 3 factors of principle component analysis with highest Eigenvalue.

Summary

- As technologies change the foods in form and in packaging – certain segments of the population have concerns
- The issues are not the same for different technologies
- The types of factors that raise concerns have some similarities and some large differences across countries
- The regulatory fixes are not clear as different fixes may be necessary for different applications of technology.

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