



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

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

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

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

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

RESOURCE ECONOMICS AND ENVIRONMENTAL SOCIOLOGY

Consumer Interest in a Natural Designation in Food Choice

Ellen Goddard, Violet Muringai and Amber Robinson

Project Report #17-01

Project Report



UNIVERSITY OF ALBERTA
DEPARTMENT OF RESOURCE ECONOMICS
AND ENVIRONMENTAL SOCIOLOGY

Abstract

In this study, the objective is to identify consumers' willingness to consume different foods and the factors that could drive their food preferences. One hundred non-academic staff and students at the University of Alberta in Edmonton, Canada participated in the study. Data were collected using focus group discussions, a survey questionnaire and a contingent valuation exercise. In the focus groups, participants discussed their preferences for traits in livestock and their products, their interest in natural foods and their perceptions regarding naturalness of food in relation to the different types of farming and technologies. In the survey questionnaire, participants were asked about their food consumption habits, perceptions, attitudes and preferences for different foods and technologies, generalized trust in people and trust in groups or institutions responsible for food in Canada among other issues. In the contingent valuation exercise, participants chose the price they were willing to pay for pork with different information about carnosine and omega-3 fatty acids. We find that there is heterogeneity in terms of consumers' perceptions, attitudes and behaviour regarding natural foods. In summary, the cost of food, concerns about human and environmental impacts and trustworthiness of information on labels are some of the factors that influence participants' decisions to buy pork labeled as coming from disease resilient or feed efficient pigs or pigs that are higher in a human or animal health component. Although some people accept genetic modification, other participants were concerned about its use in improving disease resilience, feed efficiency and human or animal health component in pigs. Although there are some variations in the results, generalized trust in people, food technology neophobia and concerns about product leanness, country of origin of the product, nutrition content, use of hormones and antibiotics in livestock production and environmental foot print of livestock production are associated with attitudes, perceptions and behaviour regarding natural foods. Participants are willing to pay more for pork chops with more information about carnosine and omega-3 fatty acids as compared to pork chops with less information. In comparison to carnosine, participants are willing to pay more for pork chops with information about omega-3 fatty acids. Generalized trust in people, trust in advocacy groups, natural product interest, frequency of purchasing products with a health claim and knowledge of sodium content in pork that have a health claim are associated with willingness to pay for enhanced carnosine and omega-3 fatty acids in pork.

Acknowledgements

We would like to thank Swine Innovation Porc for funding this research under ***Project 1236: Increasing Canadian Pork Consumption, Market Share and Competitiveness Through Enhanced Nutritional Values and Overall Quality With A Functional Molecule in Pork Meat***. We want to thank Arenna, Albert Boaitey and Yanan Zheng for their assistance during data collection. We also want to thank students in the Department of Resource Economics and Environmental Sociology, University of Alberta who participated in the pretest of the survey and students who assisted in the recruitment of research participants.

Preface

The research project, of which this report is a part, received research ethics approval from the University of Alberta Research Ethics Board, Project name: Consumer Interest in Technology and Food Choice, No. Pro00067712, 2016.

Introduction

Over time, there have been different technological developments in the field of agriculture which include novel technologies such as genetic modification, gene editing, and use of genomics in selective breeding of organisms. Novel technologies could lead to the production of livestock that are more resilient to disease, are more feed efficient and could have a higher human and animal health component. Agriculture is also characterized by different types of production systems (e.g. conventional, family and organic farming). Consumers' preferences for food production and packaging technologies and preferences for particular traits in livestock could influence their choices of livestock products.

At the same time, consumers' interest in natural food products, especially for meat products is increasing (Abrams et al., 2010). Rozin et al. (2004) found that naturalness is more important for food than medicine and preferences for natural are more for moral or aesthetic reasons as compared to healthfulness and superior sensory characteristics. Rozin (2005) found that, for individuals, naturalness is reduced when the product is mixed with unnatural entities, transformed chemically (as compared to physical transformation) and when genes are inserted from other species (e.g. genetic engineering). In addition, the processing history of a given product reduces naturalness while mixing similar natural entities and domestication do not greatly reduce naturalness (Rozin, 2005). In their study of food values, Lusk and Bridgeman (2009) found that consumers valued safety, nutrition, taste and price more than other food values and naturalness of food had moderate importance. Point of purchase and credibility have also been found to influence judgements about naturalness of food (Lunardo and Saintives, 2013). Román et al. (2017) found that naturalness influence consumer acceptance of food and food technologies. Although naturalness of food is important to consumers, the use of the word natural in a label is not regulated in most markets and products (Holmes, 2016) such that its definition varies across individuals and countries, for example.

In this study, the objective is to identify consumers' willingness to consume different foods and the factors that could drive their food preferences. Different food issues are assessed using focus group discussions, survey questions and a contingent valuation exercise. In the focus group discussions, respondents were asked about their preferences for particular traits in livestock and their products, their interest in natural foods and their perceptions regarding naturalness of food in relation to the different types of farming (conventional, family and organic), technologies (genetic modification, selective breeding or artificial selection, use of genomics in selective breeding, gene editing and change of livestock characteristics) and food processing methods. The survey portion of the study was focused on consumers' food consumption habits, perceptions, attitudes and preferences for different foods (including natural foods), food technology neophobia, myths of nature, generalized trust in people and trust in groups or institutions responsible for food in Canada. The contingent valuation exercise was aimed at assessing consumers' willingness to pay for pork with different types of information about increased carnosine (a natural molecule which has antiaging activity at cellular and whole animal levels and potentially in humans) and omega-3 fatty acids (which lower heart disease). Understanding people's preferences for different foods could help inform public policy around the acceptability of different technologies.

Data

Data used in this study were collected from focus groups discussions and surveys conducted at the University of Alberta, Canada between 17 and 25 November in 2016. Students (both undergraduate and graduate) and non-academic staff participated in the focus group discussions and completed survey questionnaires. The study was targeted at individuals who are students or non-academic staff outside the Faculty of Agricultural, Life and Environmental Sciences so that we could avoid sampling people who have high knowledge pertaining to

agricultural issues as compared to the general population. Nine sessions were conducted and each session took about an hour. There was a total of 100 participants (three sessions had 12 participants, 3 had 11 participants, one had 13 participants, one had 8 participants and the other session had 10 participants). Participants were compensated with \$35.00 for their time. Demographic characteristics of the participants are summarized in Table 1.

Table 1: Demographic characteristics of participants

Variable	Category	Frequency (%)
Gender of respondent	Male	37.0
	Female	62.0
	Other	1.00
Age of respondent (years)	18-20	5.05
	21-24	23.2
	25-29	37.4
	30-39	18.2
	40-49	8.08
	50-64	8.08
	65+	0.00
Household size	1	18.2
	2	30.3
	3+	51.5
Number of children <18 years of age living in the household	No home living children < 18 years	74.7
	1	14.1
	2	7.07
	3	1.01
	4	2.02
	More than 4	1.01
Highest level of education achieved by the respondent	Elementary school	0.00
	Secondary (high) school	8.25
	Technical/ business school/Community college	6.19
	University	44.3
	Post graduate studies (Masters or PhD)	41.2
Household income (CAN\$)	\$ 24,999 or under	27.7
	Between \$ 25,000 and \$ 39,999	24.5
	Between \$ 40,000 and \$ 64,999	9.57
	Between \$ 65,000 and \$ 79,999	9.57
	Between \$ 80,000 and \$ 99,999	8.51
	Between \$ 100,000 and \$ 119,999	8.51
	\$ 120,000 or more	11.7
	<i>Sample size^a</i>	<i>100</i>

Source: Collected survey data

^a Missing values in some cases

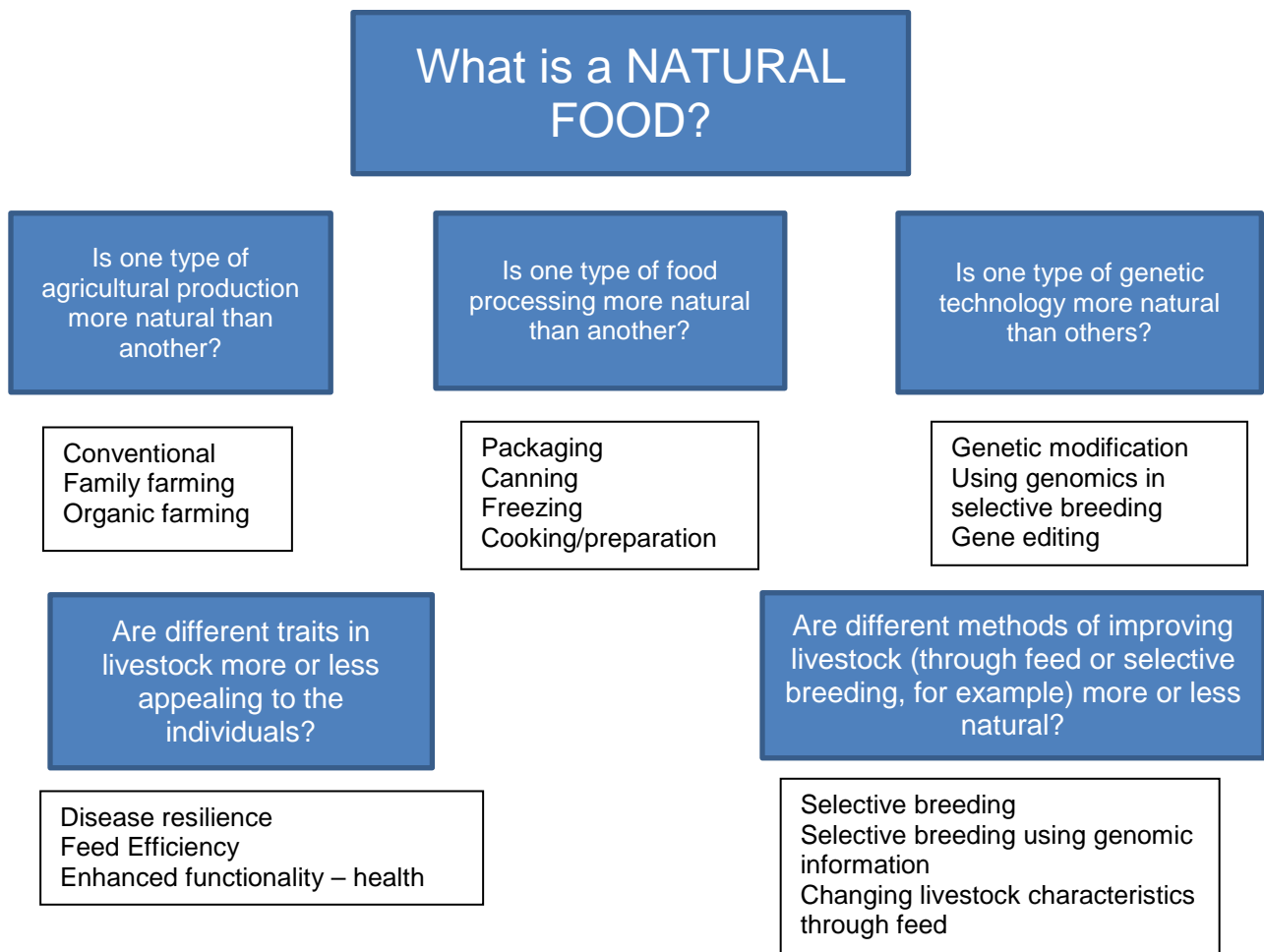
Sixty two percent of the participants are female and most of the participants (60.6%) were between 21 and 29 years of age. Most of the participants had a university degree (44.3%) or had completed postgraduate studies (41.2%). Fifty two percent of the participants had more than 3 people living in their household. About 75% of households did not have children who are less than 18 years of age. About 52% of the participants had a total household income of less than CAN\$40,000.00 while about 12% had a total household income of at least CAN\$120,000.00.

Focus Group Discussions

In this section, we present information obtained from focus group discussions. The discussions were aimed at determining the different ways that the participants identify “natural” foods. Given the nature of the research project, we were interested in how people perceive food (particularly meat) as natural and as preferred with different production and end user characteristics. A general outline of the topics covered in the discussion is provided in Figure 1.

The issues that were covered in the focus group discussions are as follows: (i) strength of interest in natural foods (ii) naturalness and agricultural production (iii) naturalness and food processing (iv) natural and genetic technologies (v) preference for particular enhanced traits in livestock and their products (vi) different types of development applied to animals (vii) views about whether different specific foods are natural or not.

Figure 1: Structure of Focus Group Discussions



(i) Strength of Interest in Natural Foods

Participants were told that there is a lot of research suggesting that people are interested in foods that are natural and they were provided with definitions of natural obtained from Rozin (2006), Falk et al. (2001), the United States Department of Agriculture (USDA) and the Canadian Food Inspection Agency (CFIA). The definitions of natural that were given to participants are provided below.

Interest in Natural Foods

Some definitions of natural from the literature

Definition 1

"Within the domains of food and drink for Americans, the judgment of naturalness has more to do with the history of an object, that is the processes that it has undergone, as opposed to its material content." For instance, if water is taken from Spring A, had all its minerals extracted, and then had the exact same minerals put back, the process of withdrawing and replacing minerals has made it less natural. "[Natural entities] are more attractive/appealing, healthier, and/or kinder to the environment. ... [They are] inherently better, in moral and/or aesthetic senses." (Rozin 2006, 91)

Definition 2

A natural food is a food that has retained its essential or innate properties, including flavour and nutrients. It is a product of nature that has undergone minimal human interference or processing. It is often produced in such a way as to reduce its negative environmental and social impacts (Falk et al. 2001, 428-436)

Definition 3

According to the USDA: "A product containing no artificial ingredient or added color and is only minimally processed. Minimal processing means that the product was processed in a manner that does not fundamentally alter the product. The label must include a statement explaining the meaning of the term natural (such as "no artificial ingredients; minimally processed")."

<http://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/food-labeling/meat-and-poultry-labeling-terms#14>

Definition 4

According to the CFIA: "A food or ingredient of a food that is represented as natural is expected:

- not to contain, or to ever have contained, an added vitamin, mineral nutrient, artificial flavouring agent or food additive.*
- not to have any constituent or fraction thereof removed or significantly changed, except the removal of water. For example: the removal of caffeine.*

not to have been submitted to processes that have significantly altered their original physical, chemical or biological state" <http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/method-of-production-claims/eng/1389379565794/1389380926083?chap=2>

Participants were asked the following questions: "Have you thought about what natural actually means in the context of food? Do either (any) of these definitions resonate with you? Is there something missing?"

Natural food to some of the participants means that there is minimal manipulation or influence from humans. Some participants regard raw meat and fruits as natural. Other participants state that natural food is grown without chemicals, artificial fertilizers and pesticides, is not processed or have minimal processing, does not contain artificial flavor or colour and is

not genetically modified. Participants also state that natural meat is from animals that are given natural feed and no injections for helping them to gain weight. Other participants state that natural is when there are threshold levels of the amounts of chemicals and pesticides used in the production process since it is not economic to avoid them. Some people argue that natural is a broad definition which changes over time and those things that were once considered natural are no longer used because they are not healthy. To some participants, natural means organic. Some participants state that natural food is food that was present in the past. Other participants state that “natural” is just a marketing claim which is meaningless. Some participants state that natural food is not healthier or more beneficial as compared to other foods. Other participants have never thought of natural in the context of food.

When asked about the definition of natural that resonates with them, some participants prefer the definition from Falk et al. (2001) because it takes into consideration environmental and social impacts of food production and food is not changed because nothing is added to enhance growth or preserve it. Others prefer the definition of natural from CFIA because it is the most comprehensive and is closer to reality (it is producer tailored) as compared to the other definitions. Some participants like the CFIA’s definition of natural because as long as you do not add anything, you can dehydrate food and it will still be considered to be natural. Other participants prefer the definition of natural from CFIA because it states that natural food is minimally processed and it is less nebulous as compared to the other definitions and provides specific guidelines. Some participants prefer the USDA’s definition of natural because different people will have different definitions of natural food. Some participants prefer the USDA’s definition of natural because it states that products are minimally processed and there are no flavours added.

When asked about whether something is missing in the definitions of natural that were provided to them, some participants do not like the definitions from the CFIA and USDA because “significantly” and “minimally processed” mean different things to different people. Some participants are concerned that the definitions do not mention anything about genetic modification. Other participants state that the definitions do not provide the threshold for animal processing. In general, participants do not like the definition from Rozin (2006) stating, for example, that a natural product is not necessarily better than other products and a lot has to do with the market.

(ii) Naturalness and Agricultural Production

Participants were provided with an information sheet with descriptions of conventional and family farming and CFIA standards for organic farming. The information about the types of agricultural production that was given to participants is described below.

<p>Naturalness and Agricultural Production</p> <p>Types of agricultural production include the following:</p> <p><i>Conventional agricultural production:</i> <i>Most of the world’s crops and livestock are produced using conventional methods. Broadly defined, conventional methods are oriented toward promoting agricultural efficiency by producing the highest yields in as little time and space as possible. These include the use of primarily synthetic (but occasionally biological) fertilizers, pesticides, insecticides, herbicides, and other chemical inputs; GMOs; use of machinery for planting, maintenance and harvest; inexpensive and readily available feed for livestock; growth hormones (where permitted); and preventative antibiotics and vaccinations, among others. Conventional farms are generally large areas devoted to a single crop (monoculture) or type of livestock (feed-lot operations).</i></p> <p><i>Family farming:</i> <i>Family farming may utilize the same methods as conventional agriculture by producing for a global market but at a smaller scale and with labour largely provided by the family of</i></p>
--

the farmer. Other family farms may use organic management and production techniques and sell produce locally or globally. Family farms are predominant in global agriculture, including in both developed and developing countries.

Organic farming: According to Canadian (CFIA) standards, organic farming “is a holistic system designed to optimize the productivity and fitness of diverse communities within the agro-ecosystem, including soil organisms, plants, livestock and people. The principal goal of organic production is to develop operations that are sustainable and harmonious with the environment.” Organic production utilizes management methods incorporating soil renewal and fertility; biological and mechanical pest, weed, and disease control; water and waste management and recycling; maintenance and enhancement of biological diversity; and nutrient cycling including crop rotation. Livestock are provided with living conditions and spatial allowances appropriate to their behaviour, and fed only organically produced feed. Organic farmers may not use technology or products such as GMOs, nanotechnology, irradiation, or cloned livestock; synthetic veterinary drugs, food additives, processing aids, growth hormones, fungicides, preservatives, or equipment or packing materials treated with such products. They may, however, use vaccines, antibiotics (when deemed appropriate), and naturally derived pesticides, herbicides, insecticides, and fertilizers, as defined by the Permitted Substances List. (<http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/programme-program/normes-standards/internet/bio-org/pgng-gpms-eng.html>, <http://www.omafra.gov.on.ca/english/crops/facts/09-077.htm#define>, http://www.cog.ca/about_organics/organic-standards-and-regulations/, http://www.cog.ca/uploads/PermittedSubstancesList_2015.pdf)

Respondents were asked the following questions: “Does the naturalness of a food have to do with agricultural production? If so, what is a more natural method of production, and why?”

Some participants agree that naturalness of food has to do with agricultural production. Although some people feel that naturalness of food has to do with agricultural production, they think that there is a disconnection between the two. Some participants state that since natural is a broad term, it is hard to tell if naturalness has to do with agricultural production. Other participants state that they do not care about the production process but they do care about the quality and cost of food.

Some participants state organic farming as the most natural way of production. Although some participants argue that organic production is more natural, others were concerned about this type of production because organic farmers still use chemicals, vaccines, pesticides and fertilizers. Most of the participants were not aware that organic farmers could use vaccines, antibiotics (when deemed appropriate), naturally derived pesticides, herbicides, insecticides and fertilizers as defined by the “Permitted Substances List” before the surveys. Some participants state that they do not know what is “naturally derived” in the definition of organic farming from the CFIA. Some participants state that natural comes only from their family garden. Other participants state that the product/produce they buy from the farmers’ market is more natural than the ones they buy from supermarkets (although they agree that they could be naive). Some people state that family farming is more natural because they produce on a smaller scale, people already trust family farming and families are constrained by financial resources such that they do not use too much fertilizer, for example. Others argue the opposite saying that family farming is not natural because they still use fertilizers and it is not different from conventional farming. Conventional production is not regarded as a natural method of production by some participants because hormones and chemicals are used in the production process. Some people argue that it depends on how the consumer defines natural. If a consumer feels that natural is more “from the earth” then they would think that organic is more natural than the other types of agricultural production. Some people argue that it is hard to produce natural food in Canada given that there are only a few months of summer. On the other hand, some participants argue that there is need to do something about naturally occurring diseases in produce, otherwise nothing will be left. Others do not care about the production process because they are more concerned about cost and quality (taste and texture) of the product while

others feel that all the three types of agricultural production are not natural. Lastly, other participants state that it is difficult to link the type of agricultural production to natural because those farms practising natural farming could be affected by nearby farms that use chemicals and fertilizers.

(iii) Naturalness and Food Processing

Participants were provided with an information sheet containing descriptions of different processing methods i.e. freezing, packaging, canning, cooking/preparation with additional food stuffs or spices and other seasonings. The information about food processing that was provided to participants is described below.

Naturalness and Food Processing

Food processing could include:

Packaging: Food may be put into paperboard cartons (milk, eggs, ice-cream, soup mix) steel or aluminum cans (soups, fruit mixes, beans), plastic bags (cake mix, cereal, jerky), cardboard boxes (pizza, donuts), glass (drinks, condiments), tins (loose tea, cookies), shrink wrapping (meats, including fresh and frozen), clamshell plastic (various drinks, ready-to-eat salads), styrofoam (apples, meats) and wax (cheeses), among others. Some foods may be purchased with no packaging at all, as with many fruits and vegetables. Packaging may be designed to be sustainable, to track freshness ("smart packaging", as with TTI (time temperature indicator) stickers that change colour when exposed to temperatures outside a certain range) or to control moisture ("active packaging" – think of the silica gel packets in jerky or other dried snacks).

Freezing: Contemporary frozen foods, as with fruits, vegetables, and meats, are generally flash frozen (rapidly frozen to prevent the formation of ice crystals) at the peak of freshness. Freezing slows, though does not stop enzyme processes (such as ripening) that, over time, lead to losses in taste, quality, nutrients, or change textures or colours. Freezing itself does not remove or change nutrients in food, and proper freezing techniques are the best method to preserve the greatest quantity of nutrients for the longest period of time. To prevent the negative effects associated with enzyme processes, fruits and vegetables are blanched before freezing, thus inactivating the enzymes. Frozen foods do not require preservatives to keep them safe for consumption, as microbes cannot reproduce at temperatures below 0 °F (-17.7 °C). However, any microbes already present on or in the food will need washing or cooking to remove.

Canning: Canning is a ubiquitous method used to store and ship a variety of foods, from beans and diced tomatoes, pumpkin, fruit cocktails, soups, chowders, and spaghettis, to flaked tuna and whole chickens. Food may be shelled, de-boned, peeled, and had stems, stones, or pits removed before the canning process. Canning requires the food and can to be sufficiently heated (boiled) to kill all harmful bacteria, whereby the food is placed and sealed in a sterile can. As with all preservation methods, over time, the quality, texture, nutritional value, and taste of the food will degrade. Cans are generally aluminum with a plastic (BPA, PVC, polyester, oleroresin, et cetera) lining to help preserve food.

Cooking/preparation with additional foodstuffs/spices and other seasonings: Many foods are cooked or otherwise prepared before you buy them. By law, milk is pasteurized (heated to destroy harmful microorganisms) before it is incorporated into other products, with the exception of some raw milk cheeses. Pasteurization is also often applied to ciders, fruit juices, honey, eggs, and even beer. Irradiated foods (ionizing radiation to reduce harmful bacteria, molds, and parasites, and slow ripening processes) such as onions, potatoes, wheat, flours, and spices are sold, with a label indicating they have been irradiated. Many grocery store foods often undergo a variety of processes by which ingredients are cleaned, prepared, seasoned, cooked/baked, and finished before reaching the consumer. For instance, beef is sliced, marinated/seasoned, smoked/cured, and additionally cut to make jerky. Cherries are harvested, rinsed, stoned, soaked and boiled in sugar, thickened with pectin, combined with lemon juice and cooked down before being bottled for cherry jam.

(<http://www.extension.umn.edu/food/food-safety/preserving/freezing/the-science-of-freezing-foods/>,
<http://www.packagingdigest.com/smart-packaging>, <http://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety->

[education/get-answers/food-safety-fact-sheets/safe-food-handling/freezing-and-food-safety/CT_Index/!ut/p/a1/jZFRt8lwEIB_DY9dbw7J8G1ZYtiUTYJK2Qsp7NYt2dqIrlU759RZ8EQNK-9LefV-ud6UFZbSQ, http://mentalfloss.com/article/62179/15-surprising-facts-about-frozen-food\)](http://mentalfloss.com/article/62179/15-surprising-facts-about-frozen-food)

Foods may also be **dried** (e.g. in the sun or with salt), **pickled**, **minced**, **macerated**, **liquefied**, **emulsified**, and **pasteurized**, among others.

Participants were asked the following questions: “Does the “naturalness” of a food have to do with processing? If so, is there a natural method of processing, and why?”

Some participants state that naturalness of food has to do with food processing but food processing is needed for safety reasons e.g. pasteurizing milk. Some participants state that when they think of an apple, they question whether it is as it was from a tree or was it sprayed wax or anything to make it shine or give it a certain colour. Pork chops are wrapped in a plastic film, sitting on styrofoam which makes them less natural to some of the participants. Some participants state that packaged or canned foods can be natural. Others argue that packaging does not affect naturalness but the presence of additives in the product does affect naturalness such that they read labels. Other participants state that the more the product is processed, the less natural it is.

When asked whether there is a more natural way of food processing, some participants argue that there is no natural method of food processing while others think that naturalness of food depends on the way it was processed. Raw food is considered by some participants to be more natural as compared to processed food. Some participants argue that there are degrees of naturalness. To them a packaged product is less natural, but a product that is packaged and frozen is worse as compared to a product that has either of the two. Chopping is regarded as a more natural method of food processing by some participants because it is very basic and does not change anything. Others regard freezing as a more natural method of processing because it does not alter food while others disagree stating that freezing changes food. Canned food that has been cooked excessively and canned food that has artificial additives and flavours is believed to be less natural by some participants. Others believe that canned food is natural if it does not have many additives since it has been done for generations. Other participants state that anything canned is not natural because there is a lot of processing that has been done. Some participants state that if packaging has an impact on the quality of food that would impact naturalness of food. Others argue that packaging can keep foods such as fish fresh and more natural. For some participants, sun-dried is more natural because you are just taking water out. Marinated beef is not believed to be natural by some participants. Foods preserved in glass jars at home or at a farmers’ market are considered to be more natural by some participants. Other participants state that it depends on the product and packaging, for example, whole eggs in packaging and beef jerky are natural in their domain. Salting is regarded as natural because there are no chemicals that are added. Boiling without adding anything is also regarded by some participants to be more natural.

(iv) Natural and Genetic Technologies

Participants were provided with an information sheet containing descriptions of three genetic technologies i.e. genetic modification, use of genomics for selective breeding and gene editing. The information about the three technologies provided to participants is described below.

Natural and Genetic Technologies

Genetic modification – GMO: Genetic modification, or genetic engineering, involves altering the genes of an organism in a way that is unlikely to occur naturally through mating or recombination. Genes may be turned off (silenced) or deleted to remove undesirable traits, transferred between organisms of the same species or organisms of different species to add desirable traits, and modified,

multiplied, or constructed and incorporated into an organism. The resulting organism is said to be a GMO (genetically modified organism). Genetic modification has been used to make plants more resistant to pests, diseases, herbicides, and drought or flood (via climate change). It has also been used to provide additional nutrition, as with golden rice.

Using genomics in selective breeding: *Genomics is the study of the genes and genetic characteristics of organisms like plants, animals, and humans. Genes carry information that determines many of the features and characteristics of organisms. A genome is all of the genes in an organism. The Human Genome Project and the sequencing of the SARS virus are examples of research in genomics related to humans. Similar research has identified traits or sequenced entire genomes of crops and livestock. The resulting information has allowed scientists and farmers to focus their breeding strategies by identifying and breeding food organisms with genes linked to traits such as drought tolerance, increased yield, and feed efficiency. (Fears, Robin, for the Food and Agriculture Organization. "Genomics and Genetic Resources for Food and Agriculture." (ftp://ftp.fao.org/docrep/fao/meeting/014/k0174e.pdf)*

Gene editing: *Gene editing is a type of genetic engineering whereby genes are inserted, deleted or replaced from within the native genome of an organism. The resulting targeted mutations, or edits, are precise alterations of an organism's genes in order to add desirable traits or remove undesirable ones. Gene editing utilizes the genes already present in the organism and does not incorporate genes from outside sources, as with transgenesis/trans-GMOs. Once genetic editing has been applied to an organism, it may be bred using traditional or conventional methods, and the beneficial alteration will be passed down through each subsequent generation. Additionally, gene editing leaves no residual or genetic "footprint" and the edited organism is thus identical to an organism who came by the trait (or removed trait. Gene editing has been applied to disease control, as with powdery mildew-resistant wheat, or to animal welfare, as with hornless cattle (in conventional dairy and beef agriculture, horns are removed so cows do not injure farmers or each other). (Carlson et al., 2016; Huang, et al., 2016)*

Participants were asked the following questions: "Are the different types of genetic technologies good, bad or you are indifferent about them? Are any of the genetic technologies more natural than the others?"

Some participants state that all the three technologies are good since all the food that is sold on the market is inspected and approved. Others mention the importance of public trust in the technologies. Someone gave the example of the Golden rice saying that it could be very beneficial globally but people in western countries tend to be very suspicious. Others state that GMOs could have positive ecological consequences of running out of space and food but there is need to get over personal relation issues first. Some participants argue that since all the three technologies are altering something, they are all not good. Other participants state that they are more concerned about food safety and do not care about the breeding method used.

Use of genomics in selective breeding is regarded by some participants as more natural because there is minimal human interference since they do not alter genes and it seems human and environmentally friendly. In addition, use of genomics in selective breeding is regarded as good because it is a continuation of what have been done for tens of thousands of years (it is traditional) i.e. selecting one organism over another has been done for a long time which means that the technology has been tested. While others prefer gene editing because it does not incorporate genes from outside sources and leads to increased food production, some participants do not like the technology due to human health concerns and because it alters the structure of the genes. In addition, some participants do not like gene editing because they think that it is used by large companies which manipulate farmers. Although participants state that GMOs lead to higher food production to feed more people and reduce the amounts of chemicals (herbicides and pesticides) required in food production, some participants are more concerned about the long term environmental and health effects of the technology since humans do not know everything i.e. there is room for error. Some participants argue that genetic modification

involves human interference e.g. tomato sizes are increasing leading to increased efficiency but not quality. Other participants regard GMOs as more natural because there is more research information as compared to the use of genomics in selective breeding. Others also state that GMOs are good because they allow for the selection of better genes as compared to traditional selective breeding. Some people who support genetic modification state that mutations occur naturally such that people should trust something that someone can control while others think that if the technology has “modified” in it, it means it is not natural. Others feel that in a technology, removing is more problematic as compared to adding things. Others state that certain changes can be good, but if you alter things too much or too quickly, there might be unexpected problems. For example, the new crops might out-compete natural ones or essential species that are needed for survival by other species might be eradicated. Others think that although they do not regard the technologies as natural, it does not mean that they are bad. Some participants wonder why we have to go to the extent of modifying or interfering with nature using technologies. They wonder why there are still hungry people while food is being wasted. In addition, some participants state that we are not trying to feed the hungry and people still get sick. Others think that a modified gene does not have human health impact and it is good to make nutritious food.

(v) Preferences for Particular Enhanced Traits in Livestock and Their Products

For the discussion about people’s preferences for particular traits in livestock and their products, participants were provided with information about three traits which might be the focus of current and future genetic development. The traits included disease resilience, feed efficiency and enhanced health functionality. The disease resilience example was pigs resilient to three highly infectious diseases that affect pigs which are Porcine Circovirus Associated Diseases (PCVAD), Porcine Reproductive and Respiratory Syndrome (PRRS) and Porcine Epidemic Diarrhea (PED). Participants were also provided with some background information on enhanced feed efficiency in pigs, which could reduce methane (GHG) emissions through a reduction in manure produced from the pigs. The third trait of interest was enhanced functionality through a particular component such as carnosine (a dipeptide which exerts antiaging activity in animals and potentially in people who consume sufficient quantities of meat) and omega-3 fatty acids (which lower risks of heart disease). These traits could all be encouraged through traditional breeding or through genomic selection (at different speeds) and given a choice we were interested in the characteristics of the individuals who prefer one of these three traits over the other. The information provided to participants is presented below.

Preference for Particular Traits in Livestock and Their Products

Pigs that are more disease resilient – Porcine Circovirus Associated Diseases (PCVAD), Porcine Reproductive and Respiratory Syndrome (PRRS) and Porcine Epidemic Diarrhea (PED) are three highly infectious diseases that occur in pig populations. They have serious implications for both hogs and hog farmers. PCVAD is associated with weight loss or decreased rate of weight gain, paleness or jaundice, and gauntness and a failure to grow in pigs. PRRS has been linked to reductions in farrowing rates (number of piglets born per sow), increased numbers of stillbirths and in some cases, abortion storms in sows and death in pigs. PED is associated with watery diarrhea and significant deaths of piglets. The highly contagious nature of the diseases often makes it necessary that all hogs in an affected production enterprise be destroyed. Economic costs are very high for hog producers. There is **no possibility that the diseases can be transferred to people** through eating pork from animals with the diseases.

Pigs that are more feed efficient – feed is one of the largest inputs (costs) in any livestock operation. Producing hogs with higher levels of feed efficiency would reduce the feed required per pound (KG) of animal being fed. Hogs that are more efficient converters of feed into meat can provide other benefits

such as reducing greenhouse gases (reduced manure production) and improving farm profitability.

Pigs that are higher in a human health (and animal health) component – such as carnosine (anti-aging) or omega-3 fatty acids (lowers risk of heart disease)

Carnosine, a natural molecule (or dipeptide) present in the muscle of animals and humans, has been observed to exert antiaging activity at cellular and whole animal levels (including potentially for people who consume sufficient quantities in meat). Carnosine is available in fish and meat products only and has been shown to be available in high quantities in pork. The therapeutic potential of carnosine has been tested in numerous diseases in which ischemia or oxidative stress is involved. For several pathologies, such as diabetes and its complications, ocular disease, aging, and neurological disorders, promising preclinical and clinical results have been obtained.

There are three types of **omega-3 fatty acids** involved in human physiology, including ALA (alpha-linolenic acid) (found in plant oils), and EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) (found in marine and other animal oils). Next to fish, pork is a good source of omega-3 fatty acids. Omega-3 fatty acids are needed for regular body function (metabolism), and have been shown to promote heart health and protect against recurrent strokes, heart attacks, and other cardiac events. They also normalize and regulate cholesterol triglyceride levels (indicative of heart health), are anti-arrhythmic (prevent or counteract cardiac events), anti-thrombotic (prevent blood from clotting within blood vessels), anti-atherosclerotic (prevent fatty deposits and fibrosis (thickening of arteries), and anti-inflammatory. They have additionally shown promise in helping fight depression and age-related mental decline.

Pigs could be bred or fed to have higher levels of omega-3 fatty acids and/or carnosine. Certain genes promote the production of omega-3 fatty acids or carnosine, as found with genomics or incorporated with genetic editing or genetic engineering. Feed may be enriched with flax or certain algae for omega-3, and carnosine supplements. It is worth noting that animal health also improves with higher levels of beneficial nutrients, as with carnosine and omega-3 fatty acids.

Participants were asked the following questions: “Would you prefer meat identified in the grocery store as coming from: (i) pigs that are more disease resilient (ii) pigs that are more feed efficient (iii) pigs that are higher in a human health (and animal health) component – such as carnosine (anti-aging) or omega-3 fatty acids (lowers risk of heart disease)?”

For meat identified in the grocery store as coming from pigs that are more disease resilient, some participants state that they would prefer it because if pigs are disease resilient it means that they are healthy which is also important to some of the participants who have young children in their households. Some participants would buy the meat from disease resilient pigs since they think that there are too much chemicals in food (and the trait disease resilience could reduce the need for some treatments). Other participants would want clear and authentic information (that they trust) on the label showing why the disease resilience is good and how it comes about. For some participants, whether they buy the meat depends on the price of the product. If the meat with the disease resilient label has the same price or is cheaper than the ones without the label, they would buy it. Other participants are concerned about potential human health and environmental risks of having the disease resilient pigs. For example, some participants are concerned that viruses that cause the pig diseases might evolve and affect humans. Some people argue that you cannot make a 100% claim about anything so they would not buy pork labeled as coming from pigs that are disease resilient since it is better to be safe than sorry (note the potential conflict with this assertion). Some participants are concerned that the pigs might be resilient to some diseases but not others. There are also concerns about the technologies that are used to make the pigs more disease resilient (some participants are concerned that genetic modification could be used to make pigs more disease resilient). For some participants, when they buy meat, they assume that the animals are not sick such that a label that states that the pork comes from disease resilient pigs would turn them away from the

meat. Some participants also state that since people are unlikely to read a lot of information, they might not pick up on the information which states that the disease cannot be transferred to humans through pork consumption. Some people state that it depends on the amount of research that is done to achieve disease resilience in the pigs. Other participants wondered why they should care whether the pigs are disease resilient or not since the diseases are not transferable to humans.

When asked whether they would prefer meat identified in the grocery store as coming from pigs that are more feed efficient, some participants stated that they would buy such meat because the pigs release fewer green-house gases which have a negative impact on the environment. Other participants stated that they would buy the meat depending on the price of the product. Some participants need more information about feed efficiency, the type of feed given to the pigs and the technology used to make the pigs more feed efficient. Other participants feel that labeling the meat as coming from feed efficient pigs might have a negative impact since people will be concerned about the technology that is used to make them feed efficient. For example, some participants are concerned about the use of genetic modification in achieving feed efficiency in pigs. Some participants state that they would probably not buy meat labeled as coming from feed efficient pigs because feed efficiency means that the meat is not natural. Other participants have health concerns for the pigs themselves. There are also human health concerns that people might end up gaining more weight after consuming the meat from pigs that are more feed efficient. Other participants are only concerned about the price of the meat i.e. they do not care whether the pigs are feed efficient or not.

When asked about whether they would prefer meat identified in the grocery store as coming from pigs that are higher in a human health (animal health) component, some participants would buy it because of human health benefits (for example, they would like to look younger). Other participants state that they would buy pork with a label about carnosine but not omega-3 fatty acids which they already look for in fish. Some participants would not buy it, raising concerns about the technology used in producing such pigs (they fear that the pigs will be genetically modified). Participants also have human health concerns about consuming such pork and they are concerned about the environmental effects of the technologies used to make pigs that are higher in the human (or animal) component. Some participants state that they need more information regarding how much they would have to eat (required daily intake and the normal level of the nutrient that will be passed to humans). Other participants state that they only look at the price when they buy meat i.e. they do not care whether or not the meat is high in a human or animal health component.

So in spite of the fact that the discussion had the aim of being neutral about the technology used to enhance certain traits in the animals the participants (or many of them) got very quickly to the idea that any enhancement must be generated from some use of technology and without more information on the technology some of our participants would be little interested in any of the enhancements. This confirms our impressions that there may be a perception that the use of any genetic technology is not considered 'natural' in some way (dealt with in a later section).

(vi) Different Types of Development Applied to Animals

Participants were presented with an information sheet containing a description of selective breeding (also known as artificial selection), selective breeding using genomic information and change of livestock characteristics through feed. The information provided to the participants is given below.

Different Types of Development Applied to Animals
--

Selective breeding: <i>Selective breeding, also known as artificial selection, is the process by which</i>

humans use animal and plant breeding practices to selectively develop for particular characteristics (phenotype) in offspring. This is determined by evaluating stock for desirable characteristics and selecting which animals or plants may breed. For instance, dairy cattle have been selectively bred for high milk production, and crops (wheat, corn, rice) have been bred for pest and disease resistance.

Selective breeding using genomic information: As with traditional selective breeding, selective breeding using genomic information is the process by which humans use animal and plant breeding practices to selectively develop for particular characteristics in offspring. Instead of observing phenotype, however, genomics allows for farmers to breed livestock and crops based on specific genetic information. Instead of relying on historical data on the milk production of cows for breeding, a farmer can select which dairy cows to breed based on genes linked to higher milk production.

Change in livestock characteristics through feed: As with people, animal bodies change depending on what they are fed. Feed has an impact on the methane or CO₂ emissions of the animal. Meat and carcass characteristics such as weight, fat content (marbling), leanness, levels of protein and nutrients, and taste may also be altered through the type of feed. For instance, eggs may be vitamin-enhanced through alteration of feed, as with feeding hens a nutritionally-enhanced diets containing higher levels of certain nutrients (e.g., feeding them flax seed to supplement their omega-3 intake) that make their way from the diet of the hen into the egg. Cattle diets may also be supplemented with flax or algae extract to increase omega-3 intake, resulting in omega-3 enhanced beef. It is worth noting that these dietary enhancements also improve the health of the animals. (<http://www.eggfarmers.ca/2016/05/the-choice-is-yours-a-guide-to-buying-eggs/>, <https://authoritynutrition.com/pastured-vs-omega-3-vs-conventional-eggs/>, http://fdsmagissues.feedstuffs.com/fds/PastIssues/FDS8740/fds09_8740.pdf)

Participants were asked the following questions: “Are these technologies beneficial or not? Are the technologies natural or not?”

Some participants state that all the three technologies (selective breeding, selective breeding using genomic information and change of livestock characteristics through feed) are potentially beneficial because they make it more efficient to feed more people. Some people state that the technologies are beneficial because they give better production, for example, by looking at the genes, we produce more good products. Others state that selective breeding was good when we did not have 7 billion people. With selective breeding you get what you want since good attributes are chosen. Others state that selective breeding using genomic information is beneficial because it helps to find out things you cannot see using selective breeding. Some participants mention that price of the products is more important while others have human health concerns about the technologies. Other participants state that the change of livestock characteristics through feed is beneficial because feeding animals healthy food which has a good impact in humans does not change much (i.e. it is least invasive) and it leads to a reduction in greenhouse gases. There were some concerns that changing livestock characteristics through feed might convince people to eat more meat which may cause other health problems, for example, increase in chronic diseases. Some participants state that it depends on how we use the technology, for example, change in livestock characteristics through feed could be beneficial if we were using feed to lower CO₂ emissions.

Some participants state that all the three technologies seem natural to them because they do not involve manipulation of genes in a laboratory, for example. Other participants state that selective breeding is more natural and using genomic information is not much different from selective breeding. They prefer selective breeding using genomic information, for disease resistance for example, as compared to the use of antibiotics. Some participants think that if the cow is supposed to eat grass, but you give something else more nutritious, there is something wrong since it is not natural. Others think that selection is not good because natural to them means that every animal has a chance to be selected and selection involves human interference. Although some participants do not regard the technologies as natural, they do not see any harm in them. Other participants state that whether changing livestock characteristics

through feed is natural depends on the type of feed given to the animal i.e. whether the feed is processed or altered to increase weight, for example.

(vii) Views About Whether Different Specific Foods are Natural or Not.

Participants were provided with a picture of different types of vegetables (a cucumber, apple, squash, carrots and raspberries) which did not have any label on it. In addition, they were provided with pictures of products with natural on them (Cheetos, Fruit roll-ups, ginger ale, Kellogg's® granola bars, Mott's medleys assorted fruit and Eboost® energy powder). In addition, participants were provided with pictures of Metro Ontario Inc.'s traditionally raised pork shoulder picnic roast (which is labeled vegetable grain fed with vitamins and minerals, no animal by-products and raised without antibiotics) and President's Choice (PC) free from™ boneless, skinless chicken thighs (which has a label which says raised without the use of antibiotics, vegetable grain fed and contains no animal by-product). Participants were asked "Do you view these foods as natural or not?"

For the fruits and vegetables, some participants state that they look fresh and seem to be natural. If vegetables are only washed and brought to the market, some participants regard them as natural. Others said that it was hard for them to know from the picture that they were natural or not because pesticides and preservatives might have been added or they could be genetically modified. Some participants state that if something is grown from the tree or from the ground they regard it as natural while others argue that natural fruits and vegetables are the ones they grow by themselves.

For Cheetos, participants state that they are not natural because of the type of packaging and they are processed. Others state that the Cheetos are not natural because they have a shelf life of more 10 days and they are cheese flavoured (i.e. there is no real cheese). Participants state that having no preservatives, artificial flavours or colours does not make them natural.

Fruit roll-ups are regarded as not natural because there is no real fruit in them, they are processed and packaged and that they have too many additives. Participants say that it just says "naturally flavored" but they do not know what that means.

Participants state that Ginger ale is not natural because it is carbonated and it has too much sugar in it (given that ginger does not have that much sugar). Some participants state that it is made with real ginger which makes it natural while others state that they do not know if it is real ginger at all since they do not know the meaning of natural flavour. Other participants state that they are sceptical if a product is completely covered because it seems like it is being hidden such that they do not think Ginger ale is natural because it is canned.

For the granola bars participants state that the grains are natural but the additives are not. Some people state that the packaging makes it seem natural but they are not natural. Participants state that there is too much sugar and the product is processed. Some participants state that they do not understand what real fruit means (is it dried?) and they were sceptical saying that it would not need another flavour if it has real fruit.

Participants do not regard the Mott's fruit to be natural because it is processed and there are added flavours. For the Eboost® energy powder, participants do not think its natural because of the packaging and it is a dietary supplement which is processed and it is a powder. Most people were not aware that Eboost® was on the market.

Participants state that traditionally raised pork is natural because of its appearance and the information on the label. Some participants argue that no matter what the label says, they still do not know what the pigs are fed which shows that these participants do not trust the label. Some participants think that "with vitamins and minerals" imply that things are being added. Some people state that they do not understand the meaning of "traditionally raised". Other participants were concerned about the information on the label which states that there are no animal by-products since all pigs are not given such products. Although they did not regard

traditionally raised pork as completely natural, some participants state that it is more natural than most of the products they saw during the focus group discussions since it has to be prepared.

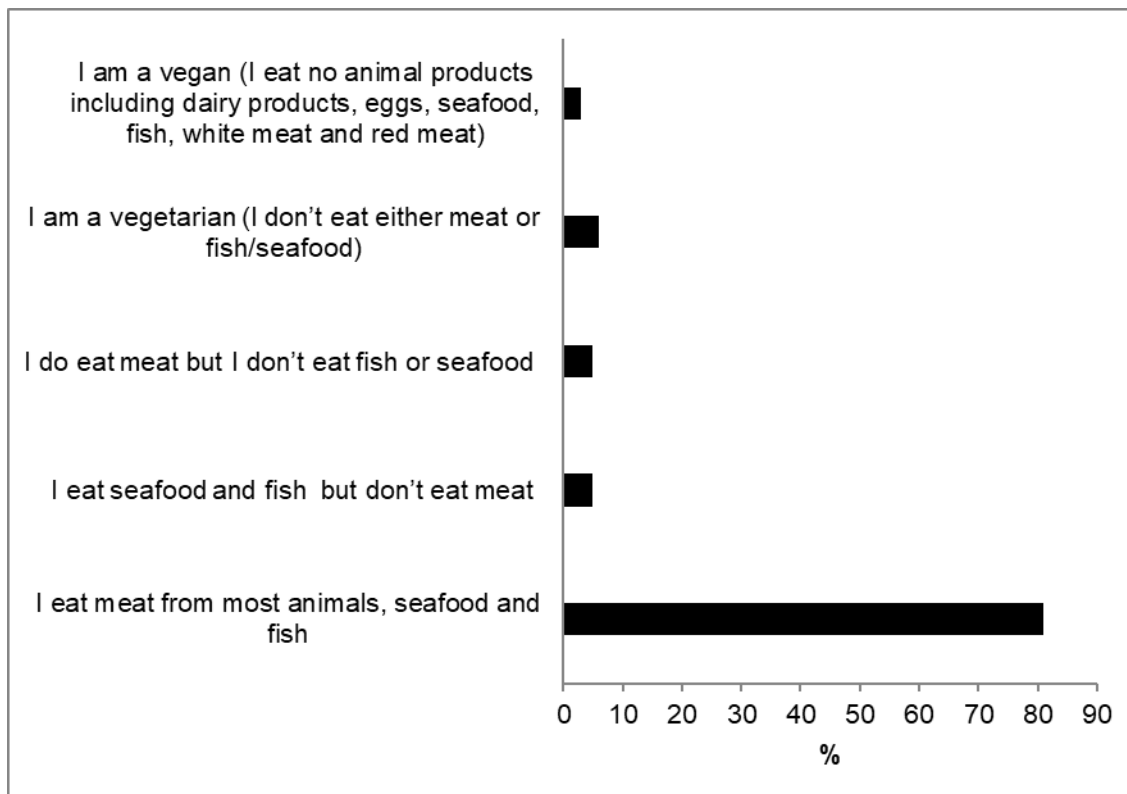
PC's free fromTM chicken is regarded by some participants as natural because it does not contain antibiotics and the birds are grain fed. Others think that the label stigmatizes other chickens (i.e. it makes them believe that other chicken are raised with antibiotics). Some people argue that traditionally raised chicken is not natural because the birds are raised in huge barns in cages where they do not run around.

Survey Questionnaire Results

In this section, we report data from the survey questionnaire. Participants were asked questions about their consumption and purchasing habits, generalized trust, trust in institutions responsible for food, myths of nature, food technology neophobia and attitudes, perceptions and preferences for foods.

(i) Food Consumption and Purchasing Habits

In the survey questionnaire participants were asked about their food preferences. Most of the participants (81%) state that they eat meat from most animals, seafood and fish (Figure 2). Six percent of the participants state that they are vegetarian while only 3% are vegan.

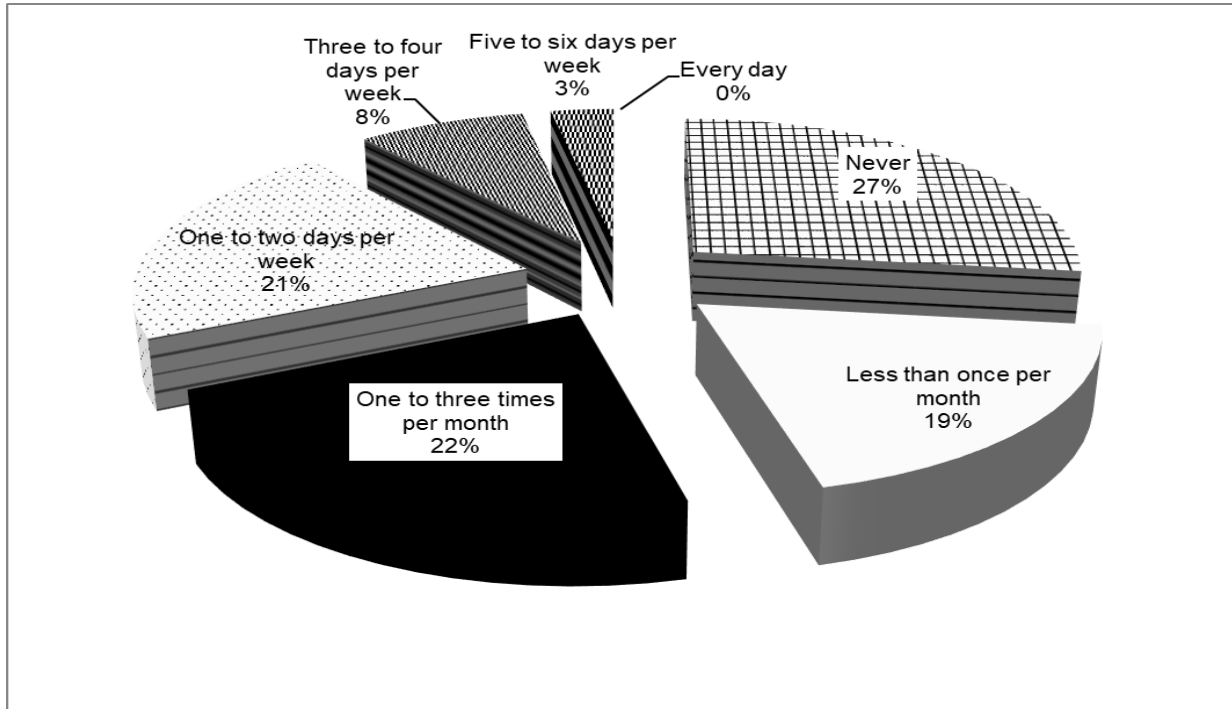


Source: Collected survey data

Figure 2: Which of the following best describes your food preferences?

When asked specifically about their consumption of pork, 8% and 3% state that they consume pork three to four days per week and five to six days per week respectively (Figure 3).

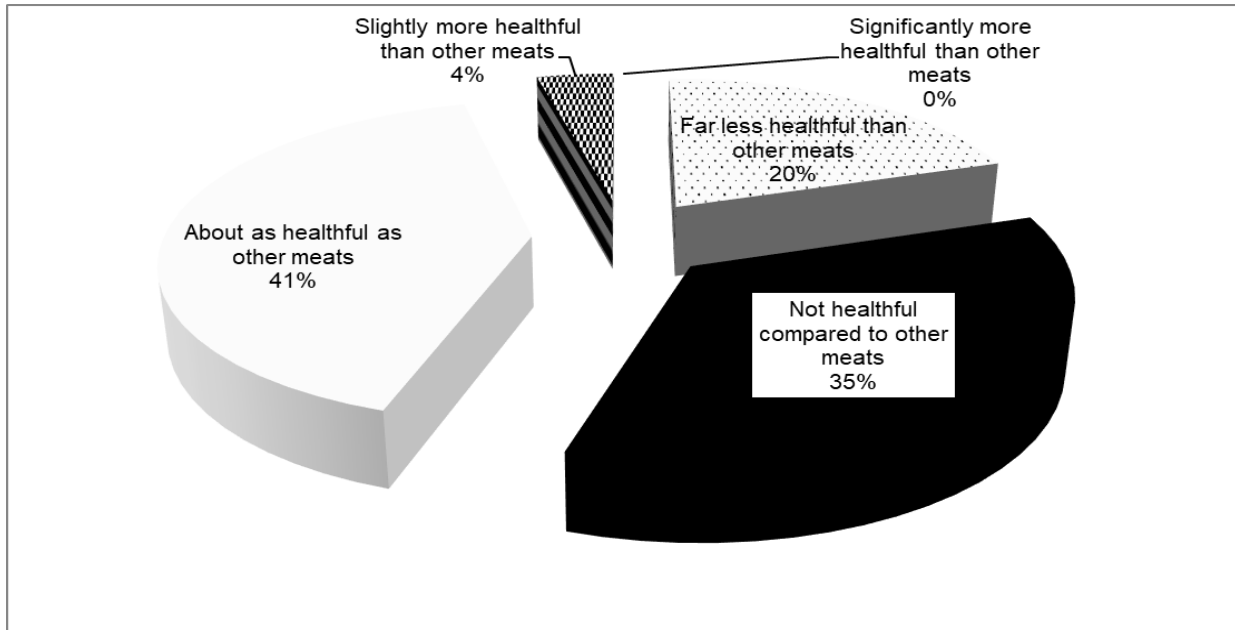
Twenty seven percent of the participants state that they never eat pork while none of the participants consume pork every day.



Source: Collected survey data

Figure 3: How frequently do you eat pork (from pigs, including bacon, ham or pork)?

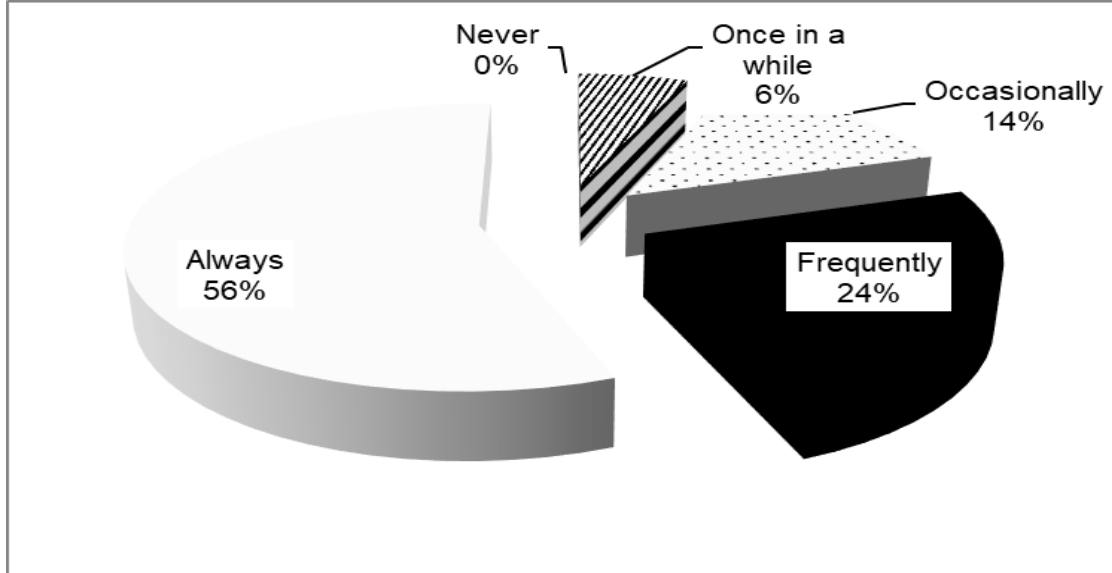
Participants were asked about their perceptions about the healthfulness of pork as compared to other meats. Most of the participants (41%) state that pork is about as healthful as other meats while 4% state that it is slightly more healthful than other meats (Figure 4). Twenty percent of participants state that pork is far less healthful than other meats while 35% state that it is not healthful as compared to other meats.



Source: Collected survey data

Figure 4: Do you believe pork is... (please pick one).

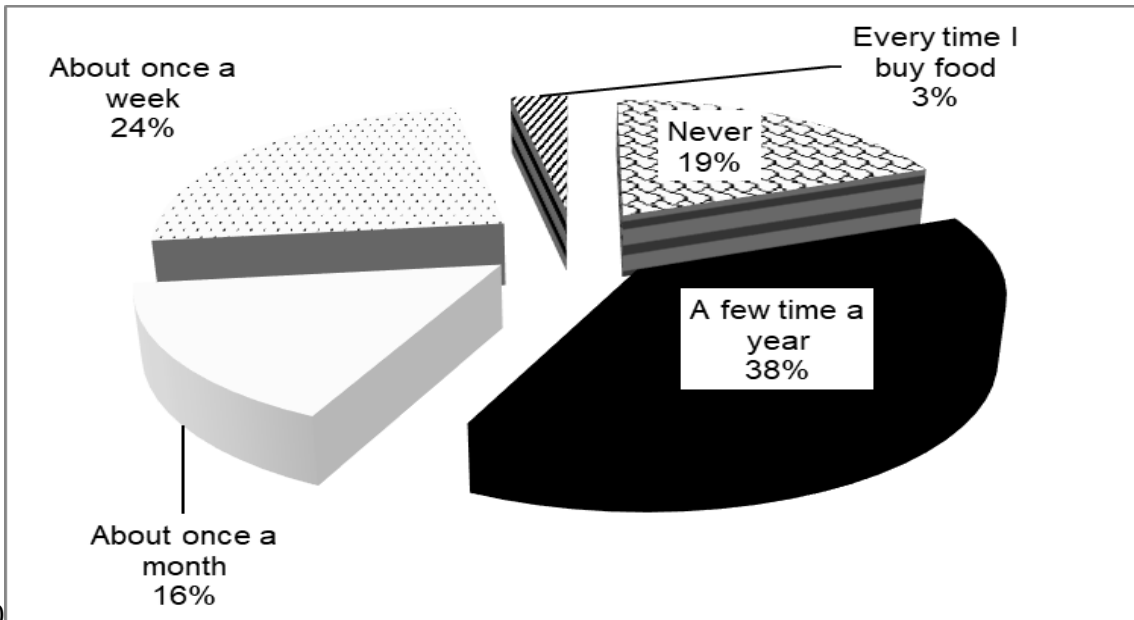
When asked about their purchasing frequency for groceries, none of the participants state that they never buy groceries (Figure 5). Most of the participants always buy groceries (56%) and 24% buy them frequently.



Source: Collected survey data

Figure 5: How often are you involved in grocery shopping for your household?

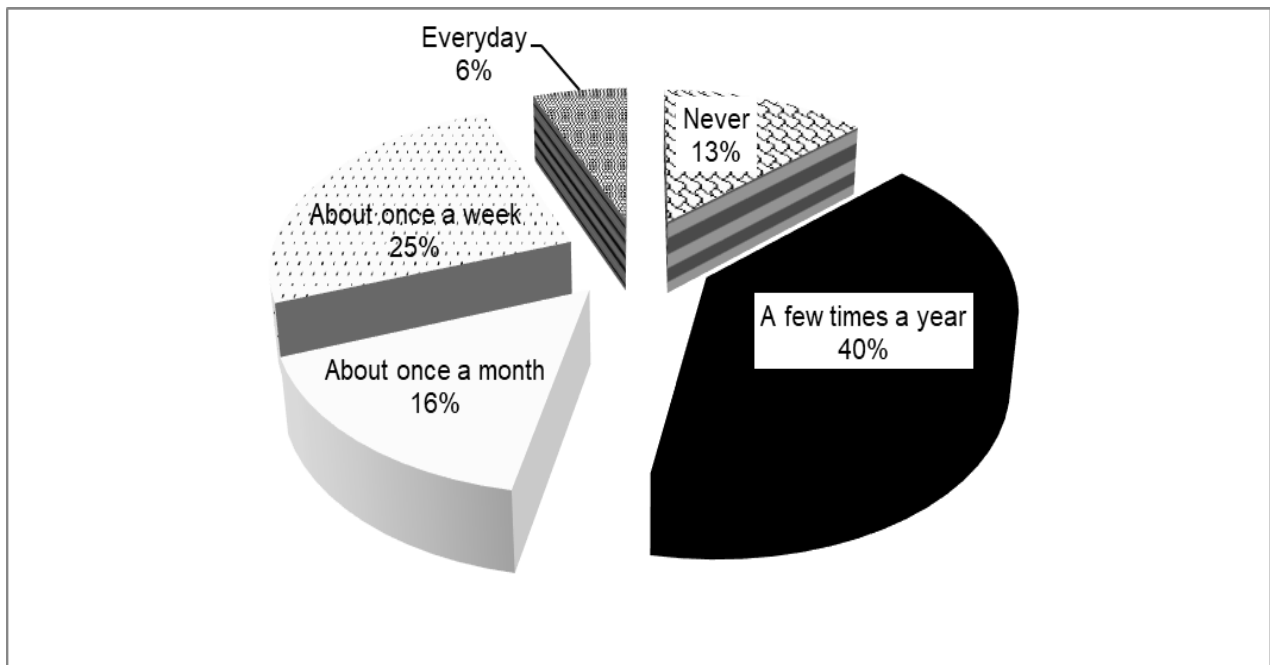
Participants were also asked their purchasing frequency for organic foods. Most of the participants (38%) state that they buy organic foods a few times a year (Figure 6). Only 3% of the participants state that they buy organic foods every time they buy food.



Source: Collected survey data

Figure 6: How often do you buy organic foods?

In terms of consumption of organic foods, 6% of the participants state that they consume them every day while most of the participants (40%) state that they consume them a few times a year (Figure 7). Twenty five percent of the participants state that they consume organic foods about once a week.

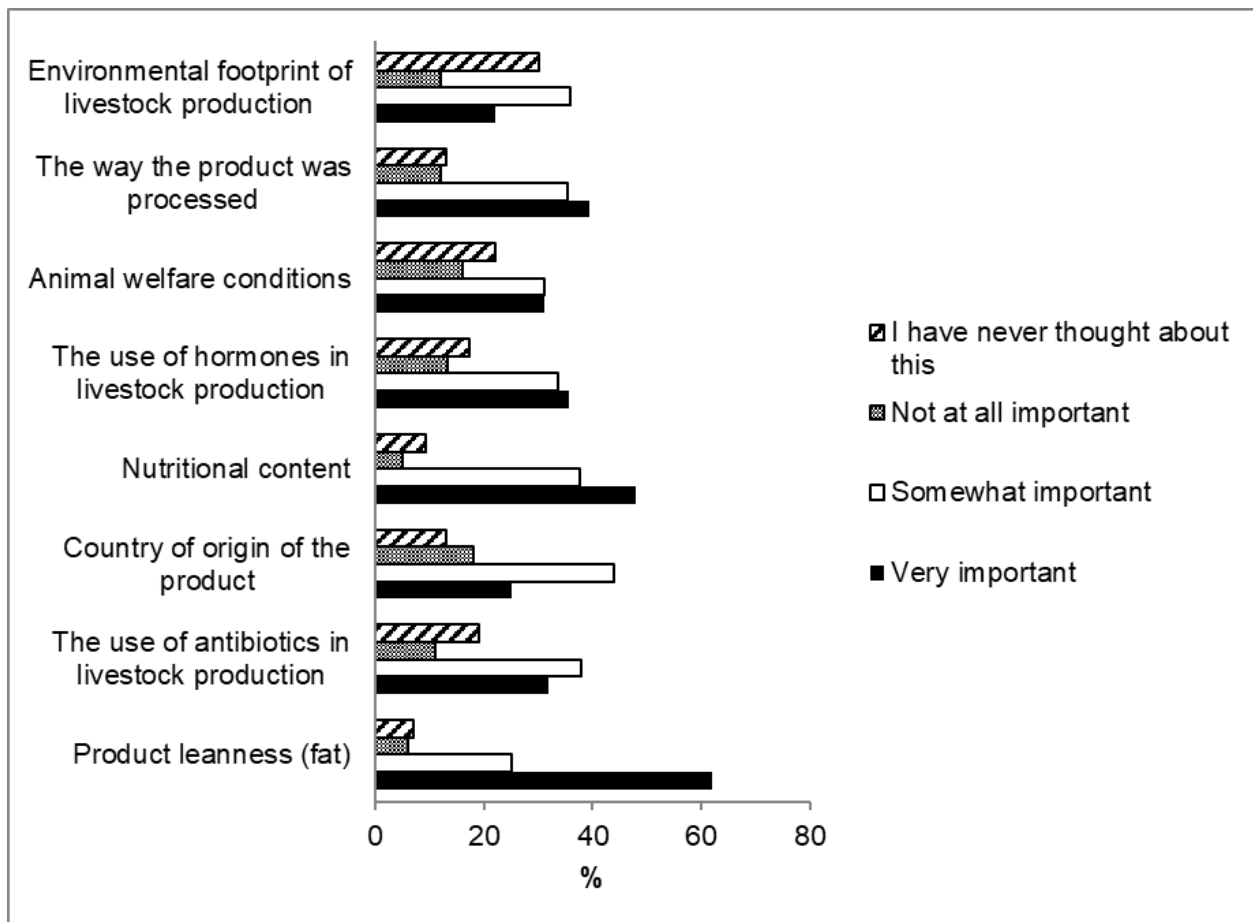


Source: Collected survey data

Figure 7: How often do you eat organic foods?

Participants were also asked about the importance of different factors when they make decisions to buy or not to buy meat. The factors were product leanness, the use of antibiotics in livestock production, country of origin, nutrition content, the use of hormones in livestock production, animal welfare conditions, the way the product was processed and environmental footprint of livestock production.

Participants generally consider all these factors when they make decisions to buy meat (Figure 8). However, most of the participants (62%) state product leanness as a very important factor when they decide to buy or not to buy meat, followed by nutrition content and the way the product was processed. Compared to the other factors, more participants state that they have never thought about the environmental footprint of livestock production when they make the decision to buy or not to buy meat.

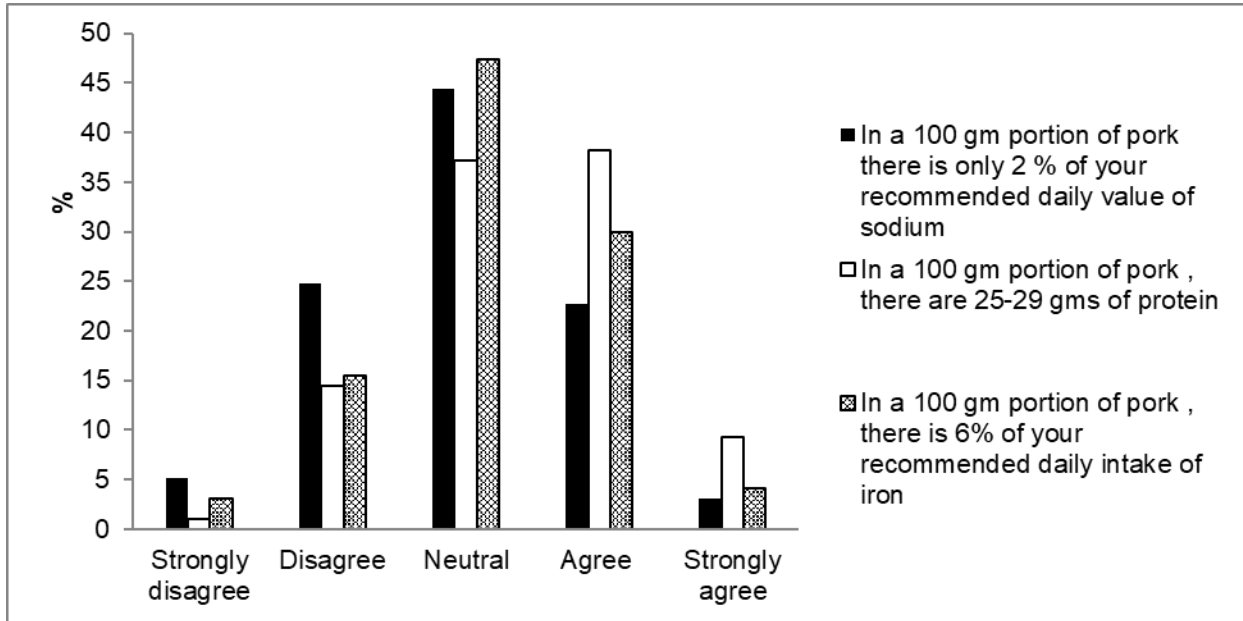


Source: Collected survey data

Figure 8: When you make the decision to buy (or not to buy, if you don't eat meat) meat, how important are the following factors to you?

Participants were given statements about the amount of sodium, protein and iron in a 100gm portion of pork and they were asked about their level of agreement with the statements on a 5-point scale (1. strongly disagree ... 5. strongly agree) (Figure 9). Given that these statements are all true, very few people knew the amount of sodium, protein and iron in a 100gm portion of pork. Only 26%, 47% and 34% of the participants agreed or strongly agreed with the information about sodium, protein and iron in a 100gm portion of pork respectively. As

compared to the amount of sodium and iron in a portion of pork, more participants are aware of the protein content in a 100gm portion of pork.

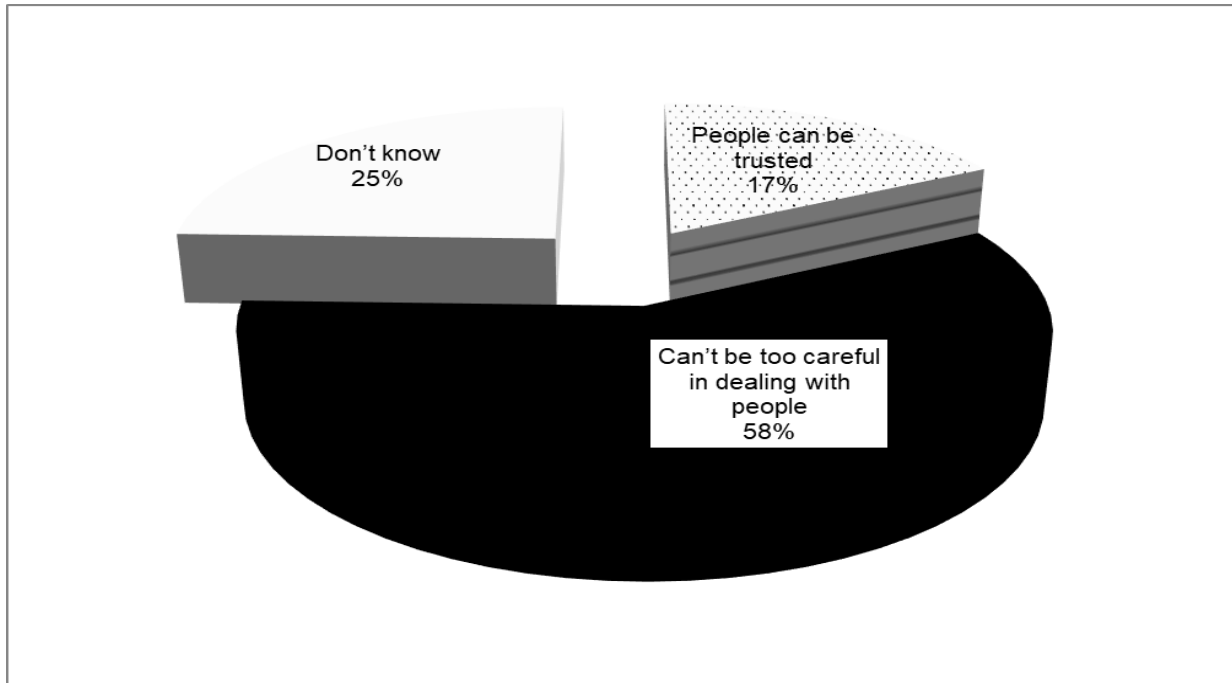


Source: Collected survey data

Figure 9: Please respond to each of the statements.

(ii) Trust in People and Groups or Institutions Responsible for Food

Participants were asked the General Social Survey question (Glaeser et al. 2000) “Generally speaking, would you say that most people can be trusted?” Generalized trust in people was very low among the participants. Seventeen percent of the respondents stated that people can be trusted, 58% of the respondents stated that they can’t be too careful in dealing with people while 25% answered don’t know (Figure 10).

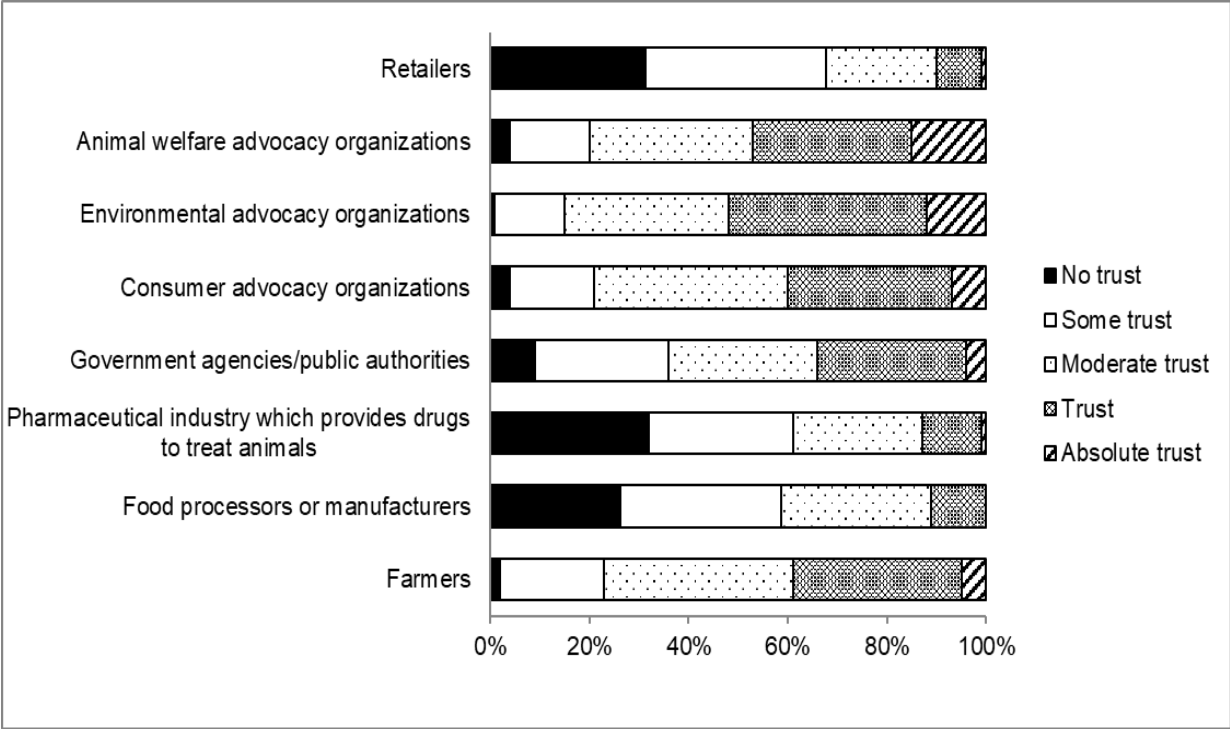


Source: Collected survey data

Figure 10: Generally speaking, would you say that most people can be trusted?

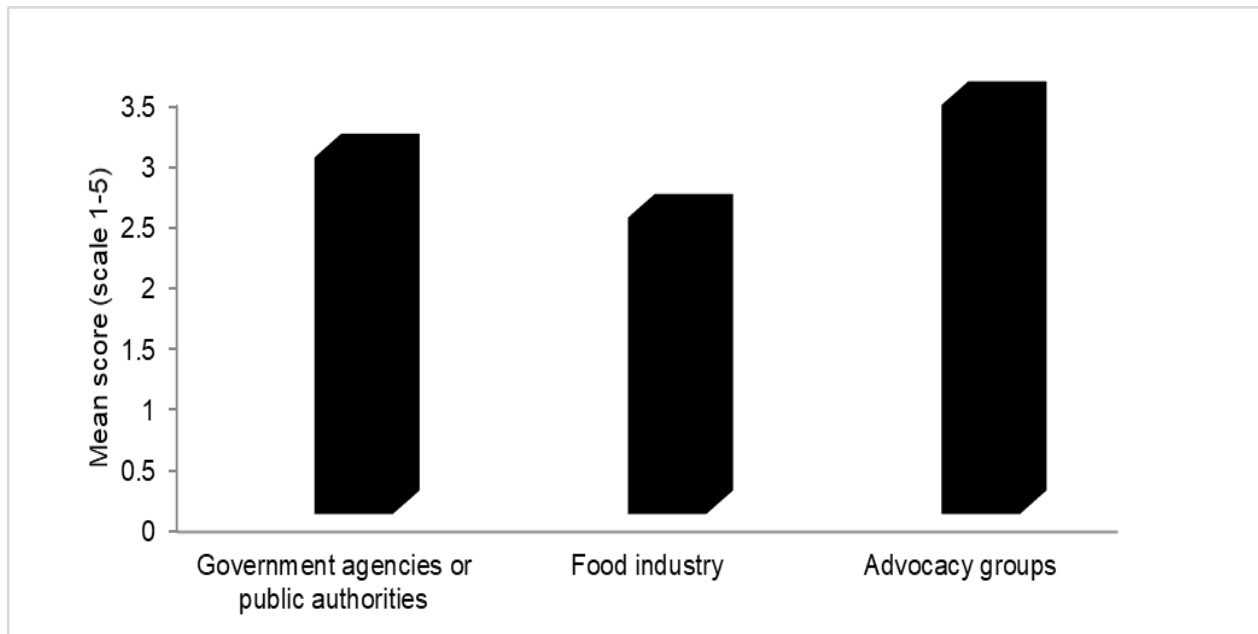
Participants were also asked about their trust in different groups or institutions (Roosen et al., 2015) regarding their responsibility for food in Canada. The food agents included in the survey are farmers, pharmaceutical industry which provides drugs to treat animals, government agencies or public authorities, consumer advocacy organizations, environmental advocacy organizations, animal welfare advocacy organizations and retailers. Responses were anchored on a 5-point scale (1. no trust ... 5. absolute trust).

More people had no trust in the pharmaceutical industry which provides drugs to treat animals (32%), retailers (31%) and food processors or manufacturers (26%) as compared to the other groups or institutions responsible for food (Figure 11). On the other hand, more participants have absolute trust in advocacy groups, especially animal welfare advocacy organizations (15%) and environmental advocacy organizations (12%) as compared to the other groups and institutions. None of the respondents state that they have absolute trust in food processors or manufacturers, 5% have absolute trust in farmers and 4% absolutely trust the government agencies or public authorities.



Source: Collected survey data
Figure 11: How much trust do you have in the following groups or institutions regarding their responsibility for food in Canada?

Institutions or groups responsible for food in Canada were classified into three groups i.e. government agencies or public authorities, food industry (farmers, food processors or manufacturers, pharmaceutical industry which provides drugs to treat animals and retailers) and advocacy groups (consumer, environmental and animal welfare advocacy organizations). On average, participants had high levels of trust in advocacy groups and the least levels of trust in the food industry (Figure 12).



Note: Means for trust in the three groups are statistically different at 1% level of significance

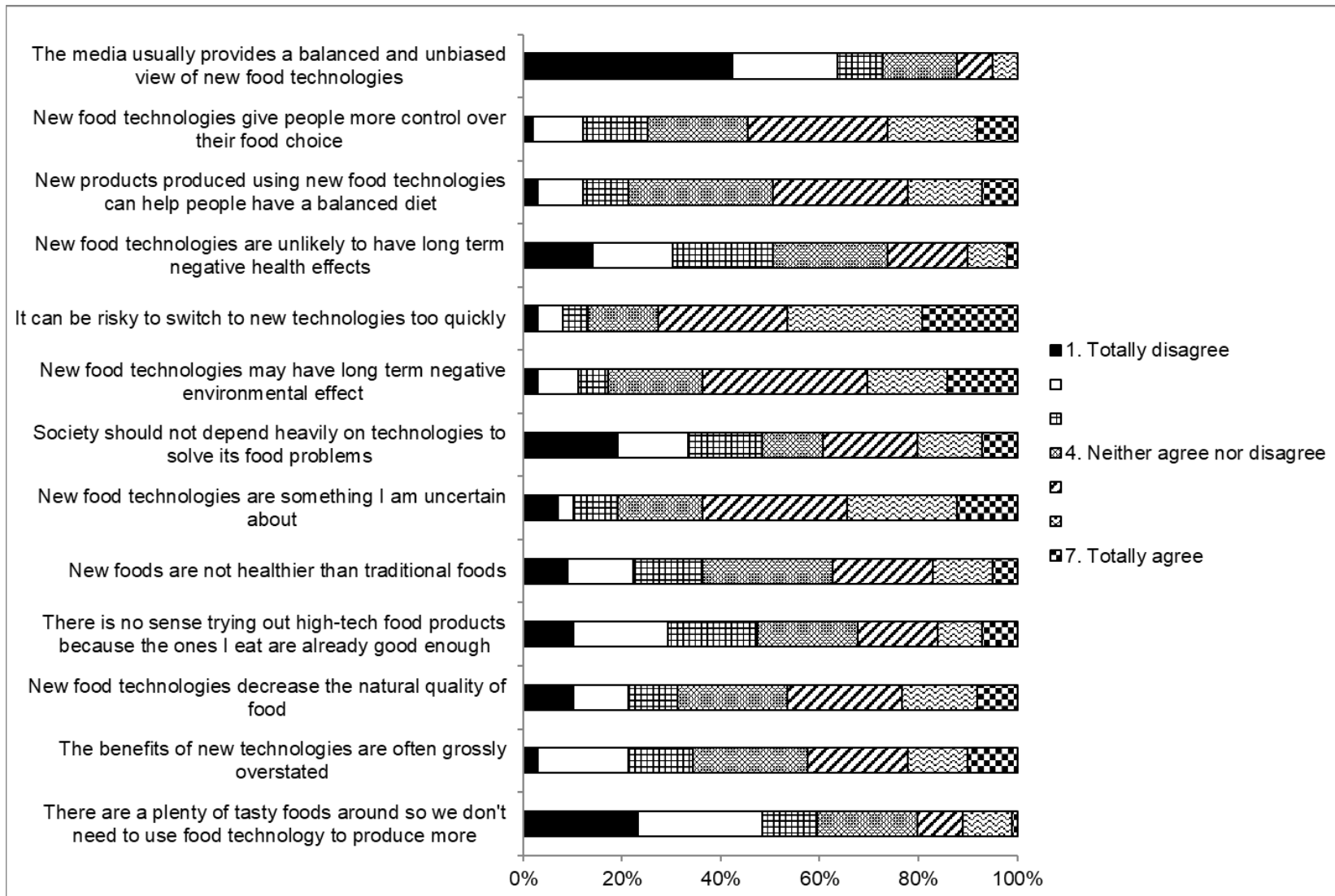
Source: Collected survey data

Figure 12: Mean scores for trust in groups or institutions responsible for food in Canada

(iii) Food Technology Neophobia

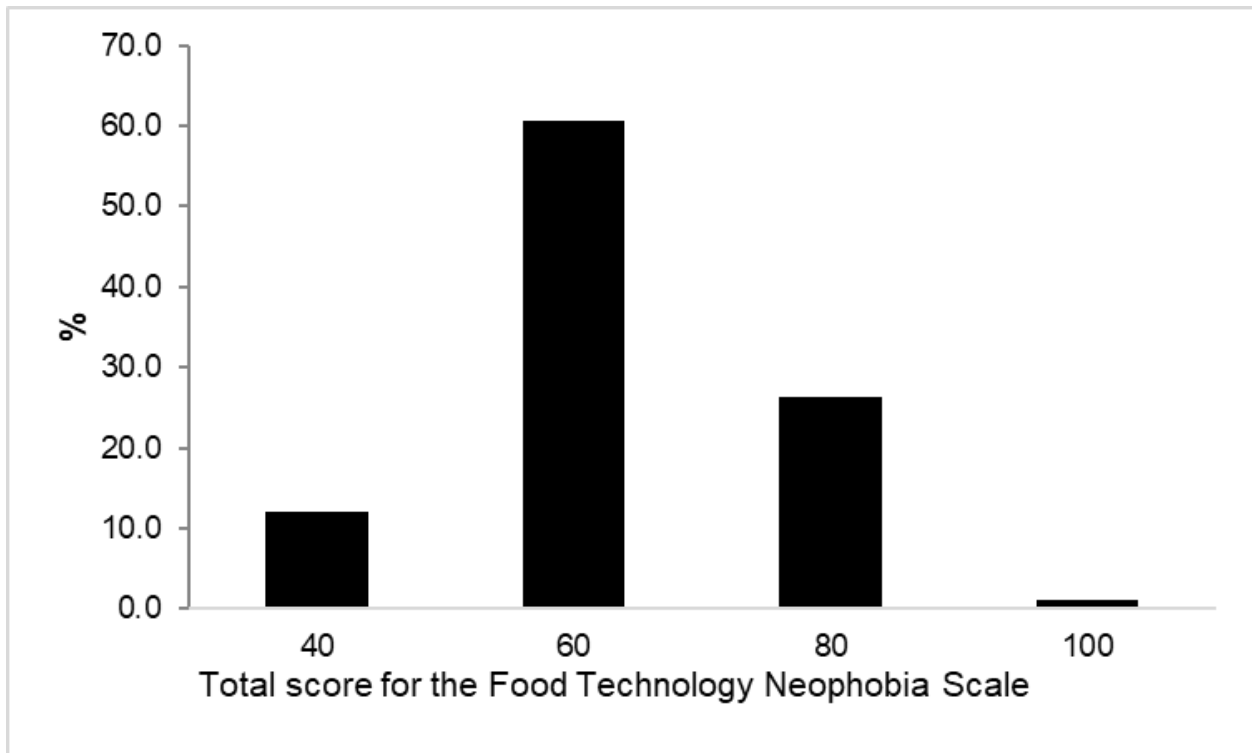
Consumers preferences for food produced with new technologies could influence their food choices. The Food Technology Neophobia Scale (FTNS, Cox and Evans, 2008) is used to measure people's neophobia regarding food technologies. Participants were asked about their level of agreement with thirteen statements relating to food technologies (Figure 13). Most participants (73%) agreed that it can be risky to switch to new technologies too quickly followed by new food technologies may have long term negative environmental effect (64%) and new food technologies are something I am uncertain about (64%). Very few participants (12%) agreed that the media usually provides a balanced and unbiased view of new technologies. Few participants (20%) agreed that there are a plenty of tasty foods around so we don't need to use food technology to produce more.

The total score for the thirteen statements of FTNS scale was calculated for each participant. The frequency distribution of the total scores for the FTNS scale is reported in Figure 14. Given a minimum total score of 13 and a maximum total score of 91, most participants are neophobic to new technologies (61% of the people had a total score of approximately 60).



Source: Collected survey data

Figure 13: The following questions detail how you feel about using food technologies and what you think of them. Please state if you disagree or agree with the following statements on a scale from 1 (totally disagree) to 7 (totally agree). When responding we ask you to think about new food technologies in general rather than one specific technology.



Source: Collected survey data

Figure 14: Distribution of the total scores for the Food Technology Neophobia Scale

Factor analysis is used to reduce the information from the thirteen FTNS statements into a few underlying factors that could be interpreted. Factor analysis is conducted in Stata 14 using principal component factor analysis with varimax rotation. The Cronbach's alpha value is 0.80 which shows that there is good internal reliability (Table 2).

Factor analysis yielded three factors which are labeled following Cox and Evans (2008) as "new technologies are not necessary", "perception of risk and information" and "healthy choice." In this study, we find three factors while Cox and Evans (2008) found four factors whereby the statement about the media loaded on the fourth factor by itself. The statement that "society should not depend heavily on technologies to solve its food problems" loaded on the 'perception risk factor' in the study by Cox and Evans (2008) while it loads on the first factor (i.e. new technologies are not necessary) in the current study. The statement that "new food technologies may have long term negative environmental effects" loads on the first two factors.

Table 2: Factor analysis of the Food Technology Neophobia Scale items (Cox and Evans, 2008)

	Factor1	Factor2	Factor3
	New technologies are not necessary	Perception of Risk and information	Healthy choice
There are a plenty of tasty foods around so we don't need to use food technology to produce more	0.58	-0.07	0.41
The benefits of new technologies are often grossly overstated	0.70	0.13	0.16
New food technologies decrease the natural quality of food	0.68	0.23	0.04
There is no sense trying out high-tech food products because the ones I eat are already good enough	0.75	-0.06	0.14
New foods are not healthier than traditional foods	0.80	-0.06	0.00
New food technologies are something I am uncertain about	0.66	0.33	-0.18
Society should not depend heavily on technologies to solve its food problems	0.73	-0.06	0.28
New food technologies may have long term negative environmental effect	0.54	0.55	-0.12
It can be risky to switch to new technologies too quickly	0.30	0.70	-0.16
R. New food technologies are unlikely to have long term negative health effects	0.00	0.61	0.39
R. New products produced using new food technologies can help people have a balanced diet	0.11	-0.05	0.88
R. New food technologies give people more control over their food choice	0.05	0.02	0.82
R. The media usually provides a balanced and unbiased view of new food technologies	-0.20	0.80	-0.01
Eigen values	4.20	2.05	1.59
Cronbach's alpha	0.80		
Sample size	99		

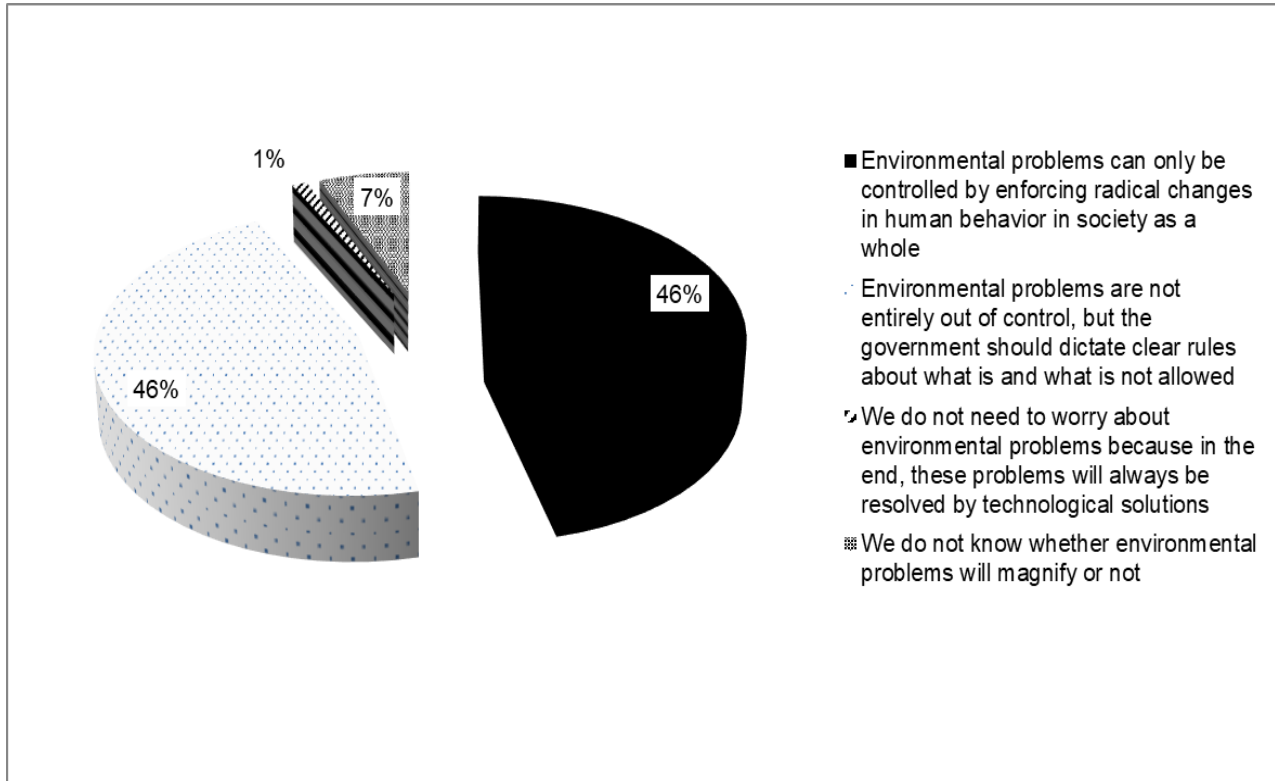
R implies that the statements are reverse coded such that they are recoded for the analysis

Source: Collected survey data

(iv) Myths of Nature

Participants were asked about their level of agreement to questions adopted from Steg and Sievers (2000) which assess people's views about the environment or myths of nature. Participants were asked to choose one statement which corresponds most with their views about nature from the following statements (i) Environmental problems can only be controlled by enforcing radical changes in human behaviour in society as a whole (ii) Environmental problems are not entirely out of control, but the government should dictate clear rules about what is and what is not allowed (iii) We do not need to worry about environmental problems because in the end, these problems will always be resolved by technological solutions (iv) We do not know whether environmental problems will magnify or not. An equal number of people (46% in each case) agree that environmental problems can be controlled by enforcing changes in human behaviour in society as a whole or that the government should dictate clear rules about what is and what is not allowed (Figure 15). Only 1% of the respondents agree that we do not know whether environmental problems will magnify or not while 7% agree that we do not need to

worry about environmental problems because in the end, these problems will always be resolved by technological solutions.

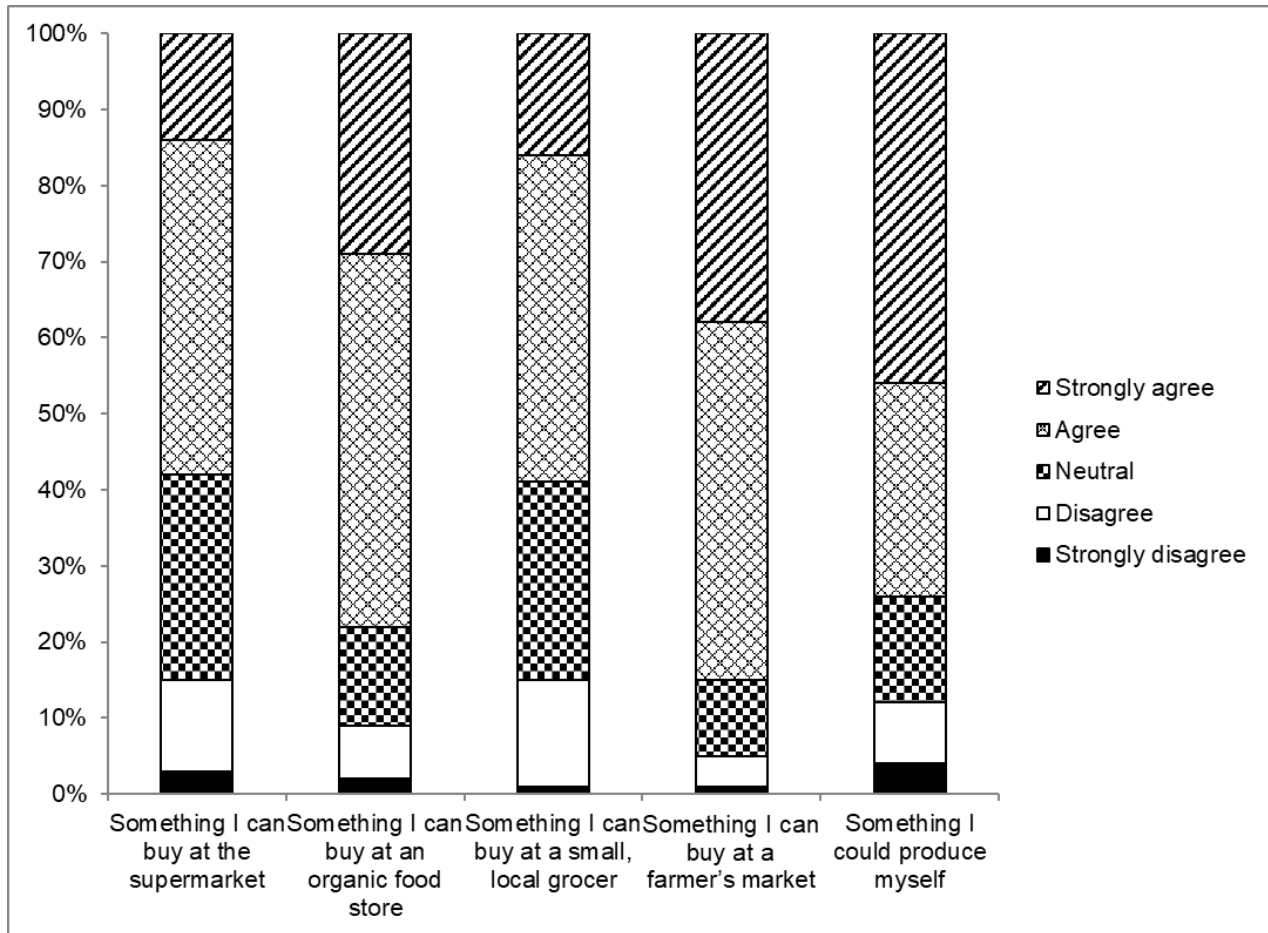


Source: Collected survey data

Figure 15: Please indicate which one of the following statements corresponds most with your view on nature. Only one answer is possible.

(v) Perceptions About Natural Foods

Participants were also asked questions about their perceptions about natural food (Figure 16). Most of the participants (85%) agree or strongly agree that natural foods are something they can buy at a farmer’s market. Seventy eight percent of the participants agree or strongly agree that natural is something that they can buy at an organic store while 74% agree or strongly agree that natural foods are something they could produce themselves. Compared to the other responses, most participants (15% in each case) disagree or strongly disagree that natural foods are something they can buy at a supermarket or a small local grocer.

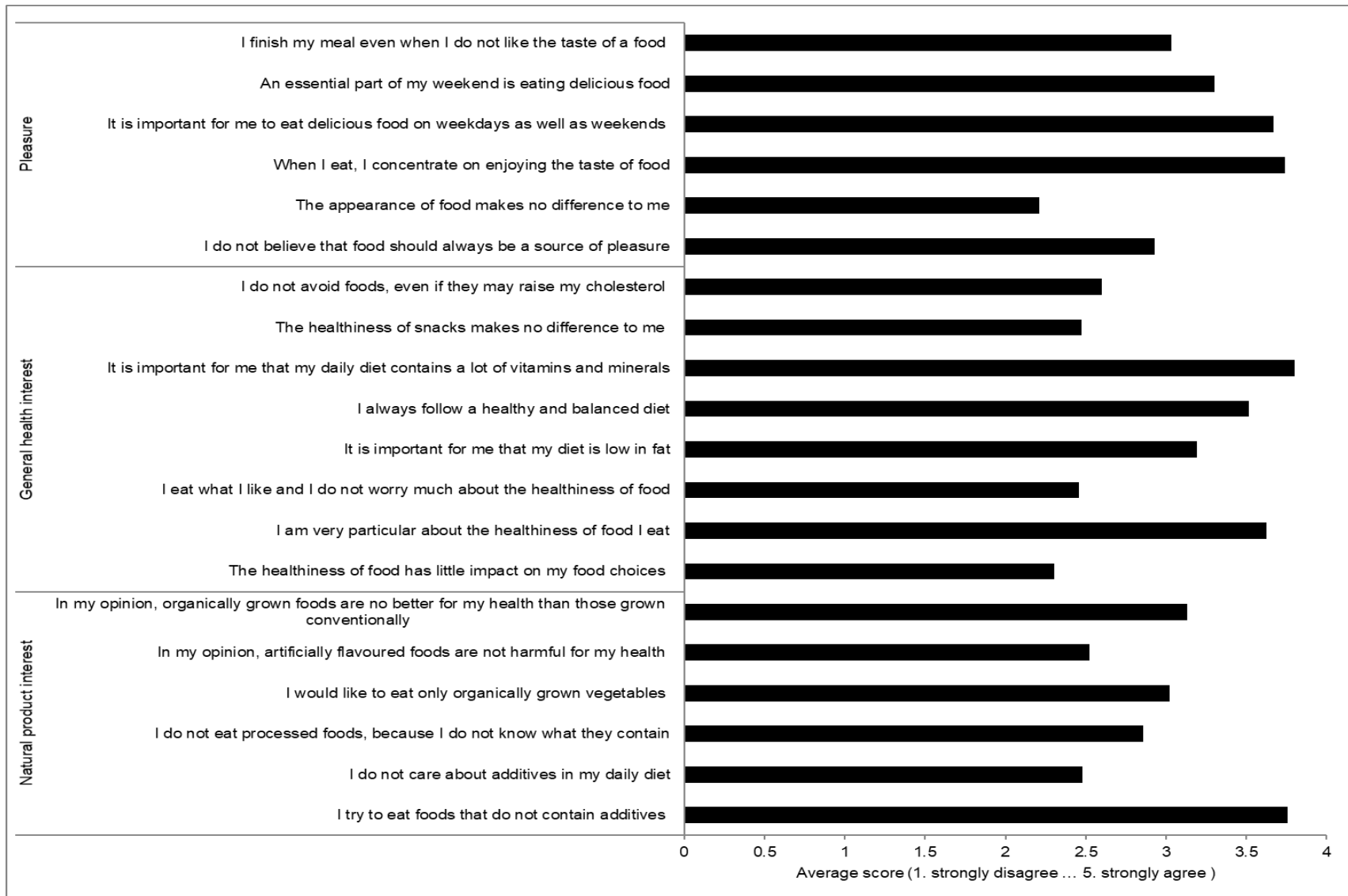


Source: Collected survey data

Figure 16: Please rate your agreement with the following. Natural foods are...

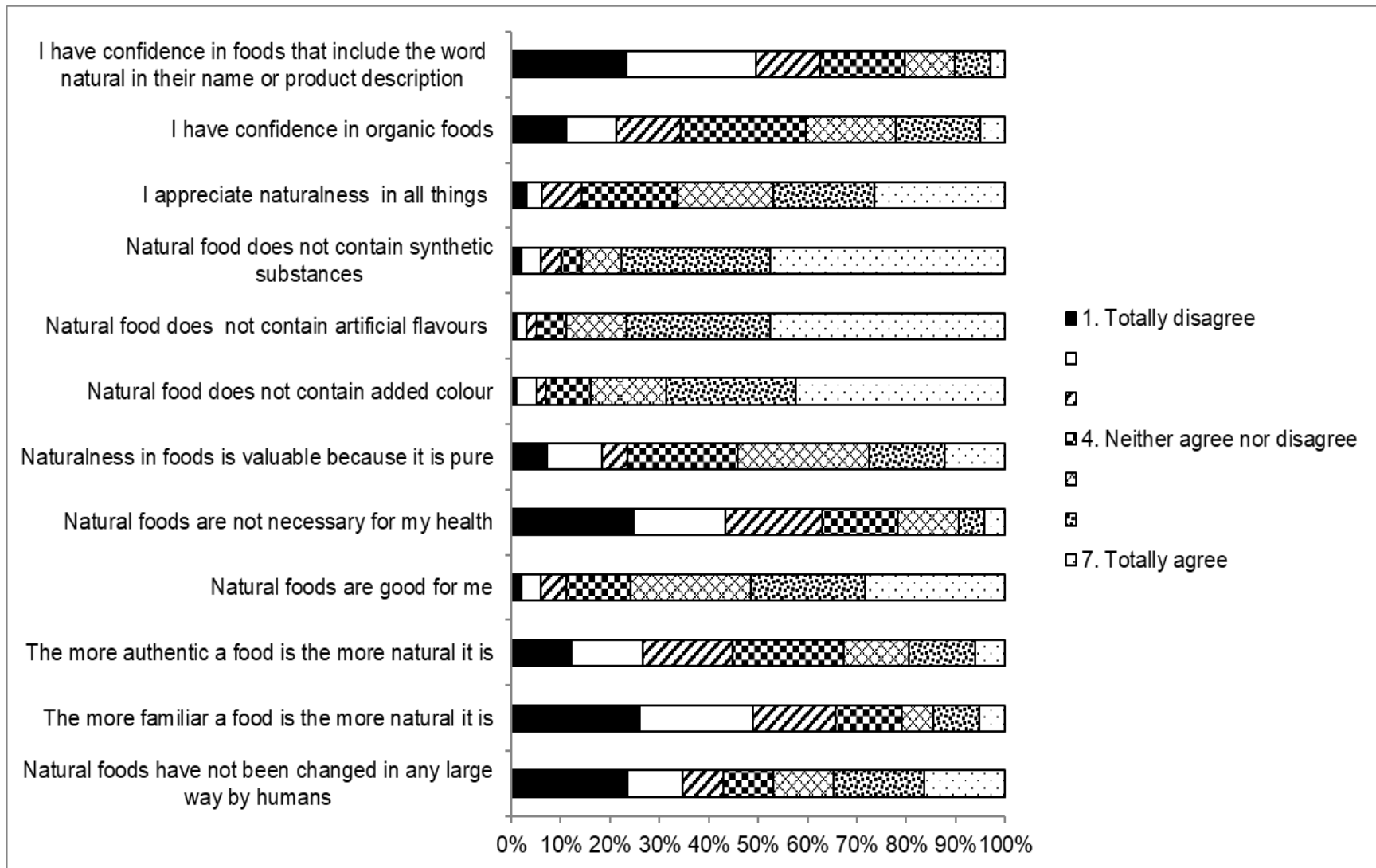
Participants were also asked questions relating to their natural product interest, general health interest and pleasure from consuming food that were adopted from Roininen et al. (1999; 2001). Responses are anchored on a 5-point scale with 1 representing strongly disagree and 5 representing strongly agree. Average scores for each of the statements are reported in Figure 17. For natural product interest, most of the participants agree that they eat foods that do not contain additives and that organically grown foods are no better for my health than those grown conventionally. For general health interest, most participants agree that it is important for them that their diet contains a lot of vitamins and minerals, they are particular about healthiness the foods they eat and they always a healthy and balanced diet. For the statements about pleasure from food, most people agree that they concentrate on enjoying the food when they eat and it is important for them to eat delicious food on weekdays as well as weekends.

Participants were also asked a number of questions from literature (for example see Table 3.4 in Ngo, 2016 and Siegrist et al., 2008) about their perceptions about natural foods (Figure 18). Most of the participants totally agree that natural foods do not contain synthetic substances, artificial flavours and added colour. Majority of the participants do not have confidence in foods that include the word natural in their name or product description and do not agree that the more familiar a product is, the more natural it is and that natural foods are not necessary for their health.



Source: Collected survey data

Figure 17: Natural product interest, general health interest and pleasure from food (Roininen et al., 1999; 2001)



Source: Collected survey data

Figure 18: Please state if you agree or disagree with the following statements:

Principal component factor analysis with varimax rotation was conducted in Stata 11 on the questions in Figure 17 in order to assess the interpretable underlying factors regarding consumers' perceptions about natural foods. Four factors are obtained from the factor analysis and the results are reported in Table 3. The factors are labeled absence of additives, pure, health and confidence. The Cronbach's alpha value is 0.83 which shows that there is good internal reliability.

Table 3: Factor analysis of consumers' perceptions and attitudes towards natural foods

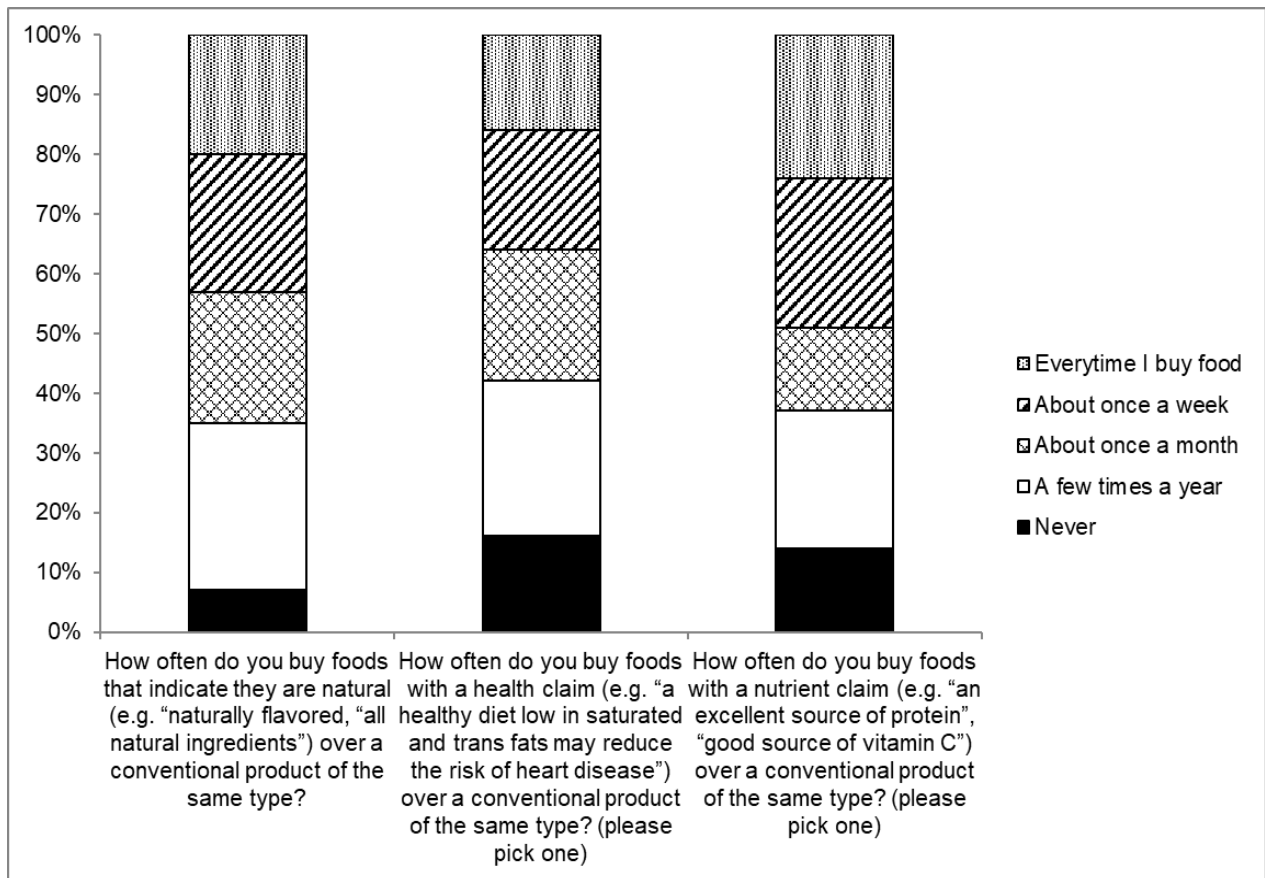
	Factor 1	Factor2	Factor3	Factor4
	Absence of additives	Purity	Health	Confidence
Natural foods have not been changed in any large way by humans	0.40	0.55	-0.08	-0.28
The more familiar a food is the more natural it is	-0.03	0.82	0.09	0.25
The more authentic a food is the more natural it is	0.15	0.74	0.11	0.25
Natural foods are good for me	0.28	0.42	0.64	0.04
R. Natural foods are not necessary for my health	0.18	-0.06	0.82	0.06
Naturalness in foods is valuable because it is pure	0.33	0.54	0.40	0.09
Natural food does not contain added colour	0.85	0.05	0.10	0.13
Natural food does not contain artificial flavours	0.88	0.03	0.19	0.09
Natural food does not contain synthetic substances	0.83	0.22	0.24	0.16
I appreciate naturalness in all things	0.26	0.20	0.68	0.28
I have confidence in organic foods	0.19	0.09	0.07	0.84
I have confidence in foods that include the word natural in their name or product description	0.10	0.23	0.13	0.84
Eigen values	4.55	1.57	1.26	1.04
Cronbach's alpha	0.83			
Sample size	95			

R implies that the statement is reverse coded such that it is recoded for the analysis

Source: Collected survey data

(vi) Purchasing Frequency for Foods with a Natural, Health or Nutrient Claim

Participants were asked about their purchasing frequency for foods that indicate that they are natural or foods that have a health claim or a nutrient claim over a conventional product of the same type. About 7%, 16% and 14% state that they never choose foods with a natural, health or nutrient claim over a conventional product of the same type respectively (Figure 19). About 20%, 16% and 24% state that they buy foods with a natural claim, health claim or nutrient claim over a conventional product every time they buy food respectively.



Source: Collected survey data

Figure 19: Purchase of foods that indicate that they are natural, with a health claim or nutrient claim

(vii) Relationships Between Perceptions About Natural Food and Other Variables

Data are analysed using cross tabulations to assess the degree of association between different variables and the perceptions about and purchase of natural foods. Participants are classified into two groups using information from each question separately. For generalized trust in people, participants are grouped into two groups i.e. one group containing people who state that people can be trusted and the other group containing people who state otherwise. Participants are also classified into groups (two in each case) using their responses to questions about trust in groups or institutions responsible for food, neophobia regarding food technologies, myths of nature, factors important in meat purchasing decisions, natural product interest, perceptions about natural foods and their purchasing frequency of products that have a natural claim. Chi-square tests are used to assess whether there are significant differences between other variables and perceptions about and frequency of purchase of natural foods. Since all the cross tabulation tables are 2 by 2, the chi square results with continuity correction are also reported.

Results in Table 4 show that there is a significant relationship between generalized trust in people and natural product interest (measured using questions from Roininen). People who state that they do not trust people or "don't know" are more likely to have higher interest in natural products as compared to those people who trust others in general. Results also show that there is a significant relationship between food technology neophobia and natural product interest. Participants who have higher food technology neophobia are more likely to have higher interest in natural products as compared to people who are less concerned about new food technologies.

People who regard product leanness, the use of antibiotics and hormones in livestock production, country of origin of the product, nutrition content and the way the product was processed as important factors in their meat purchasing decisions are more likely to have higher levels of interest in natural products as compared to those people who state otherwise.

Table 4: Results from cross-tabulation of natural product interest and other variables

Variable	Natural product interest		
	Low	High	
Generally trust people	no	10 (12.5%)	70 (87.5%)
	yes	6 (35.3%)	11 (64.7%)
	Chi square	5.29 (p=0.02)	
	Continuity correction	3.76 (p=0.05)	
Trust in the government	low	11 (16.9%)	54 (83.1%)
	high	5 (14.7%)	29 (85.3%)
	Chi-square	0.08 (p=0.78)	
	Continuity correction	0.00 (p=1.00)	
Trust in the food industry	low	12 (14.0%)	74 (86.0%)
	high	4 (30.8%)	9 (69.2%)
	Chi-square	2.36 (p=0.13)	
	Continuity correction	1.28 (p=0.26)	
Trust in advocacy groups	low	8 (15.4%)	44 (84.6%)
	high	8 (17.0%)	39 (83.0%)
	Chi-square	0.05 (p=0.83)	
	Continuity correction	0.00 (p=1.00)	
Food Technology Neophobia	low	7 (35.0%)	13 (65.0%)
	high	9 (11.5%)	69 (88.5%)
	Chi-square	6.41 (p=0.01)	
	Continuity correction	4.81 (p=0.03)	
<i>Myths of nature 1:</i> Environmental problems can only be controlled by enforcing radical changes in human behavior in society as a whole	do not agree	10 (19.6%)	41 (80.4%)
	agree	6 (14.0%)	37 (86.0%)
	Chi-square	0.53 (p=0.47)	
	Continuity correction	0.20 (p=0.65)	
<i>Myths of nature 2:</i> Environmental problems are not entirely out of control, but the government should dictate clear rules about what is and what is not allowed	do not agree	9 (18.0%)	41 (82.0%)
	agree	7 (15.9%)	37 (84.1%)
	Chi-square	0.22 (p=0.64)	
	Continuity correction	0.04 (p=0.84)	
<i>Natural foods are...</i> Something I can buy at the supermarket	do not agree	7 (17.1%)	34 (82.9%)
	agree	9 (15.5%)	49 (84.5%)
	Chi-square	0.04 (p=0.84)	
	Continuity correction	0.00 (p=1.00)	
Something I can buy at an organic store	do not agree	4 (18.2%)	18 (81.8%)
	agree	12 (15.6%)	65 (84.4%)
	Chi-square	0.09 (p=0.77)	
	Continuity correction	0.00 (p=1.00)	
Something I can buy at a small, local grocer	do not agree	7 (17.1%)	34 (82.9%)
	agree	9 (15.5%)	49 (84.5%)
	Chi-square	0.04 (p=0.84)	
	Continuity correction	0.00 (p=1.00)	
Something I can buy at a farmer's market	do not agree	3 (20.0%)	12 (80.0%)
	agree	13 (15.5%)	71 (84.5%)

	Chi-square	0.19 (p=0.66)	
	Continuity correction	0.003 (p=0.95)	
Something I can produce by my self	do not agree	5 (19.2%)	21 (80.8%)
	agree	11 (15.1%)	62 (84.9%)
	Chi-square	0.25 (p=0.62)	
	Continuity correction	0.03 (p=0.85)	
<i>Importance of factors in the buying decision</i>			
Product leanness (fat)	Not important	5 (38.5%)	8 (61.5%)
	Important	11 (12.8%)	75 (87.2%)
	Chi-square	5.49 (p=0.02)	
	Continuity correction	3.76 (p=0.05)	
The use of antibiotics in livestock production	Not important	10 (33.3%)	20 (66.7%)
	Important	6 (8.70%)	63 (91.3%)
	Chi-square	9.37 (p=0.002)	
	Continuity correction	7.64 (p=0.01)	
Country of origin of the product	Not important	9 (29.0%)	22 (71.0%)
	Important	7 (10.3%)	61 (89.7%)
	Chi-square	5.52 (p=0.02)	
	Continuity correction	4.22 (p=0.04)	
Nutrition content	Not important	8 (57.1%)	6 (42.9%)
	Important	8 (9.60%)	75 (90.4%)
	Chi-square	19.6 (p=0.00)	
	Continuity correction	16.3 (p=0.00)	
The use of hormones in livestock production	Not important	13 (43.3%)	17 (56.7%)
	Important	2 (3.00%)	65 (97.0%)
	Chi-square	25.8 (p=0.00)	
	Continuity correction	22.8 (p=0.00)	
Animal welfare conditions	Not important	8 (21.1%)	30 (78.9%)
	Important	8 (13.1%)	53 (86.9%)
	Chi-square	1.09 (p=0.30)	
	Continuity correction	0.58 (p=0.45)	
The way the product was processed	Not important	9 (36.0%)	16 (64.0%)
	Important	7 (9.6%)	66 (90.4%)
	Chi-square	9.51 (p=0.002)	
	Continuity correction	7.67 (p=0.01)	
Environmental footprint of livestock production	Not important	10 (23.8%)	32 (76.2%)
	Important	6 (10.5%)	51 (89.5%)
	Chi-square	3.15 (p=0.08)	
	Continuity correction	2.25 (p=0.13)	

Source: Collected survey data

Results on the degree of association between perceptions about natural foods (see questions in Table 3) and other variables are summarized in Table 5. Respondents who agree or strongly agree that natural foods are something they can buy from a farmers' market are more likely to have positive perceptions about natural foods as compared to people who state otherwise. Respondents who state that product leanness, the use of antibiotics in livestock production, nutrition content and environmental footprint of livestock production as important factors in their meat purchase decisions are more likely to have positive perceptions about natural foods as compared to people who state otherwise.

Table 5: Results from cross-tabulation of perceptions about natural foods (see Table 3) and other variables

Variable	Perceptions about natural foods		
	Low	High	
Generally trust people	no	14 (17.5%)	66 (82.5%)
	yes	2 (11.8%)	15 (88.2%)
	Chi-square	0.34 (p=0.56)	
	Continuity correction	0.05 (p=0.83)	
Trust in the government	low	13 (19.7%)	53 (80.3%)
	high	4 (12.1%)	29 (87.9%)
	Chi-square	0.89 (p=0.35)	
	Continuity correction	0.44 (p=0.51)	
Trust in the food industry	low	16 (18.4%)	71 (81.6%)
	high	1 (8.3%)	11 (91.7%)
	Chi-square	0.75 (p=0.39)	
	Continuity correction	0.21 (p=0.65)	
Trust in advocacy groups	low	12 (23.1%)	40 (76.9%)
	high	5 (10.6%)	42 (89.4%)
	Chi-square	2.69 (p=0.10)	
	Continuity correction	1.88 (p=0.17)	
Food Technology Neophobia	low	5 (25.0%)	15 (75.0%)
	high	12 (15.4%)	66 (84.6%)
	Chi-square	1.03 (p=0.31)	
	Continuity correction	0.47 (p=0.50)	
<i>Myths of nature 1</i> : Environmental problems can only be controlled by enforcing radical changes in human behavior in society as a whole	do not agree	7 (14.8%)	43 (86.0%)
	agree	8 (18.2%)	36 (81.8%)
	Chi-square	0.31 (p=0.58)	
	Continuity correction	0.07 (p=0.79)	
<i>Myths of nature 2</i> : Environmental problems are not entirely out of control, but the government should dictate clear rules about what is and what is not allowed	do not agree	11 (21.6%)	40 (78.4%)
	agree	4 (9.3%)	39 (90.7%)
	Chi-square	2.62 (p=0.11)	
	Continuity correction	1.78 (p=0.18)	
<i>Natural foods are...</i> Something I can buy at the supermarket	do not agree	5 (12.2%)	36 (87.8%)
	agree	12 (20.7%)	46 (79.3%)
	Chi-square	1.22 (p=0.27)	
	Continuity correction	0.70 (p=0.41)	
Something I can buy at an organic store	do not agree	6 (27.3%)	16 (72.7%)
	agree	11 (14.3%)	66 (85.7%)
	Chi-square	2.03 (p=0.15)	
	Continuity correction	1.22 (p=0.27)	
Something I can buy at a small, local grocer	do not agree	6 (15.0%)	34 (85.0%)
	agree	11 (18.6%)	48 (81.4%)
	Chi-square	0.22 (p=0.64)	
	Continuity correction	0.04 (p=0.84)	
Something I can buy at a farmer's market	do not agree	6 (40.0%)	9 (60.0%)

	agree	11 (13.1%)	73 (86.9%)
	Chi-square	6.48 (p=0.01)	
	Continuity correction	4.72 (p=0.03)	
Something I can produce by my self	do not agree	6 (23.1)	20 (76.9%)
	agree	11 (15.1%)	62 (84.9%)
	Chi-square	0.86 (p=0.35)	
	Continuity correction	0.39 (p=0.53)	
<i>Importance of factors in the buying decision</i>			
Product leanness (fat)	Not important	5 (38.5%)	8 (61.5%)
	Important	12 (14.0%)	74 (86.0%)
	Chi-square	4.77 (p=0.03)	
	Continuity correction	3.20 (p=0.07)	
The use of antibiotics in livestock production	Not important	10 (33.3%)	20 (66.7%)
	Important	7 (10.1%)	62 (89.9%)
	Chi-square	7.91 (p=0.005)	
	Continuity correction	6.36 (p=0.01)	
Country of origin of the product	Not important	4 (12.9%)	27 (87.1%)
	Important	13 (19.1%)	55 (80.9%)
	Chi-square	0.58 (p=0.45)	
	Continuity correction	0.22 (p=0.64)	
Nutrition content	Not important	9 (64.3%)	5 (35.7%)
	Important	8 (9.6%)	75 (90.4%)
	Chi-square	24.8 (p=0.00)	
	Continuity correction	21.1 (p=0.00)	
The use of hormones in livestock production	Not important	8 (26.7%)	22 (73.3%)
	Important	8 (11.9%)	59 (88.1%)
	Chi-square	3.26 (p=0.07)	
	Continuity correction	2.28 (p=0.13)	
Animal welfare conditions	Not important	9 (23.7%)	29 (76.3%)
	Important	8 (13.1%)	53 (86.9%)
	Chi-square	1.84 (p=0.18)	
	Continuity correction	1.17 (p=0.28)	
The way the product was processed	Not important	6 (25.0%)	18 (75.0%)
	Important	11 (14.9%)	63 (85.1%)
	Chi-square	1.30 (p=0.26)	
	Continuity correction	0.69 (p=0.41)	
Environmental footprint of livestock production	Not important	11 (26.2%)	31 (73.8%)
	Important	6 (10.5%)	51 (89.5%)
	Chi-square	4.17 (p=0.04)	
	Continuity correction	3.14 (p=0.08)	

Source: Collected survey data

In Table 6, results from the cross tabulation of frequency of purchase of foods with a natural claim over a conventional product of the same type and other variables are reported. Respondents who state that nutrition content and environmental footprint of livestock production are important factors in their meat purchase decisions are more likely to purchase foods with a

natural claim over a conventional product of the same type as compared to those respondents who state otherwise.

Table 6: Results from cross-tabulation of frequency of purchasing foods with a natural claim over a conventional product and other variables

Variable		Frequency of purchasing food products with a natural claim	
		Low	High
Generally trust people	no	47 (58.0%)	34 (42.0%)
	yes	9 (52.9%)	8 (47.1%)
	Pearson Chi-square	0.15 (p=0.70)	
	Continuity correction	0.01 (p=0.91)	
Trust in the government	low	38 (57.6%)	28 (42.4%)
	high	15 (55.9%)	15 (44.1%)
	Chi-square	0.03 (p=0.87)	
	Continuity correction	0.00 (p=1.00)	
Trust in the food industry	low	50 (57.5%)	37 (42.5%)
	high	7 (53.8%)	6 (46.2%)
	Chi-square	0.06 (p=0.81)	
	Continuity correction	0.00 (p=1.00)	
Trust in advocacy groups	low	33 (62.3%)	20 (37.7%)
	high	24 (51.1%)	23 (48.9%)
	Chi-square	1.28 (p=0.26)	
	Continuity correction	0.86 (p=0.35)	
Food Technology Neophobia	low	14 (70.0%)	6 (30.0%)
	high	43 (54.4%)	36 (45.6%)
	Chi-square	1.58 (p=0.21)	
	Continuity correction	1.01 (p=0.32)	
Myths of nature 1: Environmental problems can only be controlled by enforcing radical changes in human behavior in society as a whole	do not agree	32 (64.7%)	18 (35.3%)
	agree	21 (47.7%)	23 (52.3%)
	Chi-square	2.78 (p=0.10)	
	Continuity correction	2.13 (p=0.15)	
<i>Myths of nature 2: Environmental problems are not entirely out of control, but the government should dictate clear rules about what is and what is not allowed</i>	do not agree	25 (49.0%)	26 (51.0%)
	agree	29 (65.9%)	15 (34.1%)
	Chi-square	2.75 (p=0.10)	
	Continuity correction	2.10 (p=0.15)	
<i>Natural foods are...</i> Something I can buy at the supermarket	do not agree	25 (59.5%)	17 (40.5%)
	agree	32 (55.2%)	26 (44.8%)
	Chi-square	0.19 (p=0.66)	
	Continuity correction	0.05 (p=0.82)	
Something I can buy at an organic store	do not agree	15 (68.2%)	7 (31.8%)
	agree	42 (53.8%)	36 (46.2%)
	Chi-square	1.44 (p=0.23)	
	Continuity correction	0.91 (p=0.34)	

Something I can buy at a small, local grocer	do not agree	23 (56.1%)	18 (43.9%)
	agree	34 (57.6%)	25 (42.4%)
	Chi-square	0.02 (p=0.88)	
	Continuity correction	0.00 (p=1.00)	
Something I can buy at a farmer's market	do not agree	10 (66.7%)	5 (33.3%)
	agree	47 (55.3%)	38 (44.7%)
	Chi-square	0.67 (p=0.41)	
	Continuity correction	0.29 (p=0.59)	
Something I can produce by my self	do not agree	16 (61.5%)	10 (38.5%)
	agree	41 (55.4%)	33 (44.6%)
	Chi-square	0.30 (p=0.59)	
	Continuity correction	0.10 (p=0.75)	
<i>Importance of factors in the buying decision</i> Product leanness (fat)	Not important	8 (61.5%)	5 (38.5%)
	Important	49 (56.3%)	38 (43.7%)
	Chi-square	0.13 (p=0.72)	
	Continuity correction	0.003 (p=0.96)	
The use of antibiotics in livestock production	Not important	21 (70.0%)	9 (30.0%)
	Important	36 (51.4%)	34 (48.6%)
	Chi-square	2.96 (p=0.09)	
	Continuity correction	2.25 (p=0.13)	
Country of origin of the product	Not important	20 (64.5%)	11 (35.5%)
	Important	37 (53.6%)	32 (46.4%)
	Chi-square	1.04 (p=0.31)	
	Continuity correction	0.64 (p=0.42)	
Nutrition content	Not important	13 (92.9%)	1 (7.1%)
	Important	43 (51.2%)	41 (48.8%)
	Chi-square	8.51 (p=0.004)	
	Continuity correction	6.89 (p=0.01)	
The use of hormones in livestock production	Not important	21 (70.0%)	9 (30.0%)
	Important	34 (50.0%)	34 (50.0%)
	Chi-square	3.38 (p=0.07)	
	Continuity correction	2.62 (p=0.11)	
Animal welfare conditions	Not important	26 (68.4%)	12 (31.6%)
	Important	31 (50.0%)	31(50.0%)
	Chi-square	3.26 (p=0.07)	
	Continuity correction	2.55 (p=0.11)	
The way the product was processed	Not important	18 (72.0%)	7 (28.0%)
	Important	39 (52.7%)	35 (47.3%)
	Chi-square	2.85 (p=0.09)	
	Continuity correction	2.11 (p=0.15)	
Environmental footprint of livestock production	Not important	30 (71.4%)	12 (28.6%)

Important	27 (46.6%)	31 (53.4%)
Chi-square	6.15 (p=0.01)	
Continuity correction	5.18 (p=0.02)	

Source: Collected survey data

Contingent Valuation of Pork Attributes

In addition to participating in the focus group discussions and completing a survey questionnaire, participants also completed a contingent valuation exercise. The contingent valuation exercise was aimed at assessing people's willingness to pay for pork with different types of information about carnosine and omega-3 fatty acids.

Participants were presented with a picture of conventional (regular) pork chops and 6 other pictures of pork chops with different information about carnosine and omega-3 fatty acids. For carnosine, participants were presented with pork chops with information about carnosine (300mg per 100g of pork loin grilled or broiled) in the nutrition facts table, pork chops labeled "an excellent source of carnosine" and others labeled "this pork chop contains high levels of carnosine which has been shown to have anti-aging properties." For omega-3 fatty acids, participants were presented with pork chops with information about omega-3 fatty acids (0.4g per 100g of pork loin grilled or broiled) in the nutrition facts panel. There were also pork chops labeled "source of omega-3 polyunsaturated fatty acids" and the other pork chops were labeled "supportive research shows that consumption of EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease." Pork chops with omega-3 fatty acids also contained information about omega-6 fatty acids (2g 100g of pork loin grilled or broiled) in the nutrition facts table. Before completing the contingent valuation exercise, participants were presented with the following information:

Please imagine that you are at a meat counter, where you normally purchase meat. The pork chops available are packaged as below with varying labels. For each package of pork chops please identify the price that you would find reasonable to pay to purchase the product. The products may contain labels referring to either carnosine or omega-3 fatty acids.

Carnosine, a natural molecule (or dipeptide) present in the muscle of animals and humans, has been observed to exert antiaging activity at cellular and whole animal levels (including potentially for people who may consume sufficient quantities in meat). Carnosine is available in fish and meat products and has been shown to be available in high quantities in pork. The therapeutic potential of carnosine has been tested in numerous diseases in which ischemia or oxidative stress is involved. For several pathologies, such as diabetes and its complications, ocular disease, aging, and neurological disorders, promising preclinical and clinical results have been obtained.

Omega-3 fatty acids (also called omega-3 fats and n-3 fats) are essential fats—the body can't make them from scratch but must get them from food. Omega-3 fatty acids are an integral part of cell membranes throughout the body and affect the function of the cell receptors in these membranes. They provide the starting point for making hormones that regulate blood clotting, contraction and relaxation of artery walls, and inflammation. They also bind to receptors in cells that regulate genetic function. Likely due to these effects, omega-3 fats have been shown to help prevent heart disease and stroke, may help control lupus, eczema, and rheumatoid arthritis, and may play protective roles in cancer and other conditions.

Participants were asked "considering the prices indicated for **regular** pork chops, what price would be reasonable to pay for each package of pork chops?" (X one box). For each tray of pork chops (405g) participants chose the price they would pay on a payment card. Prices were listed in per kg and per 405g package basis. The price of regular (conventional pork chops) was \$13.99 per kg or 5.67 per 405g package. There were 8 prices for each 405g

package which were \$5.67, \$6.08, \$6.48, \$6.89, \$7.49, \$7.90, \$8.51 and \$8.91. Examples of pictures of pork chop trays included in the contingent valuation exercise are shown in Figures 20 and 21.



Pork Loin, Centre Chops, Boneless - Regular Cost \$13.99/kg (\$5.67 per package (405 g))

Unit Price	\$13.99	\$15.00	\$16.00	\$17.00	\$18.50	\$19.50	\$21.00	\$22.00
Total Price (package)	\$5.67	\$6.08	\$6.48	\$6.89	\$7.49	\$7.90	\$8.51	\$8.91
I would pay:								

Figure 20: An example of a tray of pork chops with information about carnosine



Supportive research shows that consumption of EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease.

PORK LOIN CENTER CHOPS BONELESS

Pork chops 1 1/2" thick, grill 4-6 min per side; 1 1/2" thick, grill 6-8 minutes per side. Season chops with salt and pepper. Brush with oil. Grill over medium coals or on a gas grill on medium-high heat. Turn and cook to desired doneness. Temperature on meat thermometer should read 160 degrees F.

SAFE HANDLING INSTRUCTIONS

THIS PRODUCT WAS PREPARED FROM INSPECTED AND PASSED MEAT AND/OR POULTRY. SOME FOOD PRODUCTS MAY CONTAIN BACTERIA THAT COULD CAUSE ILLNESS IF THE PRODUCT IS MISHANDLED OR COOKED IMPROPERLY. FOR YOUR PROTECTION, FOLLOW THESE SAFE HANDLING INSTRUCTIONS.

- KEEP REFRIGERATED OR FROZEN. THAW IN REFRIGERATOR OR MICROWAVE.
- KEEP RAW MEAT AND POULTRY SEPARATE FROM OTHER FOODS. WASH WORKING SURFACES INCLUDING CUTTING BOARDS, UTENSILS, AND HANDS AT THE TOUCHING RAW MEAT OR POULTRY.
- COOK THOROUGHLY. KEEP HOT FOODS HOT. REFRIGERATE LEFTOVERS IMMEDIATELY OR DISCARD.



203 405 2345 01234 1928 0 01 23456

Tare 0.015kg	Store No 877	Best Before Sep 30, 2016	Total Price \$x.xx
Net Wt/ct 0.405 kg	Unit Price \$xx.xx/kg		

Valeur Nutritive

Nutrition Facts

Par 100 g (longe de porc, grillé)
Per 100 g (pork loin, grilled or broiled)

Teneur Amount	% Valeur Quotidienne % Daily Value
Calories / Calories 240	
Lipides / Fat 18 g	28%
Saturés / Saturated 8 g	41%
+ Trans / Trans 0.1 g	
Polyinsaturés / Polyunsaturated 2.5 g	
Oméga-6 / Omega-6 2 g	
Oméga-3 / Omega-3 0.4 g	
Monoinsaturés / Monounsaturated 7 g	
Cholestérol / Cholesterol 55 mg	18%
Sodium / Sodium 50 mg	2%
Glucides / Carbohydrate 0 g	0%
Fibres / Fibre 0 g	
Sucres / Sugars 0 g	
Protéines / Protein 20 g	
Vitamine A / Vitamin A	0%
Vitamine C / Vitamin C	2%
Calcium / Calcium	2%
Fer / Iron	2%

Pork Loin, Centre Chops, Boneless - Regular Cost \$13.99/kg (\$5.67 per package (405 g))

Unit Price	\$13.99	\$15.00	\$16.00	\$17.00	\$18.50	\$19.50	\$21.00	\$22.00
Total Price (package)	\$5.67	\$6.08	\$6.48	\$6.89	\$7.49	\$7.90	\$8.51	\$8.91
I would pay:								

Figure 21: An example of a tray of pork chops with information about omega-3 fatty acids

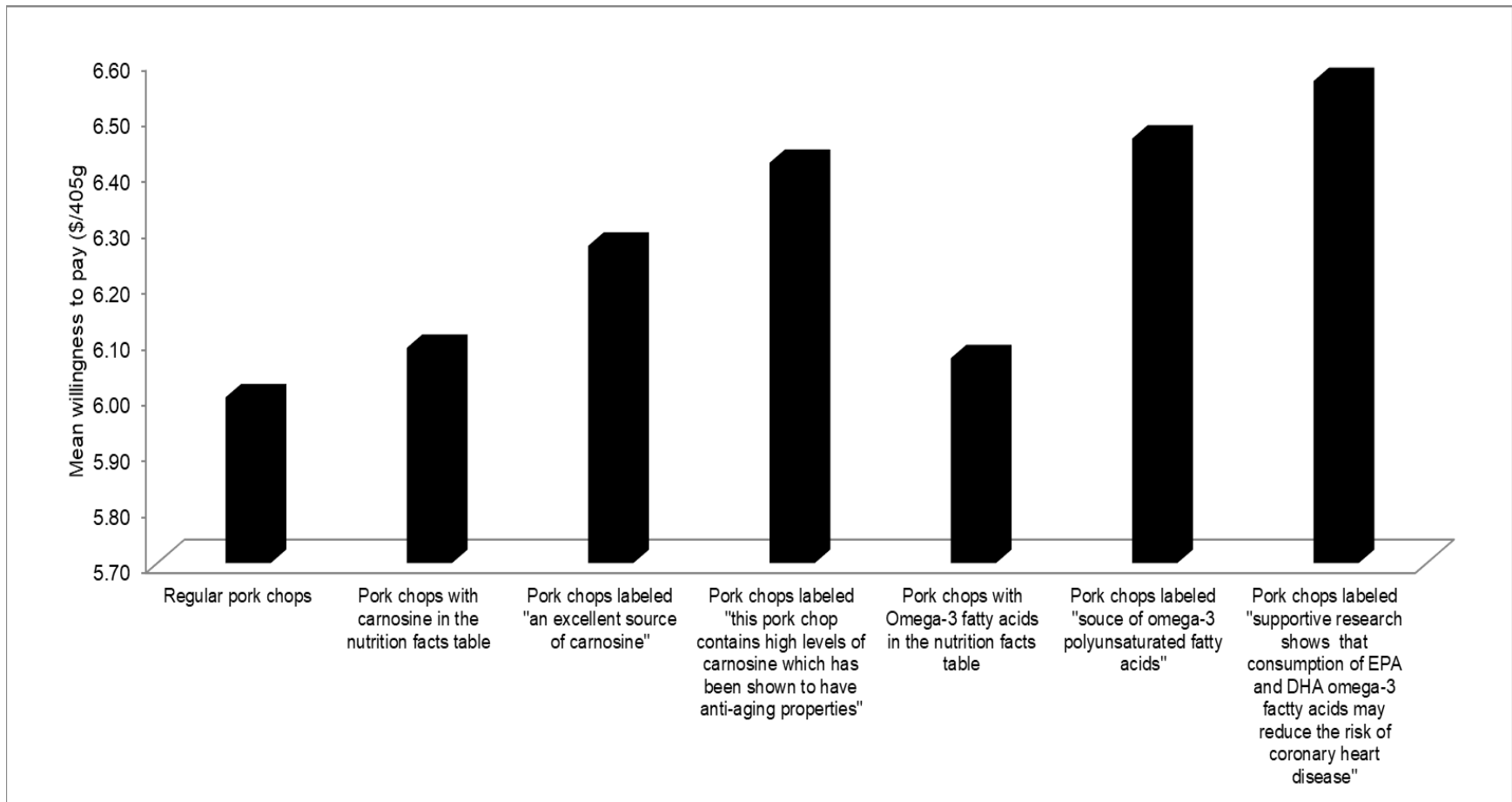
The percentage of participants who were willing to pay a given price for pork chops with different types of information is summarized in Table 7. Compared to regular pork chops and pork chops with information about carnosine or omega-3 fatty acids in the nutrition facts tables, more participants are willing to pay for pork with more information about these attributes.

Table 8: Regression results for the factors influencing willingness to pay for pork chops

Parameter	Ordinary least squares regression results		Ordered probit regression results	
	Coefficient	T-statistic	Coefficient	T-statistic
Constant	5.05	15.0	-1.61	-3.43
Carnosine in the nutrition facts table	0.09	0.87	0.19	1.14
Pork labeled "an excellent source of carnosine"	0.27	2.69	0.57	3.57
Pork labeled "this pork chop contains high levels of carnosine which has been shown to have anti-aging properties"	0.42	4.17	0.76	4.76
Omega-3 fatty acids in the nutrition facts table	0.07	0.70	0.13	0.75
Pork chops labeled "source of omega-3 polyunsaturated fatty acids"	0.46	4.60	0.84	5.23
Pork chops labeled "supportive research shows that consumption of EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease"	0.58	5.74	0.95	5.74
Age	0.003	1.12	-0.001	-0.12
Gender (female=1, male=0)	0.13	2.14	0.18	2.03
Household size	0.04	1.16	0.08	1.22
Education	0.04	2.58	0.07	3.06
Income	-0.02	-1.82	-0.03	-1.87
Eat pork (yes=1, no=0)	0.08	1.30	0.19	1.93
μ_3			0.65	14.2
μ_4			1.06	18.5
μ_5			1.60	22.0
μ_6			1.96	23.5
μ_7			2.25	21.6
μ_8			2.52	19.8
R ²	0.10		0.12	
Schwarz B.I.C.	764.4		1116.8	
Log likelihood	-722.0		-1054.8	
# of observations	682		682	

Source: Collected survey data

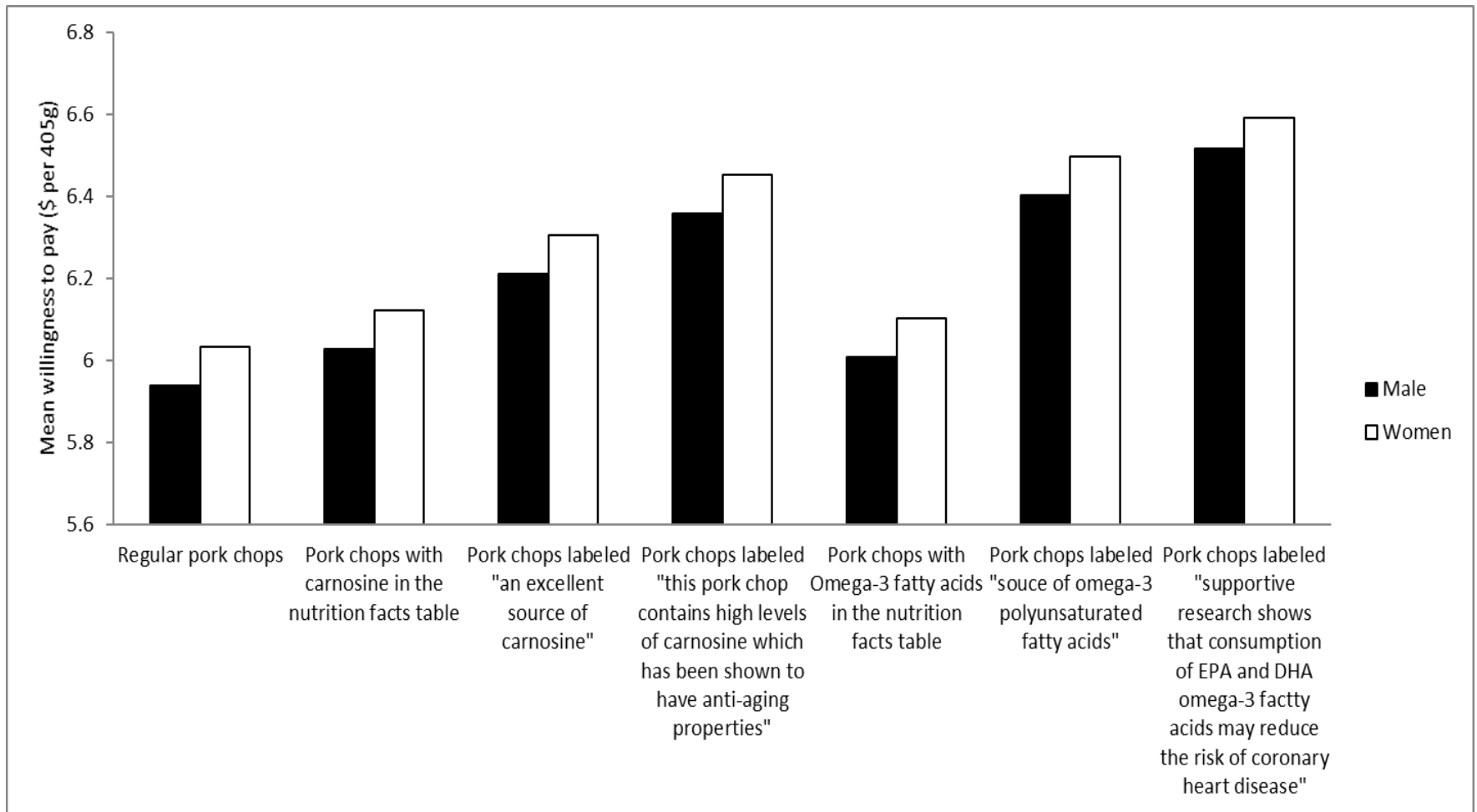
In Figure 23 and Figure 24, results on WTP values by gender and the level of education attained by respondents respectively are reported. Women had higher levels of willingness to pay values for all pork chops as compared to males. People with a university degree or post graduate studies have higher willingness to pay values as compared to people with lower levels of education.



Note: There are significant differences at $p \leq 0.05$ between willingness to pay values for pork chops with the different types of information (except for the difference between mean values for pork chops with carnosine and omega-3 fatty acids in the nutrition facts table)

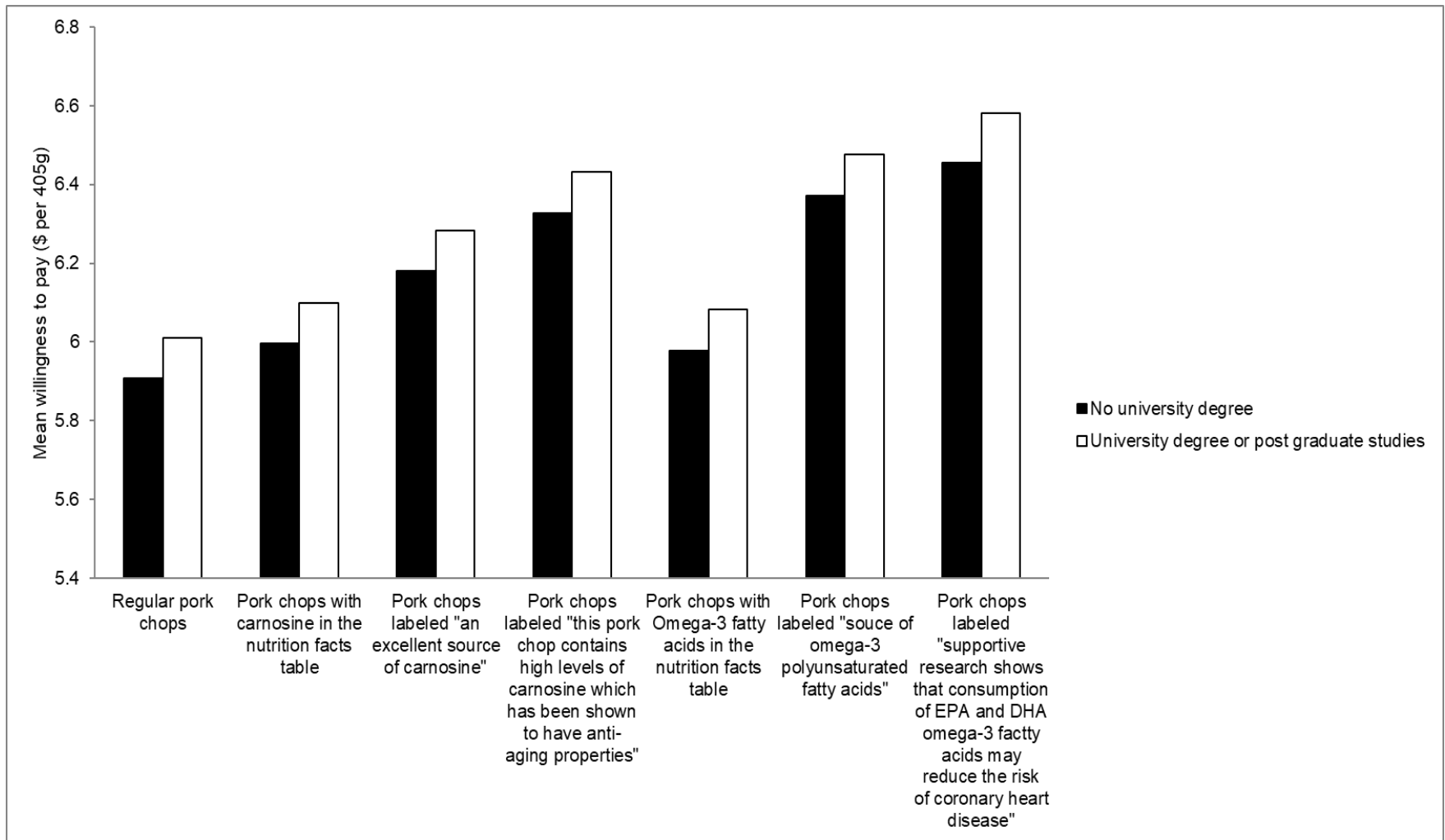
Source: Collected survey data

Figure 22: Mean values of individual's willingness for pork chops with different attributes



Note: There are significant differences at $p \leq 0.05$ between willingness to pay values for pork chops with the different types of information between the two groups
 Source: Collected survey data

Figure 23: Mean values of individual's willingness for pork chops with different attributes by gender of respondents



Note: There are significant differences at $p \leq 0.05$ between willingness to pay values for pork chops with the different types of information between the two groups
 Source: Collected survey data

Figure 24: Mean values of individual's willingness for pork chops with different attributes by education level attained by the respondents

Willingness to pay values for the different attributes are compared between groups of participants that were classified according to generalized trust in people, trust in groups or institutions responsible for food, neophobia regarding food technologies, natural product and health interest, pleasure from consuming food, myths of nature, perceptions and attitudes towards natural foods, purchasing frequency of products that have a natural, health or nutrient claim, factors important in making meat purchase decisions, beliefs about the healthfulness of pork in comparison with other meats and knowledge of sodium, protein and iron content in pork. Differences between groups of participants are tested using independent t-tests and results are reported in Table 9.

Participants who generally trust people are willing to pay significantly lower amounts for pork chops as compared to those participants who do not generally trust (with the exception of pork chops labeled “supportive research shows that consumption of EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease.” Participants who have higher levels of trust in advocacy groups are willing to pay significantly lower amounts for all pork chops as compared to those participants who have lower levels of trust in advocacy groups. Those participants who have a higher interest in natural products are willing to pay significantly higher amounts for all pork chops as compared to participants who have a lower interest in natural products. People who frequently buy foods that have a health claim are willing to pay significantly lower amounts for all pork chops as compared to those participants who buy such foods less frequently.

Participants who agree that “environmental problems are not entirely out of control, but the government should dictate clear rules about what is and what is not allowed” are willing to pay higher amounts for pork chops labeled “supportive research shows that consumption of EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease” as compared to those people who do not agree with the statement. Lastly participants who agree or strongly agree that there is only 2% of the recommended daily value of sodium in a 100gm portion of pork are willing to pay significantly higher amounts for all pork chops as compared to those participants who state otherwise.

Table 9: Differences in willingness to pay (\$/405g) between groups of participants

	Sample size	Regular pork chops	Carnosine in the nutrition facts table	Pork labeled "an excellent source of carnosine"	Pork labeled "this pork chop contains high levels of carnosine which has been shown to have anti-aging properties"	Omega-3 fatty acids in the nutrition facts table	Pork chops labeled "source of omega-3 polyunsaturated fatty acids"	Pork chops labeled "supportive research shows that consumption of EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease"
<i>Generally trust people</i>								
no	81	6.00	6.09	6.28	6.42	6.07	6.47	6.57
yes	17	5.96	6.05	6.23	6.38	6.03	6.42	6.54
p value		0.10	0.10	0.10	0.10	0.10	0.10	0.17
<i>Trust in the government</i>								
low	66	5.99	6.08	6.26	6.41	6.06	6.46	6.56
high	34	6.00	6.09	6.28	6.42	6.08	6.47	6.58
p value		0.59	0.59	0.59	0.59	0.59	0.59	0.25
<i>Trust in the food industry</i>								
low	87	6.00	6.08	6.27	6.42	6.07	6.46	6.56
high	13	6.00	6.09	6.28	6.42	6.07	6.47	6.57
p value		0.75	0.75	0.75	0.75	0.75	0.75	0.59
<i>Trust in advocacy groups</i>								
low	53	6.02	6.11	6.29	6.44	6.09	6.48	6.58
high	47	5.97	6.06	6.24	6.39	6.04	6.44	6.54
p value		0.03	0.03	0.03	0.03	0.03	0.03	0.04
<i>Food Technology Neophobia Scale</i>								
low	20	5.97	6.05	6.24	6.39	6.04	6.43	6.54
high	79	6.00	6.09	6.27	6.42	6.07	6.47	6.57
p value		0.18	0.18	0.18	0.18	0.18	0.18	0.32
<i>Perceptions about natural food</i>								
low	17	5.99	6.08	6.26	6.41	6.06	6.46	6.55
high	82	6.00	6.09	6.27	6.42	6.07	6.46	6.57
p value		0.93	0.93	0.93	0.93	0.93	0.93	0.49
<i>Natural product interest</i>								
low	16	5.96	6.05	6.23	6.38	6.03	6.42	6.52
high	83	6.00	6.09	6.28	6.42	6.07	6.47	6.57
p value		0.03	0.03	0.03	0.03	0.03	0.03	0.03
<i>General health interest</i>								
low	9	5.95	6.04	6.22	6.37	6.02	6.42	6.53
high	90	6.00	6.09	6.27	6.42	6.07	6.46	6.57
p value		0.16	0.16	0.16	0.16	0.16	0.16	0.23
<i>Pleasure</i>								
low	9	5.96	6.05	6.23	6.38	6.03	6.42	6.53
high	90	6.00	6.09	6.27	6.42	6.07	6.46	6.57
p value		0.47	0.47	0.47	0.47	0.47	0.47	0.43
<i>Frequency of buying foods that indicate natural</i>								
low	57	6.01	6.10	6.28	6.43	6.08	6.47	6.57
high	43	5.98	6.07	6.25	6.40	6.05	6.44	6.55
p value		0.15	0.15	0.15	0.15	0.15	0.15	0.22
<i>Frequency of buying foods with a health</i>								

<i>claim</i>									
low	64	6.01	6.10	6.28	6.43	6.08	6.48	6.58	
high	36	5.97	6.06	6.24	6.39	6.04	6.43	6.54	
p value		0.05	0.05	0.05	0.05	0.05	0.05	0.06	
<i>Frequency of buying foods with a nutrient claim</i>									
low	51	6.01	6.10	6.28	6.43	6.08	6.47	6.57	
high	49	5.99	6.07	6.26	6.41	6.06	6.45	6.55	
p value		0.27	0.27	0.27	0.27	0.27	0.27	0.37	
<i>Myths of nature 1: Environmental problems can only be controlled by enforcing radical changes in human behavior in society as a whole</i>									
do not agree	51	6.01	6.10	6.28	6.43	6.08	6.47	6.58	
agree	44	5.98	6.07	6.26	6.40	6.05	6.45	6.55	
p value		0.25	0.25	0.25	0.25	0.25	0.25	0.20	
<i>Myths of nature 2: Environmental problems are not entirely out of control, but the government should dictate clear rules about what is and what is not allowed</i>									
do not agree	51	5.98	6.07	6.26	6.40	6.05	6.45	6.55	
agree	44	6.01	6.10	6.28	6.43	6.08	6.48	6.58	
p value		0.18	0.18	0.18	0.18	0.18	0.18	0.09	
<i>Product leanness</i>									
not important	13	5.99	6.08	6.26	6.41	6.06	6.45	6.56	
important	87	6.00	6.09	6.27	6.42	6.07	6.46	6.56	
p value		0.76	0.76	0.76	0.76	0.76	0.76	0.99	
<i>The use of antibiotics in livestock production</i>									
not important	30	6.00	6.09	6.27	6.42	6.07	6.46	6.56	
important	70	6.00	6.09	6.27	6.42	6.07	6.46	6.56	
p value		0.99	0.99	0.99	0.99	0.99	0.99	0.98	
<i>Country of origin of the product</i>									
not important	31	6.01	6.10	6.28	6.43	6.08	6.47	6.57	
important	69	5.99	6.08	6.26	6.41	6.06	6.46	6.56	
p value		0.58	0.58	0.58	0.58	0.58	0.58	0.52	
<i>Nutrition content</i>									
not important	14	6.00	6.09	6.27	6.42	6.07	6.47	6.56	
important	84	5.99	6.08	6.27	6.41	6.06	6.46	6.56	
p value		0.82	0.82	0.82	0.82	0.82	0.82	0.83	
<i>The use of hormones in livestock production</i>									
not important	30	5.98	6.06	6.25	6.40	6.05	6.44	6.54	
important	68	6.01	6.10	6.28	6.43	6.08	6.47	6.57	
p value		0.18	0.18	0.18	0.18	0.18	0.18	0.19	
<i>Animal welfare conditions</i>									
not important	38	5.99	6.08	6.26	6.41	6.06	6.46	6.56	
important	62	6.00	6.09	6.27	6.42	6.07	6.46	6.57	
p value		0.71	0.71	0.71	0.71	0.71	0.71	0.80	
<i>The way the product was processed</i>									
not important	25	5.99	6.07	6.26	6.41	6.06	6.45	6.55	
important	74	6.00	6.09	6.27	6.42	6.07	6.46	6.56	

p value		0.58	0.58	0.58	0.58	0.58	0.58	0.66
<i>Environmental footprint of livestock production</i>	42	6.01	6.10	6.28	6.43	6.08	6.47	6.57
not important	58	5.99	6.08	6.26	6.41	6.06	6.45	6.56
important		0.29	0.29	0.29	0.29	0.29	0.29	0.37
p value								
<i>Beliefs about pork as compared to other meats</i>								
pork is not healthful as other meats	55	6.00	6.09	6.27	6.42	6.07	6.47	6.57
pork is as healthful or more healthful	45	5.99	6.08	6.26	6.41	6.06	6.45	6.55
P value		0.51	0.51	0.51	0.51	0.51	0.51	0.28
<i>Knowledge of sodium content in pork (100gm)</i>								
low	72	5.99	6.07	6.26	6.41	6.06	6.45	6.55
high	25	6.03	6.12	6.30	6.45	6.10	6.49	6.59
p value		0.05	0.05	0.05	0.05	0.05	0.05	0.04
<i>Knowledge of protein content in pork (100gm)</i>								
low	51	6.01	6.10	6.28	6.43	6.08	6.47	6.57
high	46	5.99	6.07	6.26	6.41	6.06	6.45	6.56
p value		0.32	0.32	0.32	0.32	0.32	0.32	0.45
<i>Knowledge of iron content in pork (100gm)</i>								
low	64	5.99	6.08	6.26	6.41	6.06	6.46	6.56
high	33	6.00	6.09	6.27	6.42	6.07	6.47	6.57
p value		0.66	0.66	0.66	0.66	0.66	0.66	0.43

p values are reported for the case where equal variance is not assumed

Source: Collected survey data

Conclusions

In this study, 100 students (both graduate and undergraduate students) and non-academic staff members at the University of Alberta participated in focus group discussions and completed a contingent valuation exercise and a survey questionnaire about food and agricultural technologies. In the focus groups, when asked whether they would buy meat in the grocery store identified as having a human health component such as carnosine and omega-3 fatty acids, some participants stated that they would want to have more information on the labels. Similar results are obtained in the contingent valuation exercise whereby people are willing to pay higher values for pork chops with more information.

Similar results also come from the survey questionnaire and focus group discussions in terms of judgements of naturalness of food and technologies. From both survey questions and focus group discussions, participants think that natural food is what they could produce themselves or what they can buy from a farmers' market. Most participants agree that natural foods do not contain additives or synthetic substances. In addition, participants are concerned about switching to new technologies quickly and they are concerned about uncertainties regarding the new technologies in terms of human health and environmental effects. Although there are some people who do not like the use of genomics in selective breeding, most participants prefer it since it does not involve manipulation and it is like selective breeding which has been done for a long time. The results from this study are consistent with results from the study by Rozin (2005) whereby genetic engineering, degree to which the products are processed and additives significantly reduce the naturalness of the product in the eyes of the consumer. Trust and the cost of food from the novel technologies (as compared to conventional products) are also important factors for the success of products from novel technologies.

In summary, generalized trust in people, food technology neophobia and concerns about product leanness, country of origin of the product, nutrition content, use of hormones and antibiotics in livestock production and environmental footprint of livestock production are associated with attitudes and perceptions regarding natural foods. Generalized trust in people, trust in advocacy groups, natural product interest, frequency of purchasing products with a health claim and knowledge of sodium content in pork are associated with willingness to pay for enhanced carnosine and omega-3 fatty acids in pork.

References

- Abrams, K.M., C.A. Meyers, and T.A. Irani. 2010. Naturally confused: Consumers' perceptions of all-natural and organic pork products. *Agriculture and Human Values* 27(3): 365-374.
- Carlson, D.F., C.A. Lancto, B. Zang, E-S. Kim, M. Walton, D. Oldeschulte, C. Seabury, T.S. Sonstegard, and S.C. Fahrenkrug. 2016. Production of hornless dairy cattle from genome-edited cell lines. *Nature Biotechnology* 34(5): 479-481.
- Cox, D.N., and G. Evans. 2008. Construction and validation of a psychometric scale to measure consumers' fears of novel food technologies: The Food Technology Neophobia Scale. *Food Quality and Preference* 1: 704-710
- Falk, L.W., J. Sobal, C. A. Bisogni, M. Connerst, and C.M. Devine. 2001. Managing healthy eating: Definitions, classifications, and strategies. *Health Education & Behaviour* 28(4): 425-439.

- Huang, S., D. Weigel, R.N. Beachy, and J. Li. 2016. A proposed regulatory framework for genome-edited crops. *Nature Genetics* 48(2): 109-111.
- Glaeser, E.L., D.I., Laibson, J.A. Scheinkman, and C.L. Soutter. 2000. Measuring trust. *Quarterly Journal of Economics* 115(3): 811-846.
- Holmes, L. 2016. The intangible appeal of "natural": growing consumer interest in an unregulated product label. <http://blog.euromonitor.com/2016/11/intangible-appeal-natural-growing-consumer-interest-unregulated-product-label.html> (downloaded February 22, 2017).
- Lunardo, R., and C. Saintives. 2013. The effect of naturalness claims on perceptions of food product naturalness in the point of purchase. *Journal of Retailing and Consumer Services* 20(6): 529-537.
- Lusk, J.L., and B.C. Briggeman. 2009. Food values. *American Journal of Agricultural Economics* 91(1): 184-196.
- Ngo, S. Consumer preferences for different sources of vitamin A in Odisha, India and Alberta, Canada. MSc. diss. University of Alberta.
- Roininen, K., L. Lähteenmäki, and H. Tuorila. 1999. Quantification of consumer attitudes to health and hedonic characteristics of foods. *Appetite* 33(1): 71-88.
- Roininen, K., H. Tuorila, E.H. Zandstra, C. de Graaf, K. Vehkalahti, K. Stubenitsky, and D.J. Mela. 2001. Differences in health and taste attitudes and reported behaviour among Finnish, Dutch and British consumers: A cross-national validation of the Health and Taste Attitude Scales (HTAS). *Appetite* 37(1): 33-45.
- Román, S., L.M. Sánchez-Siles, and M. Siegrist. 2017. The importance of food naturalness for consumers: Results of a systematic review. *Trends in Food Science & Technology* 67: 44-57.
- Roosen, J., A. Bieberstein, S. Blanchemanche, E. Goddard, S. Marette, and F. Vandermoere. 2015. Trust and willingness to pay for nanotechnology food. *Food Policy* 52: 75-83.
- Rozin, P. 2005. The meaning of "natural": Process more important than content. *Psychological Science* 16(8): 652-658.
- Rozin, P. 2006. Naturalness judgments by lay Americans: Process dominates content in judgments of food or water acceptability and naturalness. *Judgment and Decision Making* 1(2): 91-97.
- Rozin, P., M. Spranca, Z. Krieger, R. Neuhäus, D. Surillo, A. Swerdlin, and K. Wood. 2004. Preference for natural: Instrumental and ideational/moral motivations, and the contrast between foods and medicines. *Appetite* 43(2): 147-154.
- Siegrist, M., N. Stampfli, H. Kastenzholz, and C. Keller. 2008. Perceived risks and perceived benefits of different nanotechnology foods and nanotechnology food packaging. *Appetite* 51(2): 283-290.

Steg, L., and I. Sievers. 2000. Cultural theory of individual perceptions of environmental risks. *Environment and behavior* 32(2): 248-267.

Appendix: Survey Instruments

ID:

Session:

Date:

Pork Chop Exercise

Please imagine that you are at a meat counter, where you normally purchase meat. The pork chops available are packaged as below with varying labels. For each package of pork chops please identify the price that you would find reasonable to pay to purchase the product. The products may contain labels referring to either carnosine

Carnosine, a natural molecule (or dipeptide) present in the muscle of animals and humans, has been observed to exert antiaging activity at cellular and whole animal levels (including potentially for people who may consume sufficient quantities in meat). Carnosine is available in fish and meat products and has been shown to be in available in high quantities in pork. The therapeutic potential of carnosine has been tested in numerous diseases in which ischemia or oxidative stress is involved. For several pathologies, such as diabetes and its complications, ocular disease, aging, and neurological disorders, promising preclinical and clinical results have been obtained.

Omega-3 fatty acids (also called omega-3 fats and n-3 fats) are *essential* fats—the body can't make them from scratch but must get them from food. Omega-3 fatty acids are an integral part of cell membranes throughout the body and affect the function of the cell receptors in these membranes. They provide the starting point for making hormones that regulate blood clotting, contraction and relaxation of artery walls, and inflammation. They also bind to receptors in cells that regulate genetic function. Likely due to these effects, omega-3 fats have been shown to help prevent heart disease and stroke, may help control lupus, eczema, and rheumatoid arthritis, and may play protective roles in cancer and other conditions.

Considering the prices indicated for **regular** pork chops, what price would be reasonable to pay for each package of pork chops? (X one box)



1. Pork Loin, Centre Chops, Boneless - **Regular Cost \$13.99/kg (\$5.67 per package (405 g))**

Unit Price	\$13.99	\$15.00	\$16.00	\$17.00	\$18.50	\$19.50	\$21.00	\$22.00
Total Price (package)	\$5.67	\$6.08	\$6.48	\$6.89	\$7.49	\$7.90	\$8.51	\$8.91
I would pay:								



PORK LOIN CENTER CHOPS BONELESS

Pork chops 1/2" thick, grill 4-6 min per side; 1 1/2" thick, grill 6-8 minutes per side. Season chops with salt and pepper. Brush with oil. Grill over medium coals or on a gas grill on medium high heat. Turn and cook to desired doneness. Temperature on meat thermometer should read 160 degrees F.

SAFE HANDLING INSTRUCTIONS

THIS PRODUCT WAS PREPARED FROM INSPECTED AND PASSED MEAT AND/OR POULTRY. SOME FOOD PRODUCTS MAY CONTAIN BACTERIA THAT COULD CAUSE ILLNESS IF THE PRODUCT IS MISHANDLED OR COOKED IMPROPERLY. FOR YOUR PROTECTION, FOLLOW THESE SAFE HANDLING INSTRUCTIONS.

KEEP REFRIGERATED OR FROZEN. THAW IN REFRIGERATOR OR MICROWAVE.

KEEP RAW MEAT AND POULTRY SEPARATE FROM OTHER FOODS, ESPECIALLY READY TO EAT FOODS, INCLUDING CUTTING BOARDS, UTENSILS, AND HANDS AFTER TOUCHING RAW MEAT OR POULTRY.

COOK THOROUGHLY.

KEEP HOT FOODS HOT, REFRIGERATE LEFTOVERS IMMEDIATELY OR DISCARD.



Tare 0.019kg	Store No. 877	Best Before Sep 30, 2016	Total Price \$x.xx
Net Wt/ct 0.405 kg	Unit Price \$xx.xx/kg		

Valeur Nutritive
Nutrition Facts
Par 100 g (longe de porc, grillé)
Per 100 g (pork loin, grilled or broiled)

Teneur Amount	% Valeur Quotidienne % Daily Value
Calories / Calories 180	
Lipides / Fat 7.3 g	11%
Saturés / Saturated 2.2 g	11%
+ Trans / Trans 0 g	
Cholestérol / Cholesterol 84 mg	28%
Sodium / Sodium 56 mg	2%
Glucides / Carbohydrate 0 g	0%
Fibres / Fibre 0 g	0%
Sucres / Sugars 0 g	
Protéines / Protein 27 g	
Carnosine/ Carnosine 300 mg	
Vitamine A / Vitamin A	0%
Vitamine C / Vitamin C	0%
Calcium / Calcium	2%
Fer / Iron	6%

2. Pork Loin, Centre Chops, Boneless - **Regular Cost \$13.99/kg (\$5.67 per package (405 g))**

Unit Price	\$13.99	\$15.00	\$16.00	\$17.00	\$18.50	\$19.50	\$21.00	\$22.00
Total Price (package)	\$5.67	\$6.08	\$6.48	\$6.89	\$7.49	\$7.90	\$8.51	\$8.91
I would pay:								



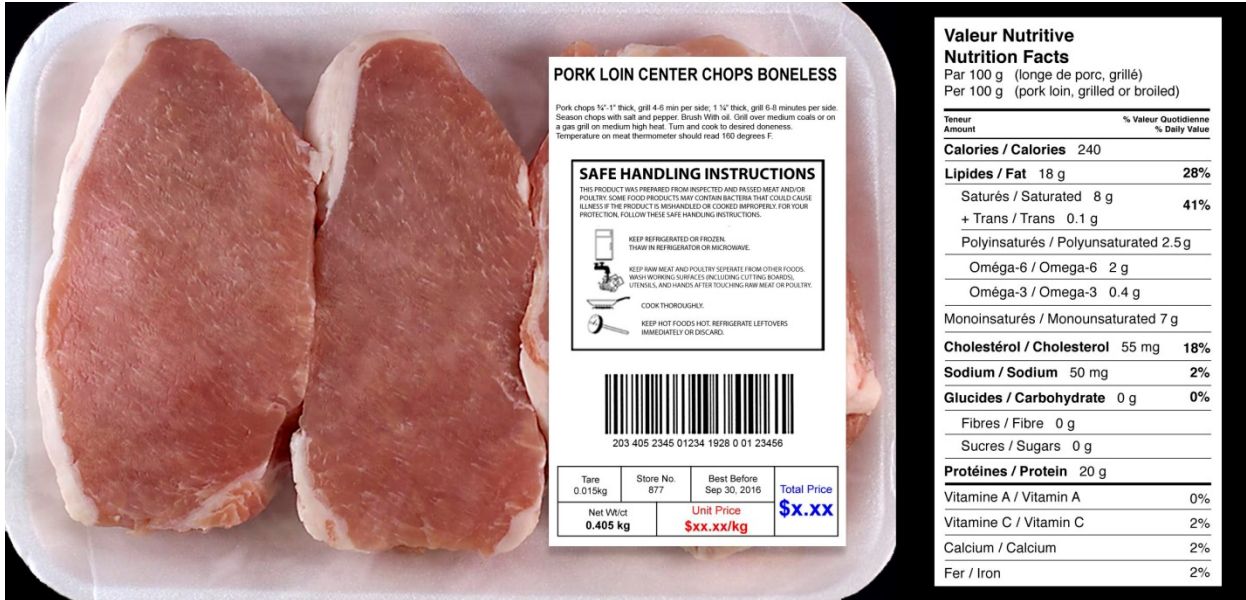
3. Pork Loin, Centre Chops, Boneless - **Regular Cost \$13.99/kg (\$5.67 per package (405 g))**

Unit Price	\$13.99	\$15.00	\$16.00	\$17.00	\$18.50	\$19.50	\$21.00	\$22.00
Total Price (package)	\$5.67	\$6.08	\$6.48	\$6.89	\$7.49	\$7.90	\$8.51	\$8.91
I would pay:								



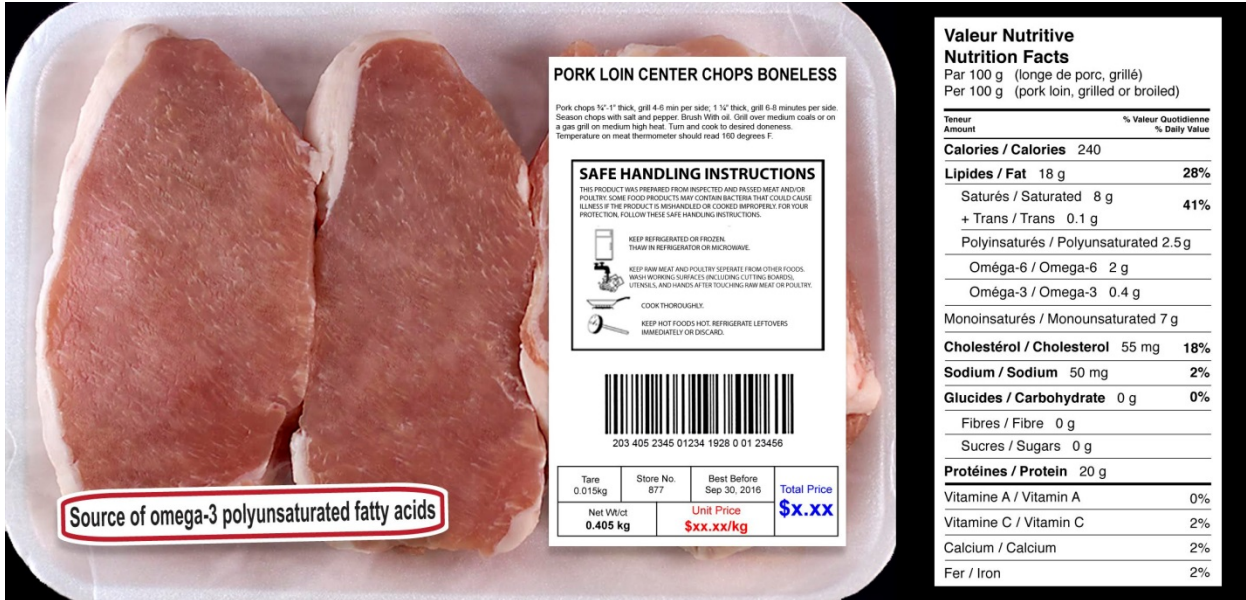
4. Pork Loin, Centre Chops, Boneless - Regular Cost **\$13.99/kg (\$5.67 per package (405 g))**

Unit Price	\$13.99	\$15.00	\$16.00	\$17.00	\$18.50	\$19.50	\$21.00	\$22.00
Total Price (package)	\$5.67	\$6.08	\$6.48	\$6.89	\$7.49	\$7.90	\$8.51	\$8.91
I would pay:								



5. Pork Loin, Centre Chops, Boneless - Regular Cost **\$13.99/kg (\$5.67 per package (405 g))**

Unit Price	\$13.99	\$15.00	\$16.00	\$17.00	\$18.50	\$19.50	\$21.00	\$22.00
Total Price (package)	\$5.67	\$6.08	\$6.48	\$6.89	\$7.49	\$7.90	\$8.51	\$8.91
I would pay:								



6. Pork Loin, Centre Chops, Boneless - **Regular Cost \$13.99/kg (\$5.67 per package (405 g))**

Unit Price	\$13.99	\$15.00	\$16.00	\$17.00	\$18.50	\$19.50	\$21.00	\$22.00
Total Price (package)	\$5.67	\$6.08	\$6.48	\$6.89	\$7.49	\$7.90	\$8.51	\$8.91
I would pay:								



7. Pork Loin, Centre Chops, Boneless - Regular Cost \$13.99/kg (\$5.67 per package (405 g))

Unit Price	\$13.99	\$15.00	\$16.00	\$17.00	\$18.50	\$19.50	\$21.00	\$22.00
Total Price (package)	\$5.67	\$6.08	\$6.48	\$6.89	\$7.49	\$7.90	\$8.51	\$8.91
I would pay:								

ID:

Session:

Date:

Section 1: Grocery Habits

For the following section, please pick one answer per question only.

1. How often are you involved in grocery shopping for your household?	Never	Once in a while	Occasionally	Frequently	Always
	1	2	3	4	5
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. How often do you buy organic foods?	Never	A few times a year	About once a month	About once a week	Every time I buy food
	1	2	3	4	5
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. How often do you eat organic foods?	Never	A few times a year	About once a month	About once a week	Every day
	1	2	3	4	5
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. How often do you buy foods that indicate they are natural (e.g. “naturally flavored, “all natural ingredients”) over a conventional product of the same type?	Never	A few times a year	About once a month	About once a week	Every time I buy food
	1	2	3	4	5
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. How often do you buy foods with a health claim (e.g. “a healthy diet low in saturated and trans fats may reduce the risk of heart disease”) over a conventional product of the same type? (please pick one)	Never	A few times a year	About once a month	About once a week	Every time I buy food
	1	2	3	4	5
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. How often do you buy foods with a nutrient claim (e.g. "an excellent source of protein", "good source of vitamin C") over a conventional product of the same type? (please pick one)	Never	A few times a year	About once a month	About once a week	Every time I buy food
	1	2	3	4	5
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. Which of the following best describes your food preferences?

1. I eat meat from most animals, seafood and fish
2. I eat seafood and fish but don't eat meat
3. I do eat meat but I don't eat fish or seafood
4. I am a vegetarian (I don't eat either meat or fish/seafood)
5. I am a vegan (I eat no animal products including dairy products, eggs, seafood, fish, white meat and red meat)

8. How frequently do you eat pork (from pigs, including bacon, ham or pork)?

1. Never
2. Less than once per month
3. One to three times per month
4. One to two days per week
5. Three to four days per week
6. Five to six days per week
7. Every day

9. When you make the decision to buy (or not to buy, if you don't eat meat) meat, how important are the following factors to you?

	Very important	Somewhat important	Not at all important	I have never thought about this
	1	2	3	4
Product leanness (fat)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The use of antibiotics in livestock production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Country of origin of the product	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nutritional content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The use of hormones in livestock production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Animal welfare conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The way the product was processed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental footprint of livestock production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. Do you believe pork is... (please pick one)

1. Far less healthful than other meats
2. Not healthful compared to other meats
3. About as healthful as other meats
4. Slightly more healthful than other meats
5. Significantly more healthful than other meats

Section 2: Eating Motivation Scale

1. Please indicate your strength of agreement with the following statements. In terms of food, I eat what I eat...

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
<i>Liking</i>					
... because I have an appetite for it					
... because it tastes good					
... because I like it					
<i>Habits</i>					
... because I am accustomed to eating it					
... because I usually eat it					
... because I am familiar with it					
<i>Need & Hunger</i>					
... because I need energy					
... because it is pleasantly filling					
... because I am hungry					
<i>Health</i>					
... to maintain a balanced diet					
... because it is healthy					
... because it keeps me in shape (e.g. energetic, motivated)					
<i>Convenience</i>					
... because it is quick to prepare					
... because it is the most convenient					
... because it is easy to prepare					
<i>Pleasure</i>					
... because I enjoy it					
... in order to indulge myself					
... in order to reward myself					
<i>Traditional Eating</i>					
... because it belongs to certain situations					
... out of traditions (e.g. family traditions, special occasions)					
... because I grew up with it					
<i>Natural Concerns</i>					
... because it is natural (e.g. not genetically modified)					
... because it contains no harmful substances (e.g. pesticides, pollutants, antibiotics)					
... because it is organic					
... because it is fair trade					

1. (continued) In terms of food, I eat what I eat...

	Strongly	Disagree	Neutral	Agree	Strongly
--	----------	----------	---------	-------	----------

	disagree				agree
... because it is environmentally friendly (e.g. production, packaging, transport)					
... because it is minimally processed					
<i>Sociability</i>					
... because it is social					
... so that I can spend time with other people					
... because it makes social gatherings more comfortable					
<i>Price</i>					
... because it is inexpensive					
... because I don't want to spend any more money					
... because it is on sale					
<i>Visual Appeal</i>					
... because the presentation is appealing (e.g. packaging)					
... because it spontaneously appeals to me (e.g. situated at eye level, appealing colours)					
... because I recognize it from advertisements or have seen it on TV					
<i>Weight Control</i>					
... because it is low in calories					
... because I watch my weight					
... because it is low in fat					
<i>Affect Regulation</i>					
... because I am sad					
... because I am frustrated					
... because I am lonely					
<i>Social Norms</i>					
... because it would be impolite not to eat it					
... to avoid disappointing someone who is trying to make me happy					
... because I am supposed to eat it					
<i>Social Image</i>					
... because it is trendy					
... because it makes me look good in front of others					
... because others like it					

Section 3: Naturalness of products

1. Please respond to the following statements:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
<i>Natural product interest</i>					
1. I try to eat foods that do not contain additives.					
2. I do not care about additives in my daily diet.					
3. I do not eat processed foods, because I do not know what they contain.					
4. I would like to eat only organically grown vegetables.					
5. In my opinion, artificially flavoured foods are not harmful for my health.					
6. In my opinion, organically grown foods are no better for my health than those grown conventionally.					
<i>General health interest</i>					
1. The healthiness of food has little impact on my food choices.					
2. I am very particular about the healthiness of food I eat.					
3. I eat what I like and I do not worry much about the healthiness of food.					
4. It is important for me that my diet is low in fat.					
5. I always follow a healthy and balanced diet.					
6. It is important for me that my daily diet contains a lot of vitamins and minerals.					
7. The healthiness of snacks makes no difference to me.					
8. I do not avoid foods, even if they may raise my cholesterol.					
<i>Pleasure</i>					
1. I do not believe that food should always be a source of pleasure.					
2. The appearance of food makes no difference to me.					
3. When I eat, I concentrate on enjoying the taste of food.					
4. It is important for me to eat delicious food on weekdays as well as weekends.					
5. An essential part of my weekend is eating delicious food.					
6. I finish my meal even when I do not like the taste of a food.					

2. Please rate your agreement with the following. Natural foods are...

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	1	2	3	4	5
Something I can buy at the supermarket	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Something I can buy at an organic food store	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Something I can buy at a small, local grocer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Something I can buy at a farmer's market	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Something I could produce myself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Please state if you agree or disagree with the following statements:

	Totally disagree		Neither agree nor disagree			Totally agree	
	1	2	3	4	5	6	7
Natural foods have not been changed in any large way by humans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The more familiar a food is the more natural it is	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The more authentic a food is the more natural it is	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Natural foods are good for me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Natural foods are not necessary for my health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Naturalness in foods is valuable because it is pure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Natural food does not contain added colour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Natural food does not contain artificial flavours	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Natural food does not contain synthetic substances.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I appreciate naturalness in all things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have confidence in organic foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

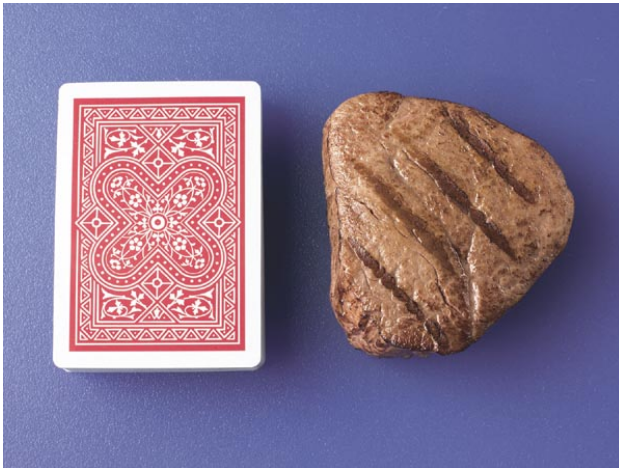
I have confidence in foods that include the word natural in their name or product description

4. The following questions detail how you feel about using food technologies and what you think of them. Please state if you disagree or agree with the following statements on a scale from 1 (totally disagree) to 7 (totally agree). When responding we ask you to think about new food technologies in general rather than one specific technology.

	Totally disagree			Neither agree nor disagree			Totally agree	
	1	2	3	4	5	6	7	
There are a plenty of tasty foods around so we don't need to use food technology to produce more	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The benefits of new technologies are often grossly overstated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
New food technologies decrease the natural quality of food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
There is no sense trying out high-tech food products because the ones I eat are already good enough	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
New foods are not healthier than traditional foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
New food technologies are something I am uncertain about	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Society should not depend heavily on technologies to solve its food problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
New food technologies may have long term negative environmental effects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
It can be risky to switch to new technologies too quickly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
New food technologies are unlikely to have long term negative health effects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
New products produced using new food technologies can help people have a balanced diet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
New food technologies give people more control over their food choice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The media usually provides a balanced and unbiased view of new food technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Section 4: Nutrition

1. Please respond to each of the statements



100 gms of pork approximate size

	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	In a 100 gm portion of pork there is only 2 % of your recommended daily value of sodium.					
2.	In a 100 gm portion of pork , there are 25-29 gms of protein.					
3.	In a 100 gm portion of pork , there is 6% of your recommended daily intake of iron.					

Section 5: Attitudes, Demographics and Trust

1. Please indicate which one of the following statements corresponds most with your view on nature. **Only one answer is possible:**

1	Environmental problems can only be controlled by enforcing radical changes in human behavior in society as a whole.
2	Environmental problems are not entirely out of control, but the government should dictate clear rules about what is and what is not allowed.
3	We do not need to worry about environmental problems because in the end, these problems will always be resolved by technological solutions.
4	We do not know whether environmental problems will magnify or not.

2. Generally speaking, would you say that most people can be trusted?	People can be trusted 1	Can't be too careful in dealing with people 2	Don't know 3
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. How much trust do you have in the following groups or institutions regarding their responsibility for food in Canada?

	No trust 1	Some trust 2	Moderate trust 3	Trust 4	Absolute trust 5
Farmers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Food processors or manufacturers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pharmaceutical industry which provides drugs to treat animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Government agencies/public authorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consumer advocacy organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental advocacy organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Animal welfare advocacy organizations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Retailers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. In which of the following age groups do you fall?

- 1. 18-20
- 2. 21-24
- 3. 25-29
- 4. 30-39
- 5. 40-49
- 6. 50-64
- 7. 65+

5. Please indicate if you are:

- 1. Male
- 2. Female
- 3. Other _____

6. How many people live in your household?

- 1. 1
- 2. 2
- 3. 3 +

7. How many children younger than 18 live in your house?

- 1. No home living children < 18 years
- 2. 1
- 3. 2
- 4. 3
- 5. 4
- 6. More than 4

8. What is the highest level of education you've achieved? (Pick one only)

- 1. Elementary school
- 2. Secondary (high) school
- 3. Technical/ business school/Community college
- 4. University

5. Post graduate studies (Masters or PhD)

9. What is the approximate range of your total household income? (Pick one only)

- 1. \$ 24,999 or under
- 2. Between \$ 25,000 and \$ 39,999
- 3. Between \$ 40,000 and \$ 64,999
- 4. Between \$ 65,000 and \$ 79,999
- 5. Between \$ 80,000 and \$ 99,999
- 6. Between \$ 100,000 and \$ 119,999
- 7. \$ 120,000 or more

THANK YOU FOR YOUR PARTICIPATION

You can proceed to the front desk to obtain your payment

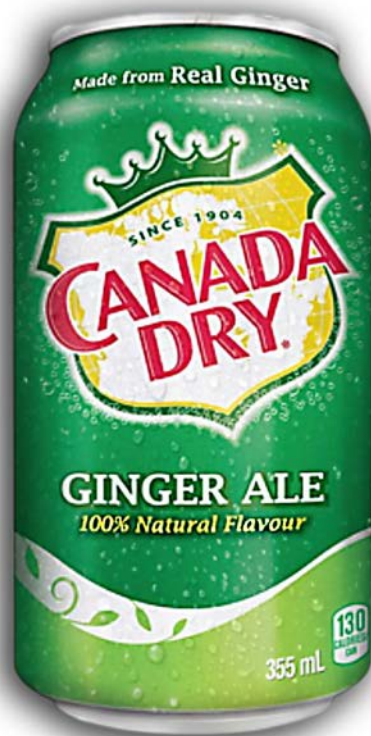
Pictures of Foods Used to Stimulate Discussion of What is Natural or Not?





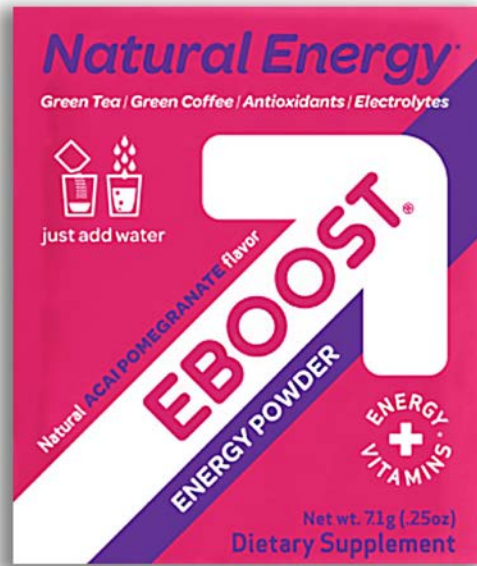














TRADITIONALLY RAISED
PORK PORC

Vegetable grain-fed with vitamins and minerals
 Nourri aux grains végétaux enrichis de vitamines et minéraux

No animal by-products
 Ne contient aucun sous-produit animal

Raised without antibiotics
 Élevé sans l'utilisation d'antibiotiques

ÉLEVAGE TRADITIONNEL

KEEP REFRIGERATED - GARDER AU FROID

PREPARED FOR / PRÉPARÉ POUR:
 METRO BRANDS / LES MARCHÉS METRO, MONTRÉAL (QUÉBEC) INC 116
 QUESTIONS 1 866 695 6554

TR PORK SHOULDER PICNIC ROAST

10:51
 BEST BEFORE 16.FE.18

UNIT PRICE \$6.15/kg
 NET WEIGHT 1.670 kg

TARE 0.008 kg
 KEEP REFRIGERATED

STORE NO# 496
 TOTAL \$10.27

0 219459 010274

SAFE HANDLING INSTRUCTIONS
 THIS PRODUCT WAS PREPARED FROM INSPECTED AND PASSED MEAT AND/OR POULTRY. SOME MEAT PRODUCTS MAY CONTAIN BACTERIA THAT COULD CAUSE ILLNESS IF THE PRODUCT IS MIS-HANDLED OR COOKED IMPROPERLY. FOR YOUR PROTECTION, FOLLOW THESE SAFE HANDLING INSTRUCTIONS:

- KEEP REFRIGERATED OR FROZEN. THAW IN REFRIGERATOR OR MICROWAVE.
- KEEP RAW MEAT AND POULTRY SEPARATE FROM OTHER FOODS.
- WASH WORKING SURFACES (INCLUDING CUTTING BOARDS), KNIVES AND HANDS AFTER TOUCHING RAW MEAT OR POULTRY.
- COOK TO THE RECOMMENDED TEMPERATURE.
- KEEP REFRIGERATED.
- USE BY DATE.

METRO ONTARIO INC., TORONTO, ON, M5S 1A4