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Beijing UHT Milk consumer consumption behaviours and product preferences: A Latent Class Analysis

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Key Points

- The Agribusiness and Economics Research Unit (AERU) at Lincoln University with the support of research partners under the *Unlocking Export Prosperity from the Agri-food Values of Aotearoa New Zealand* research programme has estimated willingness-to-pay (WTP) values for selected credence attributes of UHT milk products by Beijing (China) consumers, with a focus on identifying preferences for attributes considered *distinctively New Zealand.*
- Preferences for many of the credence attributes considered here are not readily observable from market prices and so the non-market valuation method of Choice Experiments was used. This involved an online survey of Beijing residents in December 2019, using a research panel. The survey process achieved 1,001 responses with suitable representation of key population demographics.
- As well as WTP values, this survey reports on:
    - Purchase and consumption frequency
    - Country-of-origin purchase frequency and quality ranking
    - Reasons for buying NZ UHT milk
    - Ideal UHT milk characteristics importance
    - Factors associated with high food safety UHT milk
    - Factors associated with socially responsible UHT milk production
    - Factors associated with high quality UHT milk
    - Factors associated with high nutritional content UHT milk
    - Attitudes towards environment, health, price, and trust
    - Use of digital media and smart technologies for milk shopping
- China was the main source of UHT being purchased by 74 per cent of respondents weekly or more frequently. This was followed by New Zealand at 40 per cent, then Australia at 33 per cent and the Netherlands at 24 per cent.
- New Zealand was ranked second highest of the countries included for quality with 26 per cent of respondents ranking New Zealand as best compared to 30 per cent for Chinese UHT. The qualities associated with New Zealand sourced UHT were high food safety, quality, nutritional value, organic and environmental standards.
- The factors associated with high quality milk were food safety, with 59 per cent stating this was very important. The factors important for food safety included reduced use of agrichemicals with 49 per cent stating this was very important and organic production again 49 per cent stating that was very important. Forty eight per cent thought that high quality of the natural environment was very important, and 48 per cent stating that environmental quality on farm was very important.
- Over half the respondents use mobile apps to purchase UHT, with 18 per cent of expenditure on line domestically and 6 per cent from overseas. The most expenditure is at supermarkets at nearly 30 per cent. Supermarkets are also the main online channel, however 21 per cent stated they often purchased directly from the producer.
- The survey included a choice experiment to assess the Willingness to Pay by consumers for different attributes associated with kiwifruit. The consumers were then segmented, using a latent class model, into 3 classes each with different characteristics and preferences.

- The Choice Experiment identified three groupings of UHT milk consumers, and we describe profiles for these groups using the questions above. The differences between the demographic groups was not large with most having a university degree, have children and most were in the age ranges 30-44 years old.
- Group one (38 per cent of the sample) is willing to pay the highest premiums for contribution to local communities at 33 per cent followed by biodiversity enhancement at 35 per cent, of the average milk price. They also were willing to pay a premium for feedlot raised and grain fed and then water quality enhancement at 16, 15 and 13 per cent respectively. This group had the highest purchase of UHT milk.
- Group two (31 per cent of the sample) were willing to pay the highest premium for carbon neutral milk at 50 per cent, followed by 44 per cent for organic and then 32 per cent for increased calcium. They were also willing to pay a premium of around 15 per cent for grain fed, support for farmers and care for workers. This group has the lowest purchasing frequency of the groups, had a higher percentage of male in the sample, and tended to be older.
- Group three (32 per cent of the sample) were willing to pay the most for biodiversity enhancement at 56 per cent followed by enhanced animal welfare 27 per cent increased calcium at 23 per cent and the same for contributing to local communities. This group tended to be older, had a higher income, liked New Zealand sourced product the most across the sample and the highest purchase frequency of New Zealand UHT.
- The respondents percentage willingness-to-pay (WTP) values for the average price of UHT are presented in the table below.

UHT Milk Attribute	Group One 38% of consumers	Group Two 31% of consumers	Of Group Three 32% of consumers
Enhanced Animal Welfare	0	12	27
Organic	0	44	18
Increased Protein	0	12	11
Increased Calcium	0	32	23
Care for Workers	0	15	10
Contribute to local Communities	33	0	23
Support for Farmers	0	15	0
Carbon Neutral	0	50	0
Biodiversity Enhancement	35	0	56
Water Quality Protection	13	0	0
100% Pasture Raised	0	24	0
Feedlot Raised	16	0	0
100% Grass-fed	12	0	0
Grain-fed	15	16	14

Chapter 1
Introduction

This study is part of a research programme entitled *Unlocking Export Prosperity from the Agri-food Values of Aotearoa New Zealand*. It is funded by the Ministry of Business, Innovation and Employment (MBIE) Endeavour Fund for science research programmes.

The research aims to provide new knowledge on how local enterprises can achieve higher returns by ensuring global consumers understand the distinctive qualities of the physical, credence and cultural attributes of agri-food products that are "Made in New Zealand".

Agricultural exports are an important contributor to the New Zealand (NZ) economy. While NZ historically relied on key markets such as the United Kingdom for export trade, NZ has more recently significantly expanded its export markets and China has become established as an important dairy product destination. It is critically important for NZ exporters to understand export markets and the different cultures and preferences of those consumers to safeguard market access, and for realising potential premiums.

This report describes the application of a survey of Beijing UHT milk consumers that is designed to examine consumption behaviour and consumer Willingness-to-Pay (WTP) for credence attributes. While search attributes such as price or colour can be observed directly, and experience attributes such as flavour can be assessed when consumed, credence attributes such as environmental sustainability cannot be immediately seen or experienced at the point of sale. For products promoting credence attributes, the role of verification including labelling is of significant importance.

Our approach is to apply a Choice Experiment economic valuation method, analysed using a statistical approach called Latent Class Modelling that describes profiles for different consumer segments identified in the data and provides estimates of attribute WTP across these segments.

Chapter 2
UHT Milk Survey Method

To understand how consumers value NZ credence attributes, this study used a structured self-administered online survey that included a Choice Experiment, conducted in Beijing in December 2019. The survey was administered through Qualtrics™, a web-based survey system, and had a sample size of 1,001 UHT milk consumers.

The survey was developed by the research team drawing from a literature review on consumer trends for dairy products, results from previous surveys examining consumer attitudes in overseas markets, a scoping survey of 200 Beijing UHT milk consumers (November 2019) and consultation with industry partners and stakeholders, especially those on the advisory board.

Sampling involved recruiting participants from an online consumer panel database provided by an international market research company (dynata.com). Panel members are recruited by online marketing across a range of channels and panels are profiled to ensure adequate representativeness. Panels are frequently refreshed, with the participation history of members reviewed regularly. Respondents for each survey are compensated with a retail voucher for completing a survey. Potential respondents were recruited by e-mail and were screened out if they purchased UHT milk less than fortnightly.

2.1 Using Choice Experiments to examine consumer preferences

Choice Experiments are a survey-based valuation approach that have been widely used to value consumer preferences for food product attributes. They are particularly useful for examining the role of new attributes, and attributes that that are not easily observable in market prices, such as the attributes explored in the current report. The ability of this method to identify which individual attributes are more important in consumer choices, and to estimate consumers' WTP for these, has seen this approach to valuation become increasingly favoured by researchers.

Designing a Choice Experiment survey involves deciding which product attributes are of interest, combining these into different product offerings, and asking consumers to pick which offering they prefer from a range of alternatives. In this study, alternative UHT milk products are described by production practices, nutritional content and price (Table 2.1). Attribute selection was primarily informed by the scoping survey that used a combination of open text and structured questions to identify which attributes Beijing consumers considered distinctive of NZ milk.

Table 2.1 UHT milk attribute descriptions used in the choice experiment

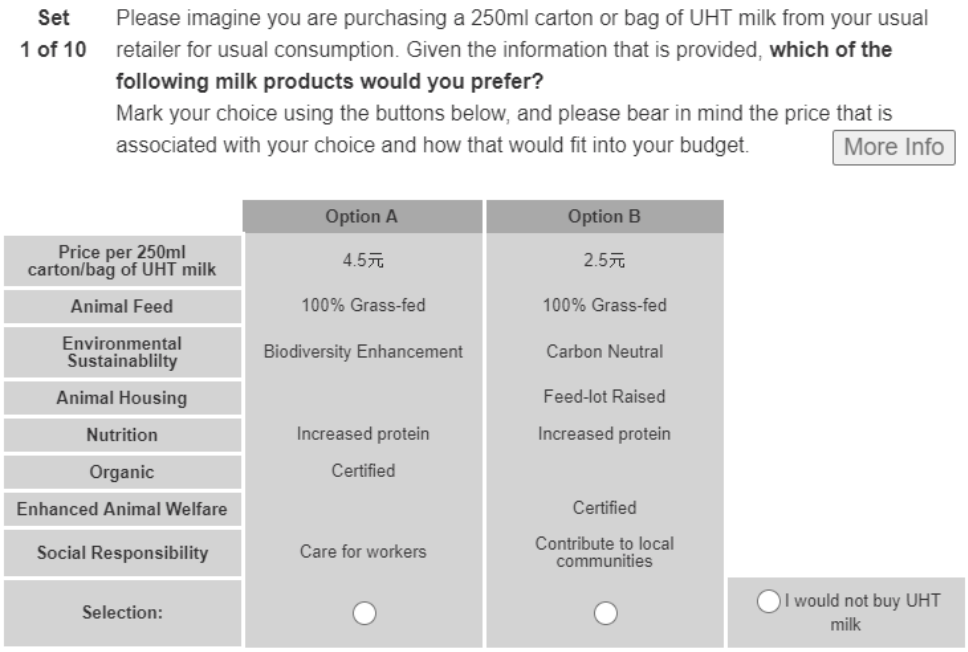
UHT milk attributes	Attribute descriptions
Enhanced Animal Welfare	The milk may be labeled as using a production system that provides animal welfare that is above the minimum regulatory requirements.
Organic Production	The milk may be labeled as being 100% organically produced, which is GE free, with no synthetic fertilisers or pesticides used.
Enhanced Nutrition	The milk may be labeled as containing increased levels of protein or calcium compared to standard milk.
Animal Housing	The milk may be labeled as being from cows raised mainly in pastures, or mainly in feedlots.
Animal Feed	The milk may be labeled as being from cows feed mostly grass, or mostly grain.
Social Responsibility	The milk may be labeled as being produced by dairy farms that are socially responsible who either care for workers, contribute to local communities, or support farmers.
Environmental Sustainability	The milk may be labeled as using a production system that is either Carbon Neutral, Enhances Biodiversity, or Protects Water Quality.
Price	Yuan per one 250ml carton or bag of UHT milk.

Changes in milk attributes are described using the labels in Table 2.2. Price levels were determined by market prices, and from what scoping survey respondents said that they usually paid. Countries of origin were selected based on volumes of sales in China for 2019.

Table 2.2 UHT milk attribute levels used in the choice experiment

UHT milk attributes	Attribute levels			
Enhanced Animal Welfare	No Label	Certified		
Organic Production	No Label	Certified		
Enhanced Nutritional	No change	Increased Protein	Increased Calcium	
Animal Housing	No label	100% Pasture Raised	Feed-lot raised	
Animal Feed	No label	100% Grass-fed	Grain-fed	
Social Responsibility	No label	Care for workers	Contribute to local communities	Support for farmers
Environmental Sustainability	No Label	Carbon Neutral	Biodiversity Enhancement	Water Quality Protection
Price ¥ per 250ml unit UHT milk	¥2.5	¥4.5	¥6.5	

An example of alternative product offerings presented to respondents is shown in Figure 2.1. Each set of offerings comprises three options, of which respondents chose their preferred one. Two options present alternative UHT milk products, while the third is a 'none of these' option. Each respondent answered ten choice sets, generating 10,010 completed choice sets over the total sample.



Set 1 of 10 Please imagine you are purchasing a 250ml carton or bag of UHT milk from your usual retailer for usual consumption. Given the information that is provided, **which of the following milk products would you prefer?**
Mark your choice using the buttons below, and please bear in mind the price that is associated with your choice and how that would fit into your budget. More Info

	Option A	Option B	
Price per 250ml carton/bag of UHT milk	4.5元	2.5元	
Animal Feed	100% Grass-fed	100% Grass-fed	
Environmental Sustainablilty	Biodiversity Enhancement	Carbon Neutral	
Animal Housing		Feed-lot Raised	
Nutrition	Increased protein	Increased protein	
Organic	Certified		
Enhanced Animal Welfare		Certified	
Social Responsibility	Care for workers	Contribute to local communities	
Selection:	○	○	○ I would not buy UHT milk

Figure 2.1 Example of a choice experiment question shown to respondents

Product choices are statistically analysed, and consumers' WTP for each attribute is estimated. A more detailed presentation of theoretical foundation and statistical procedure can be found in Appendix A.

Chapter 3
Survey Results

3.1 Sample demographic description

- The sample comprised a wide range of demographics which is important to ensure that the sampling process has broadly canvased the relevant population (Figure 3.1).
- It is important to note that we are not attempting to represent the overall Beijing population, but rather those that purchase UHT milk at least fortnightly.

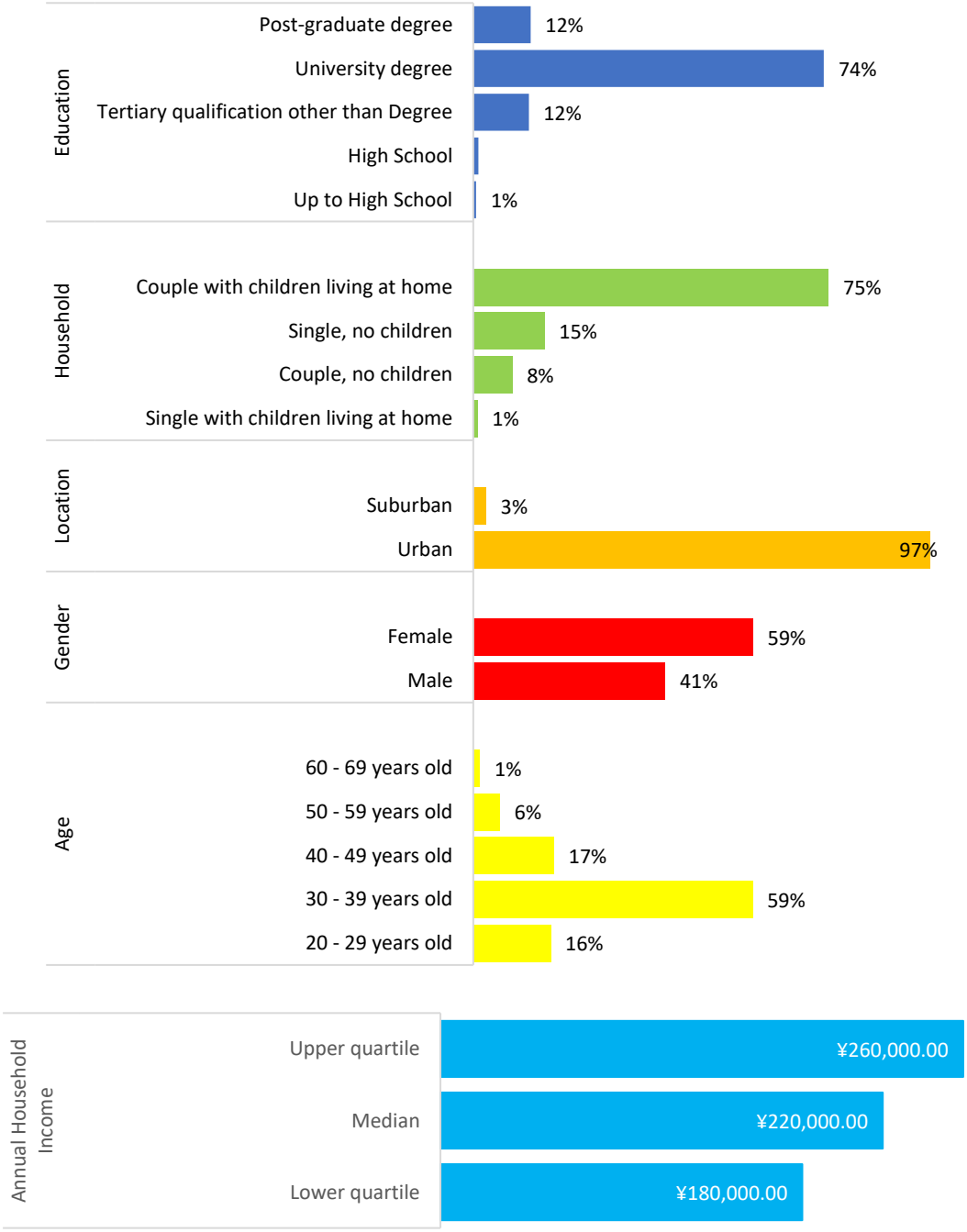


Figure 3.1 Sample demographics

3.2 Purchase and consumption behaviour

- Everyone invited to respond to the survey purchased UHT milk at least fortnightly (Figure 3.2).

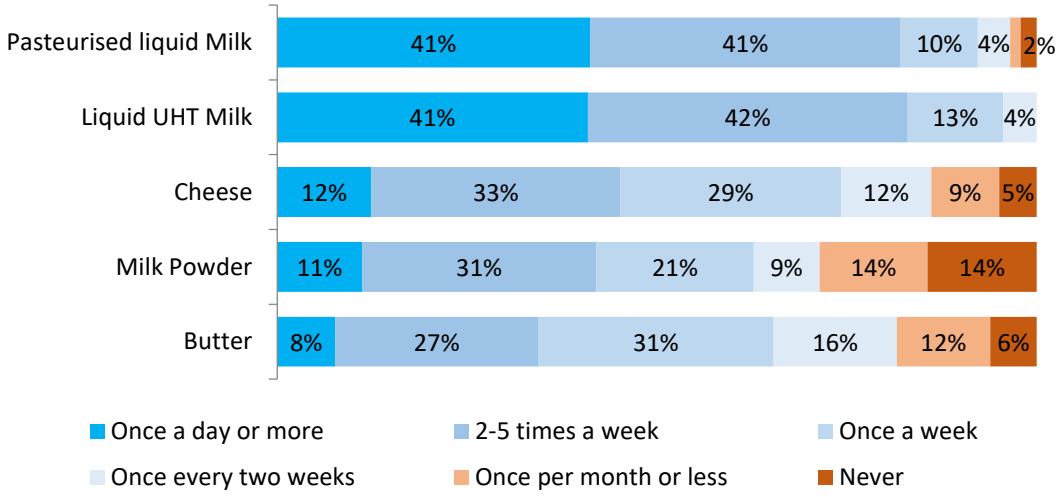


Figure 3.2 Dairy product purchase frequency

- Average weekly consumption of 250ml UHT milk products ranged from 1 to 20, with almost one in five respondents consuming an average of three per week (Figure 3.3).

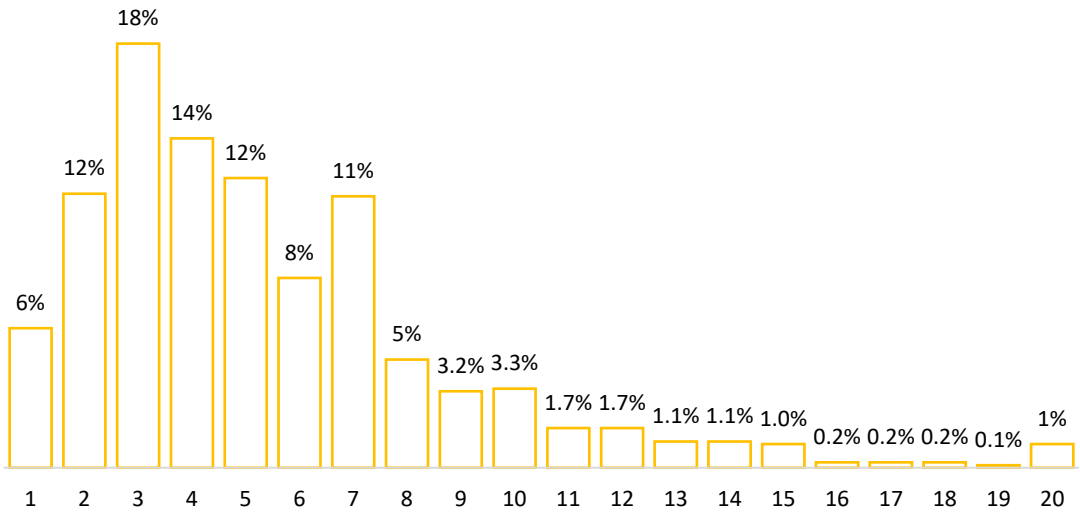


Figure 3.3 Average weekly consumption of 250ml UHT milk products

- Average weekly consumption of 1-litre size UHT milk products is lower than for 250ml products, with just over one in five respondents consuming an average of two per week (Figure 3.4).

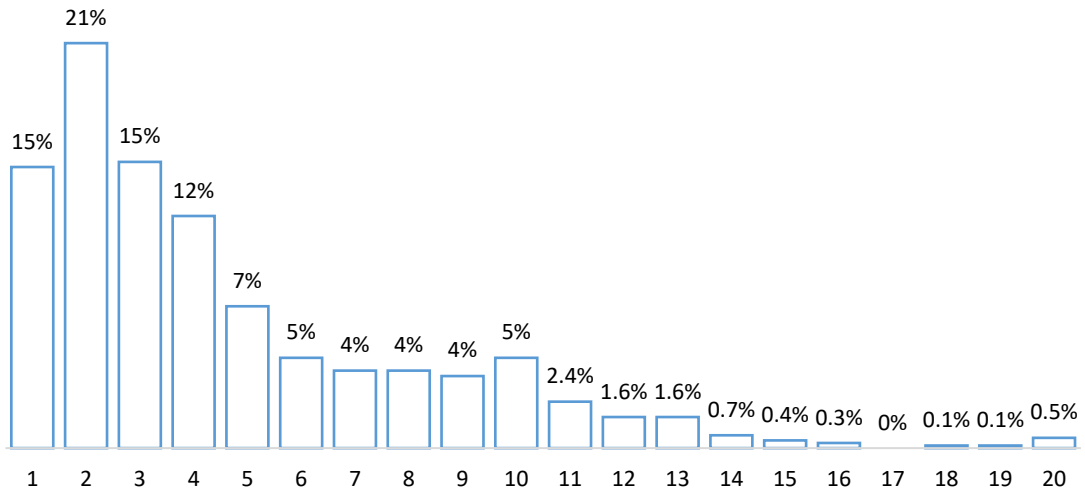


Figure 3.4 Average weekly consumption of 1litre UHT milk products

- NZ has the second highest country-of-origin purchase frequency (Figure 3.5). However, 20 per cent of respondents say they have never purchased NZ UHT milk, and another 20 per cent only once.

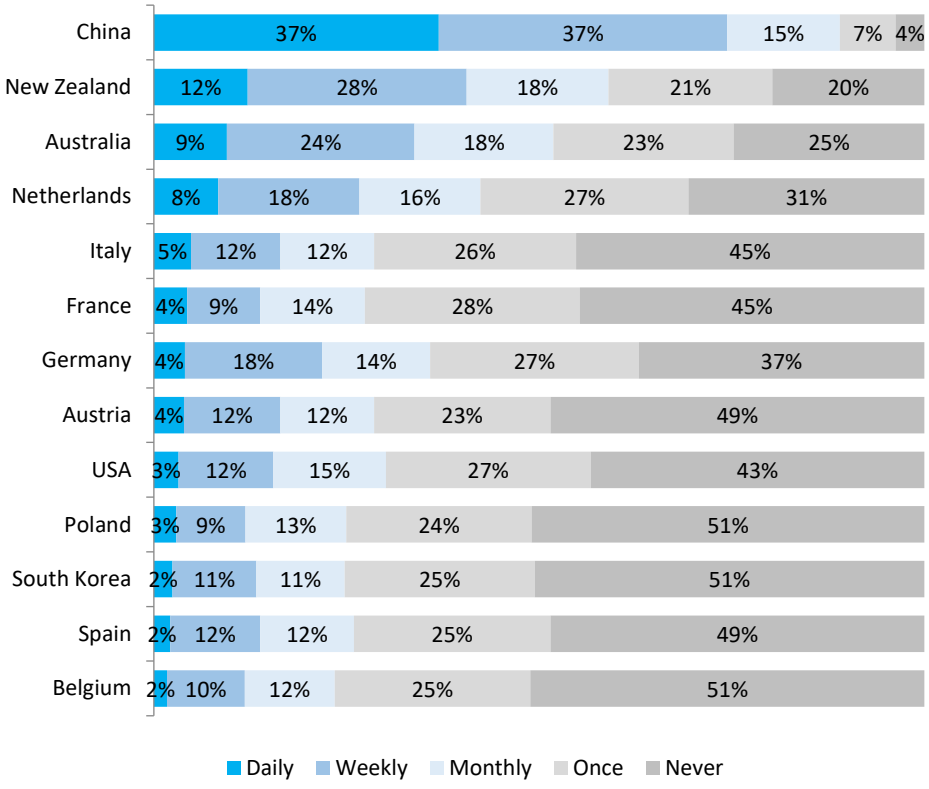


Figure 3.5 Country-of-origin purchase frequency

3.3 Perceptions, preferences and attitudes

- Considering how respondents rank the quality of UHT milk from each country, we see that NZ is ranked in the top three by 56 per cent of respondents (Figure 3.6).

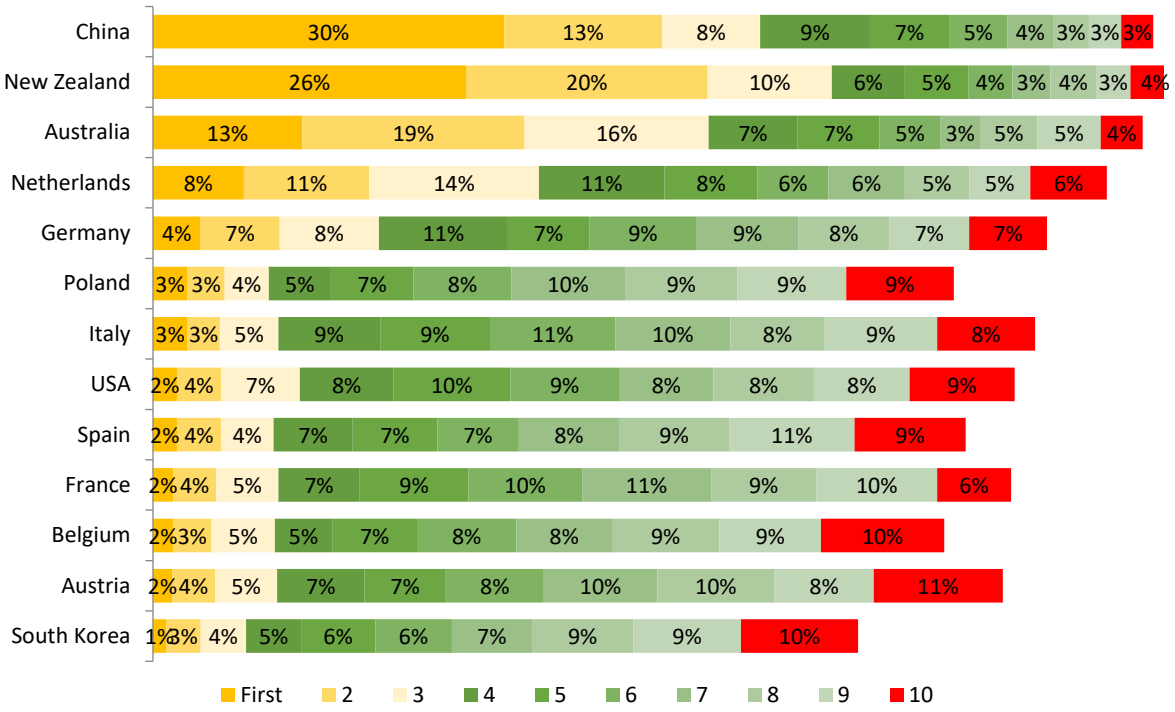


Figure 3.6 Country-of-origin quality ranking

- For those who had purchased NZ UHT milk, high food safety, quality, nutrition and environmental quality are important reasons to purchase NZ UHT milk (Figure 3.7).

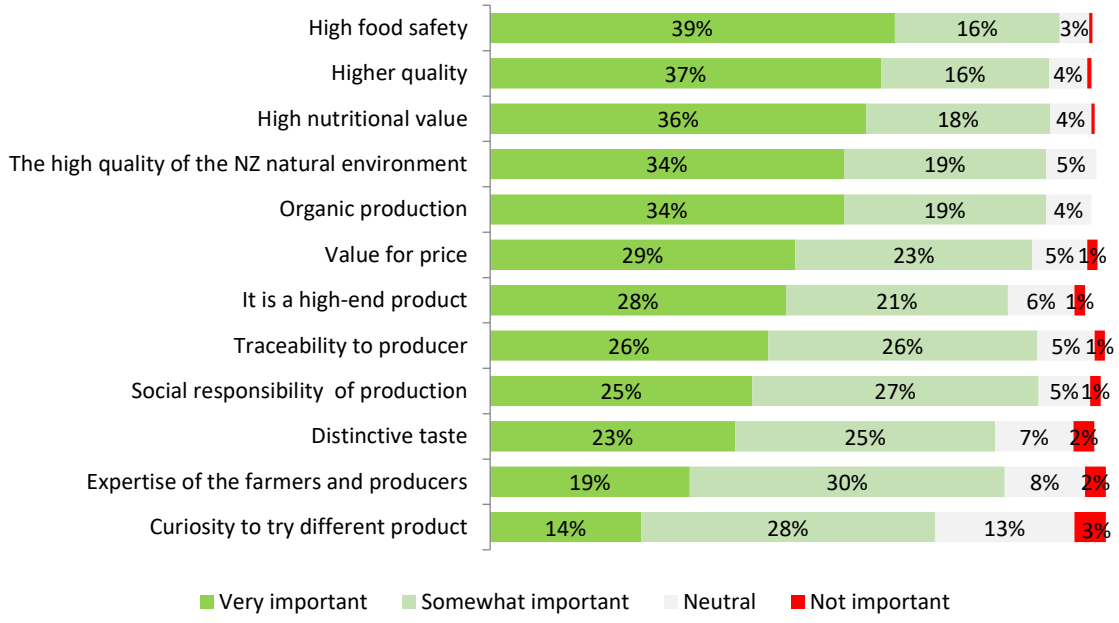


Figure 3.7 Reasons for purchasing New Zealand produced UHT milk

- Most respondents styled their ideal UHT milk product using descriptors representing a pure and unadulterated product that is nutritious and produced responsibly (Figure 3.8).

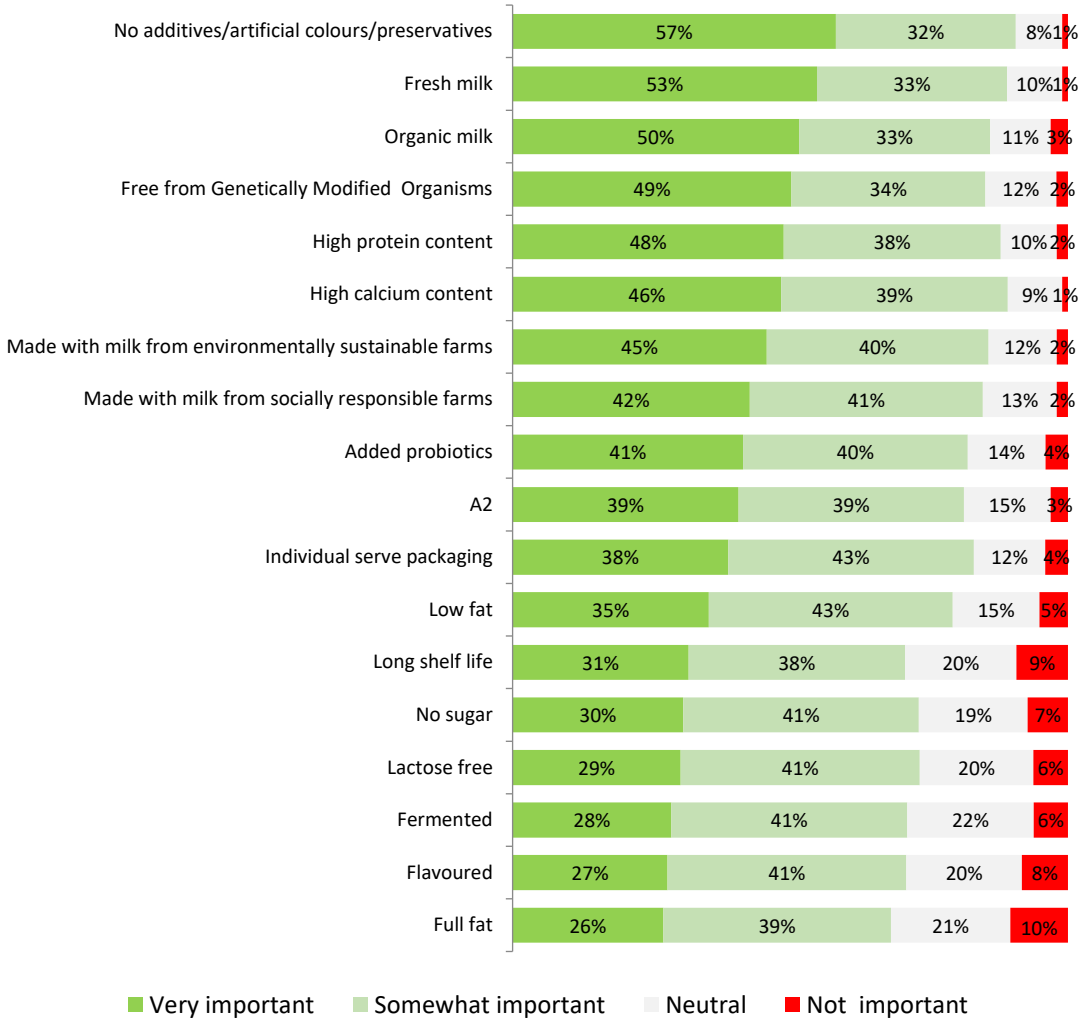


Figure 3.8 Characteristics of the ideal UHT milk product

- Freshness, certification, reduced agrichemicals and on-farm environmental quality represent some of the most important factors for high food safety (Figure 3.9).

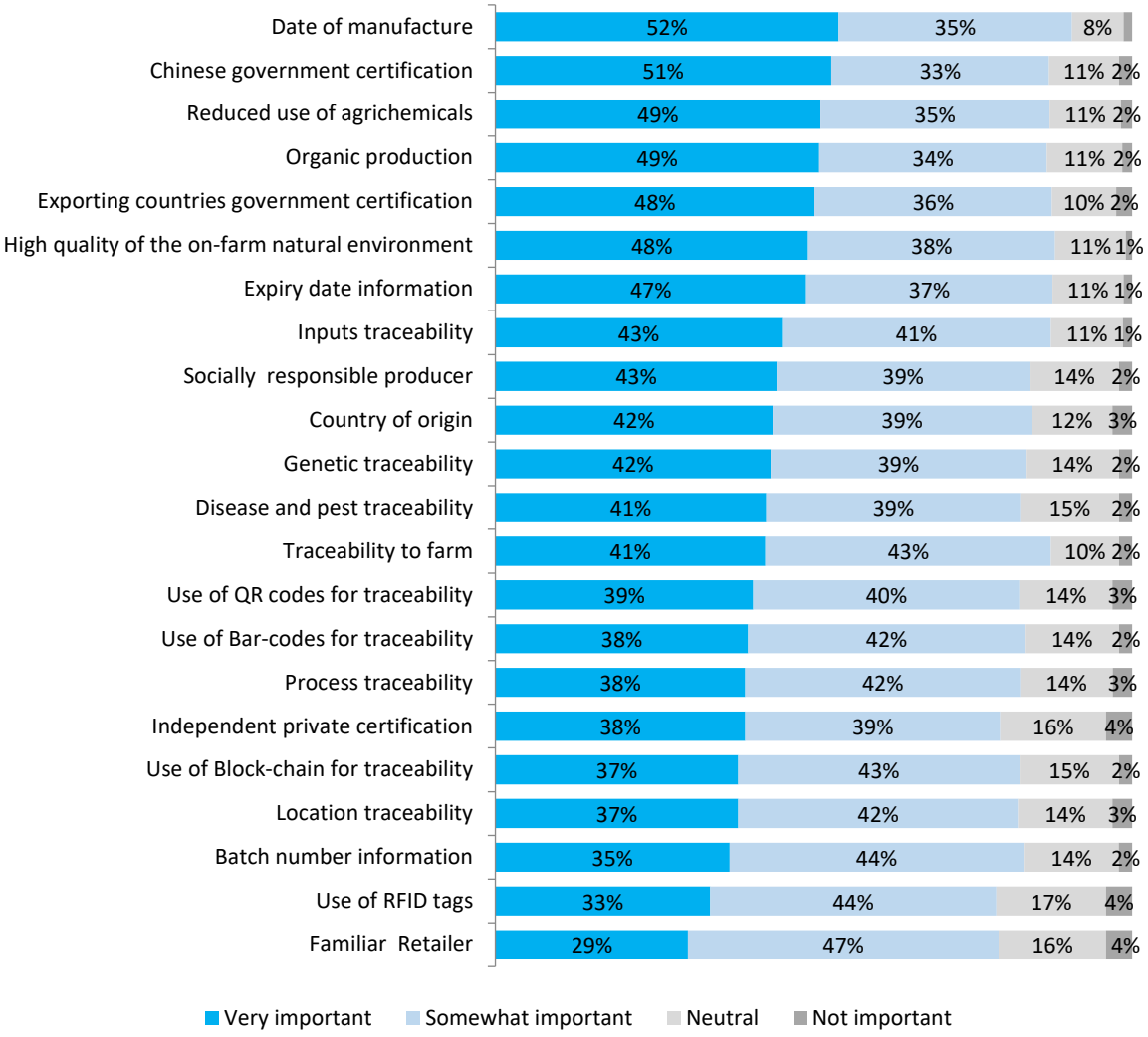


Figure 3.9 Important factors for high food safety of UHT milk

- Food safety, environmental protection and working conditions are considered some of the most important factors for socially responsible production (Figure 3.10).

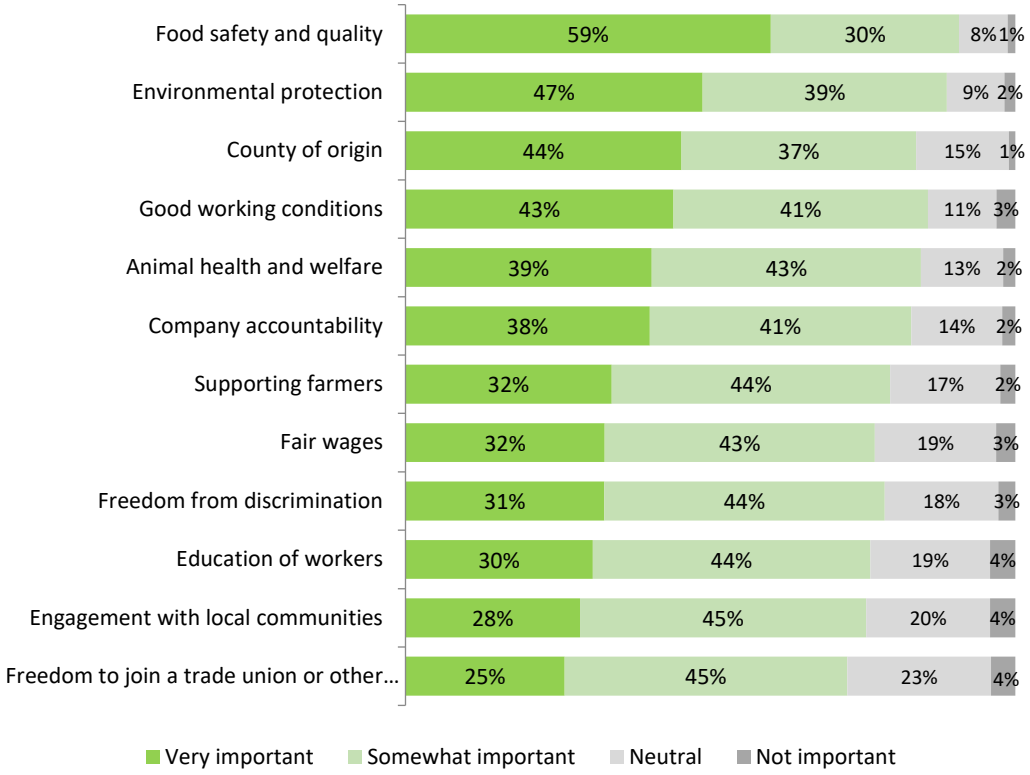


Figure 3.10 Important factors for socially responsible production of UHT milk

- Food safety and on-farm environmental quality are considered some of the most important factors for higher quality UHT milk (Figure 3.11).

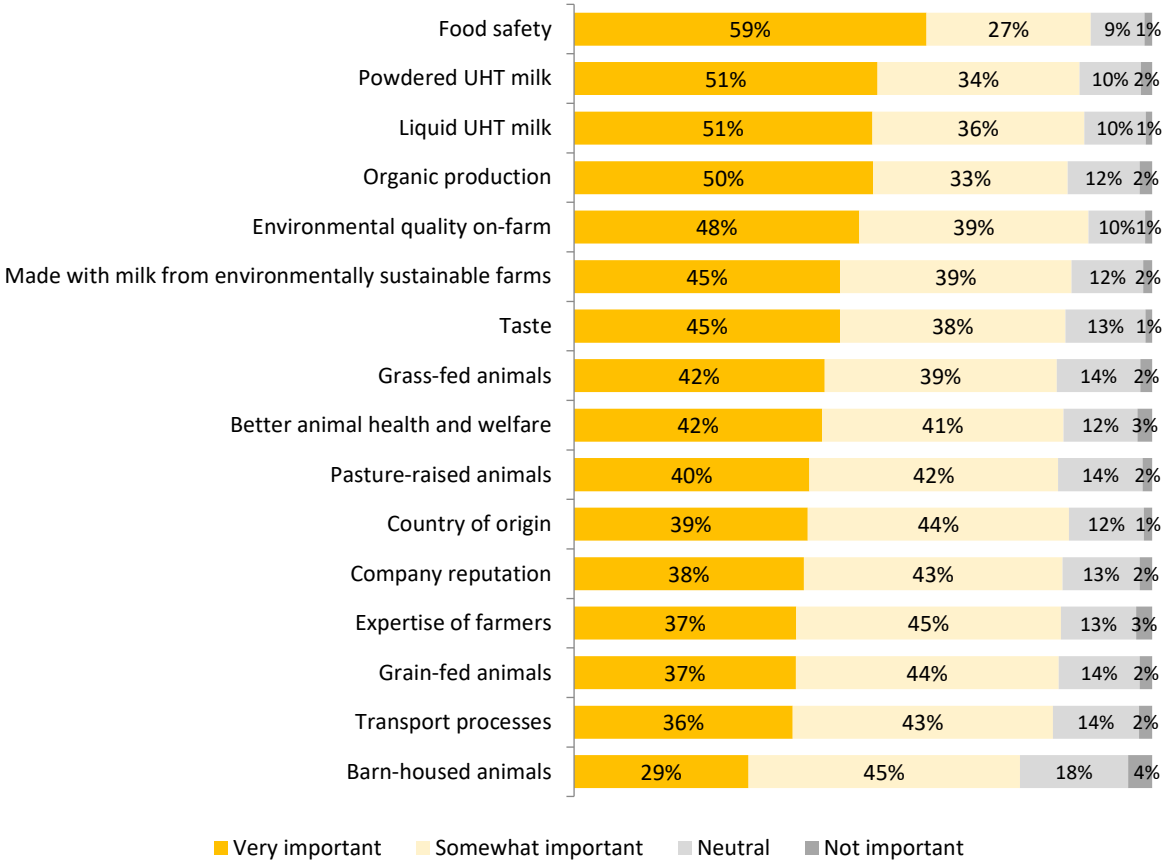


Figure 3.11 Important factors for higher quality of UHT milk

- Freshness, safety, and unmodified qualities are considered some of the most important factors associated with higher nutritional value of UHT milk (Figure 3.12).

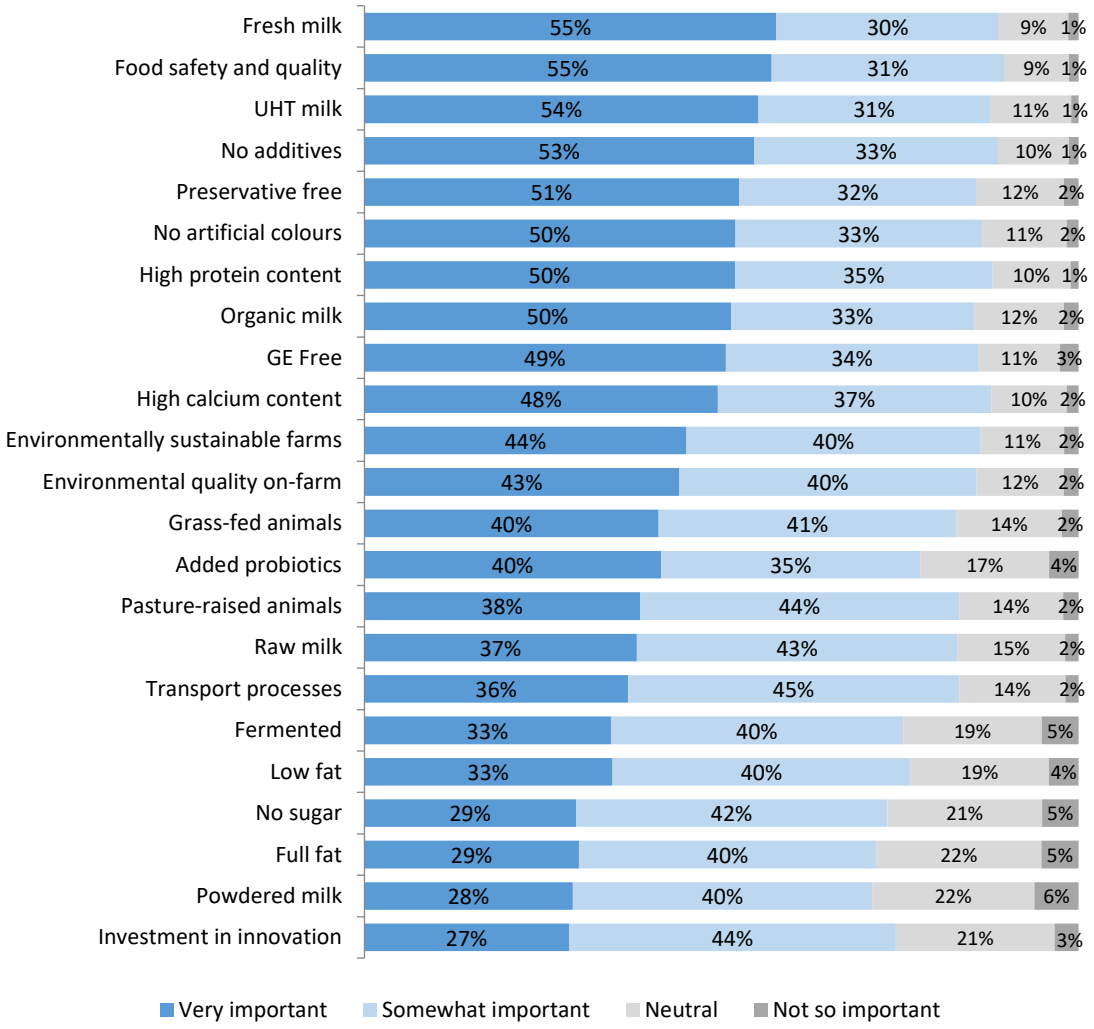


Figure 3.12 Important factors for higher nutritional value of UHT milk

- Respondents express some concerns regarding the effects of agrichemicals and additives on the environment and health, and an interest in more labels providing information addressing these issues (Figure 3.13).
- There is a relatively moderate association with higher prices and improved product characteristics such as quality, safety, and nutrition.
- There is a greater level of trust in Chinese brands compared with foreign brands.

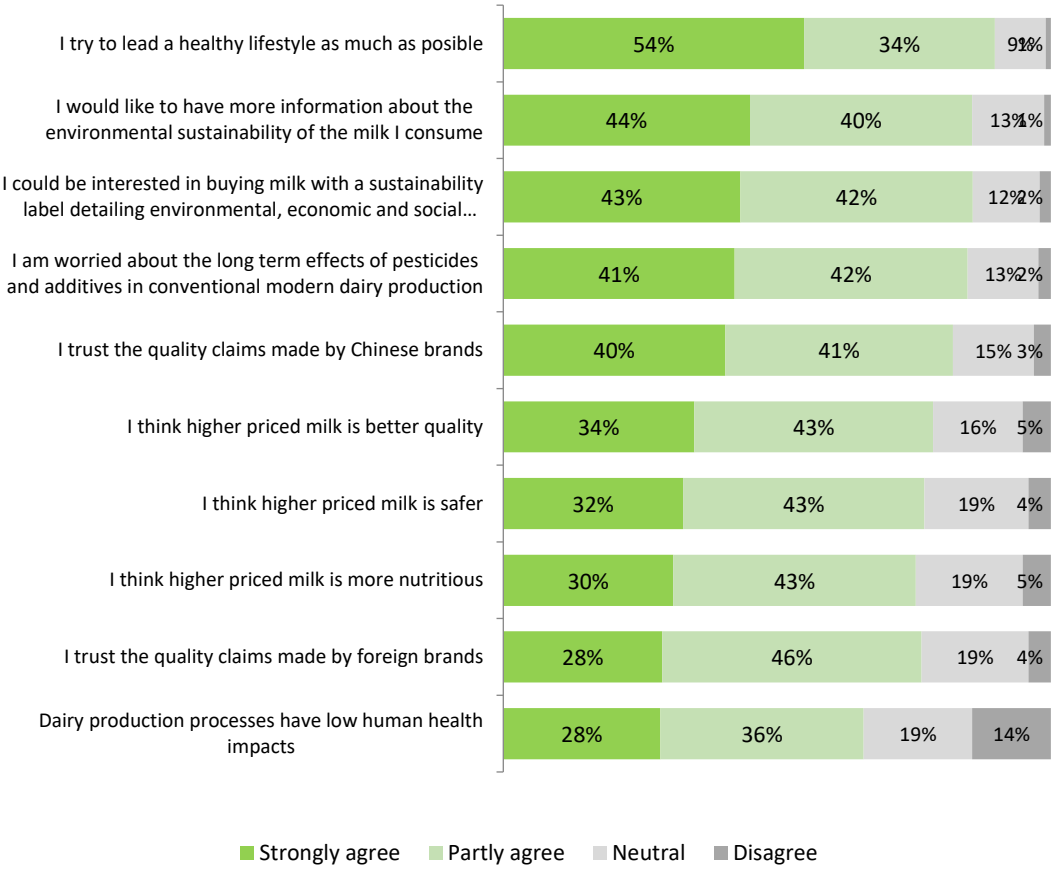


Figure 3.13 Attitudes towards environment, health, price and trust

3.4 Use of digital media and smart technology for milk shopping

- Over 80 per cent of respondents access the internet daily, with most using a mobile device (Figure 3.14).

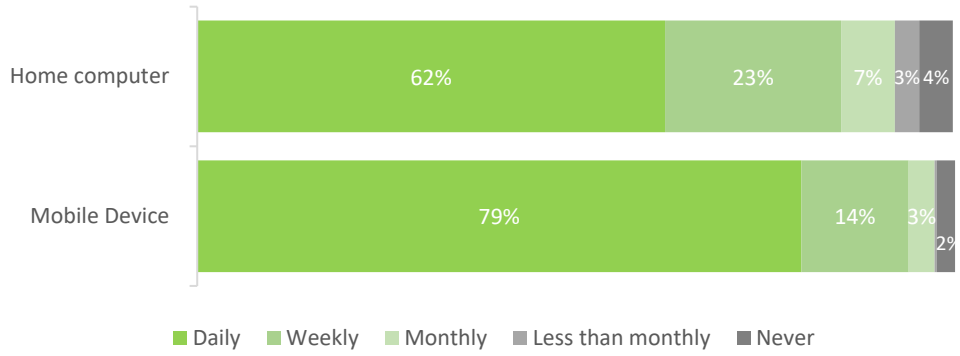


Figure 3.14 Frequency of internet access

- The types of digital media used for searching for milk product information are generally different from those used to make milk purchases (Figure 3.15).

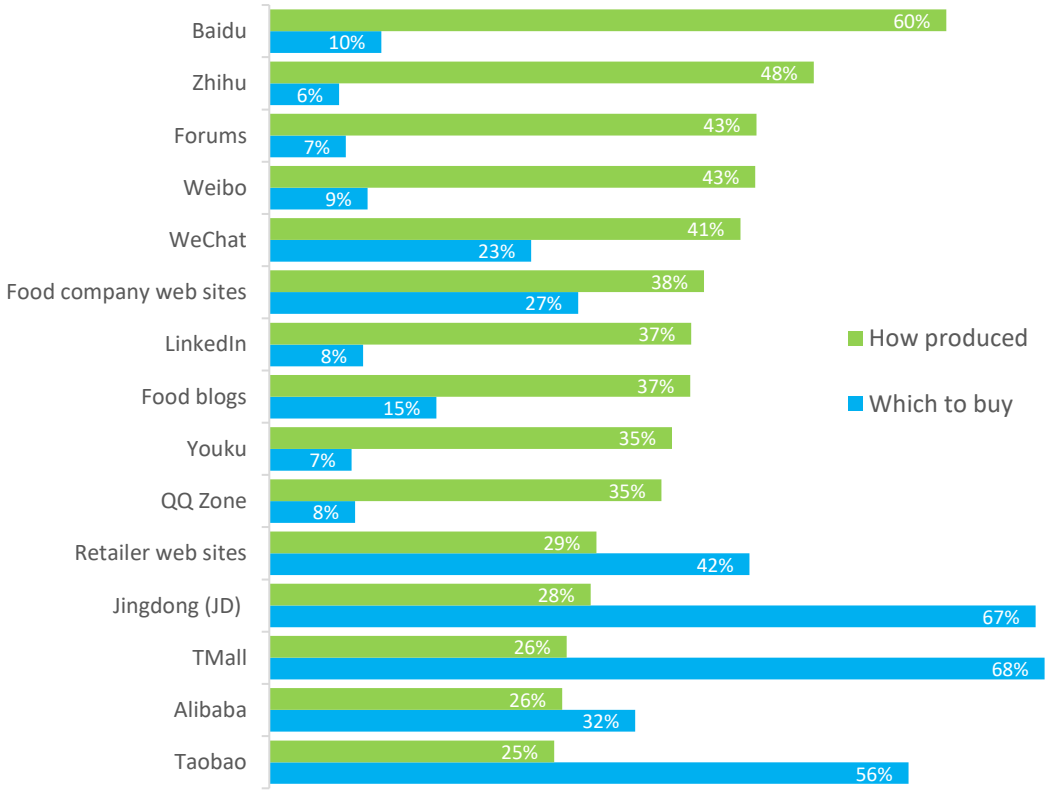


Figure 3.15 Use of digital media for information searching and purchase

- Almost two thirds of respondents use QR codes for milk purchasing, 84 per cent use them for milk information searching (Figure 3.16).

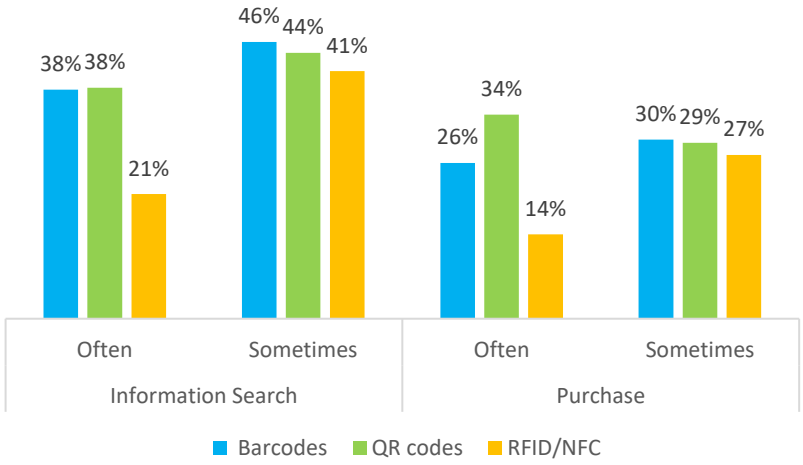


Figure 3.16 Use of smart technologies for information searching and purchase

- Over half of respondents use specific applications to make milk purchases, and while one third use apps for traceability - another 50 per cent are interested in this use (Figure 3.17).

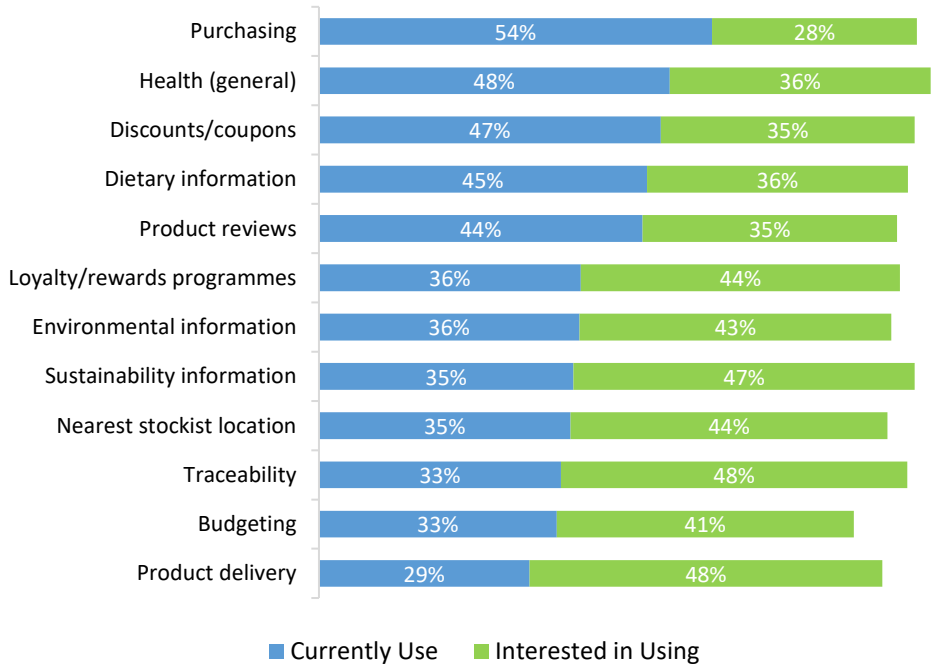


Figure 3.17 Current and potential uses of mobile applications

- On average, 29 per cent of milk expenditure occurs at supermarkets, while a quarter of expenditure is done online (Figure 3.18).

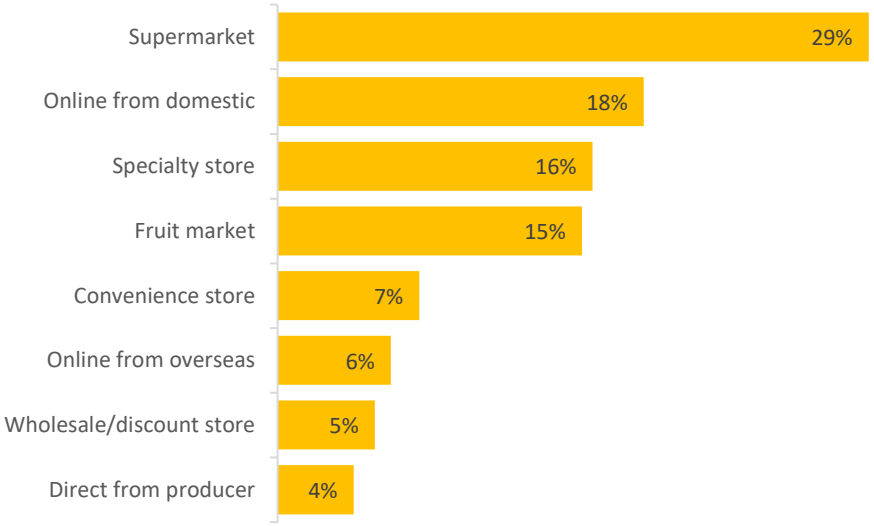


Figure 3.18 Percentage of milk expenditure by retail channel

- 27 per cent of respondents spent up to 10 per cent of their milk expenditure online, while over 40 per cent of respondents spent over 30 per cent of their milk expenditure online (Figure 3.19).

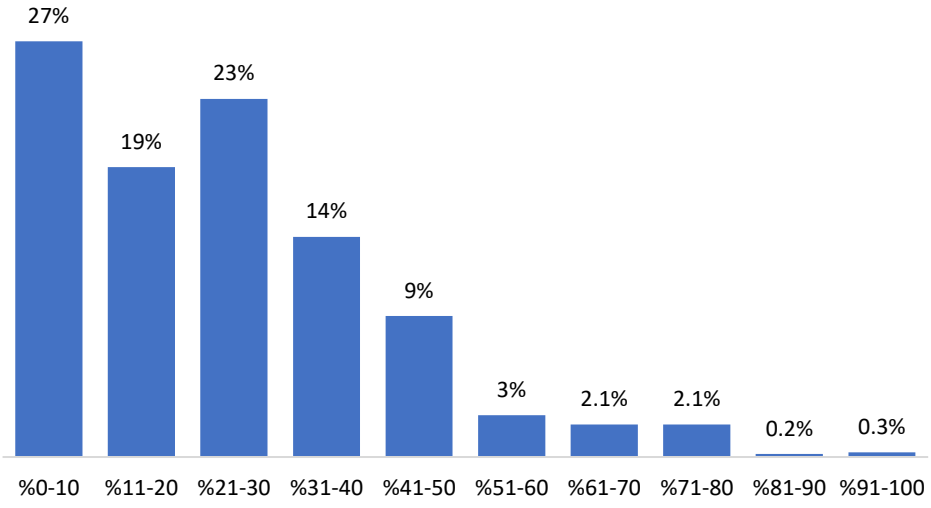


Figure 3.19 Percent of online milk expenditure

- Greater variety is the main reason given for shopping online for milk (Figure 3.20).

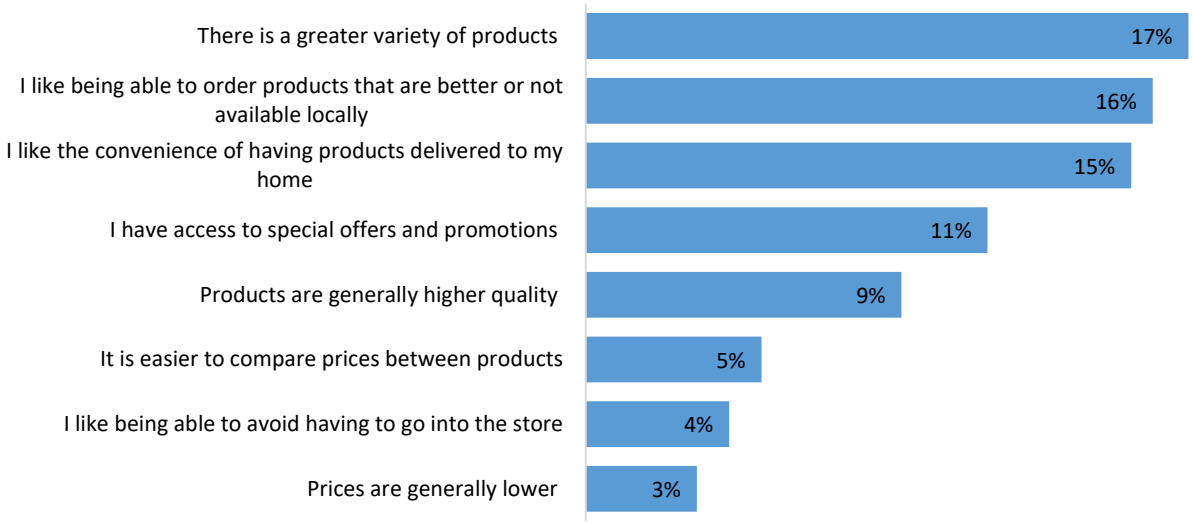


Figure 3.20 Main reason for shopping online for milk

- Supermarkets are the main online channel used for milk purchasing, while one in five respondents often buy milk direct from a producer (Figure 3.21).

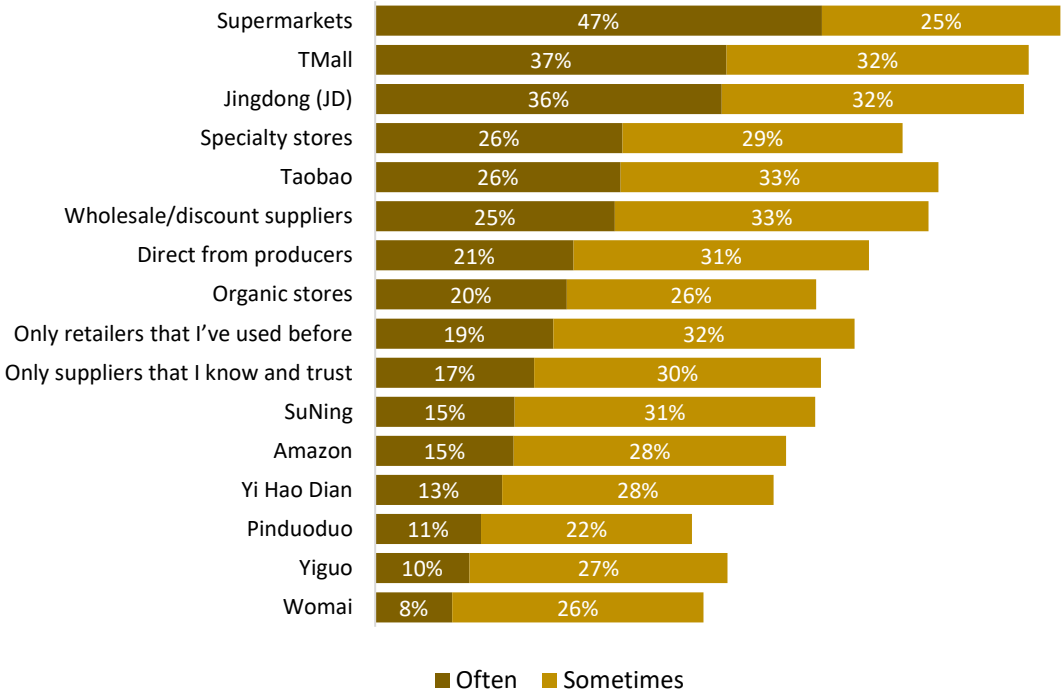


Figure 3.21 Use of online retail channels

3.5 Choice Experiment analysis of UHT milk choices

In this section we present findings of the Choice Experiment. Our aim is to identify which UHT milk attributes drive product choices, by how much, and by who. We do this by segmenting the sample of consumers into groups based on which product offerings they preferred (Appendix B). Choice Experiments can be somewhat more difficult to answer compared with the usual question formats that people have typically seen before, so it is important to check whether respondents have been able to complete the exercise reliably. Overall, task and attribute understanding was high, and most respondents felt certain that their responses reflected real-world choices if these UHT milk products were available (Figure 3.22).

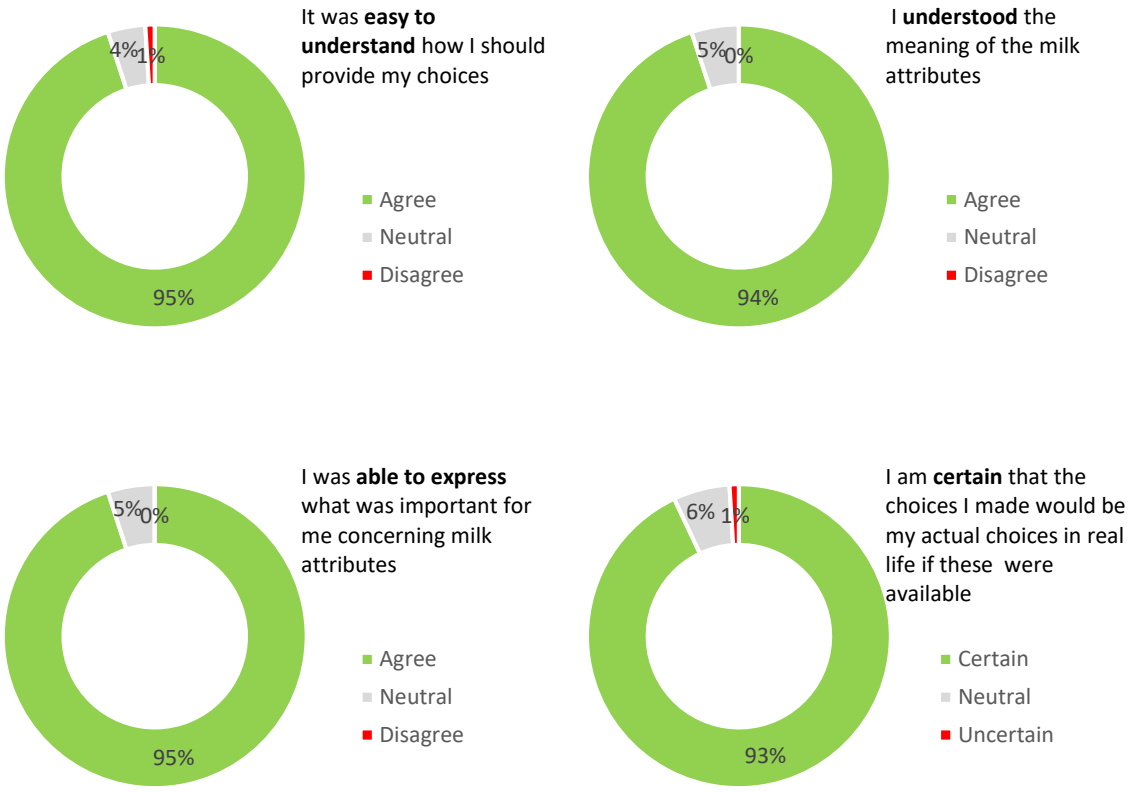


Figure 3.22 Choice experiment debriefing questions: task understanding, attribute understanding, ability to express preferences, certainty of choices made

Estimates of WTP tell us how much more the average consumer is willing to pay for a 250ml UHT milk product with a particular attribute, over one that does not have this attribute Table 3.1, Figure 3.23. For example, members of Group Two are willing to pay, on average, ¥0.53 more for milk that is produced with enhanced animal welfare standards over one that is not. There is some uncertainty in WTP estimates, and the Confidence Intervals reported in Table 3.1 indicate that we can be 95 per cent sure that the true WTP falls within this interval.

Table 3.1 reported under each group's column heading. We can see that three distinct consumer groups have been identified, the first group has an estimated size of 38 per cent, the second group's size is 31

per cent and the third is 32 per cent. These group sizes tell us the probability that a randomly selected Beijing UHT milk purchaser belongs to that consumer group.

Group one is willing to pay the highest premiums for contribution to local communities at 33 per cent followed by biodiversity enhancement at 35 per cent, of the average milk price. They also were willing to pay a premium for feedlot raised and grain fed and then water quality enhancement at 16, 15 and 13 per cent respectively.

Group two were willing to pay the highest premium for carbon neutral milk at 50 per cent, followed by 44 per cent for organic and then 32 per cent for increased calcium. They were also willing to pay a premium of around 15 per cent for grain fed, support for farmers and care for workers.

Group three were willing to pay the most for biodiversity enhancement at 56 per cent followed by enhanced animal welfare 27 per cent increased calcium at 23 per cent and the same for contributing to local communities.

Table 3.1 UHT milk attribute willingness-to-pay by consumer group

UHT Milk Attribute	Group One 38%	Group Two 31%	Group Three 32%
Enhanced Animal Welfare		¥0.53 (0.38, 0.69)	¥1.20 (0.97, 1.44)
Organic		¥1.99 (1.77, 2.21)	¥0.79 (0.59, 1.00)
Increased Protein		¥0.56 (0.01, 1.12)	¥0.50 (-0.02, 1.03)
Increased Calcium		¥1.42 (1.03, 1.81)	¥1.05 (0.68, 1.41)
Care for Workers		¥0.67 (0.20, 1.13)	¥0.47 (-0.01, 0.94)
Contribute to local Communities	¥1.48 (1.03,1.94)		¥1.04 (0.56, 1.52)
Support for Farmers		¥0.66 (0.16, 1.16)	
Carbon Neutral		¥2.27 (1.72, 2.83)	
Biodiversity Enhancement	¥1.57 (1.26, 1.87)		¥2.53 (2.05, 3.01)
Water Quality Protection	¥0.57 (0.15, 0.99)		
100% Pasture Raised		¥1.10 (0.47, 1.72)	
Feedlot Raised	¥0.71 (0.39, 1.03)		
100% Grass-fed	¥0.56 (0.05, 1.07)		
Grain-fed	¥0.69 (0.41, 0.98)	¥0.73 (0.39, 1.10)	¥0.63(0.25, 1.01)

Average WTP per single 250ml product 2019 (95 per cent Confidence Interval)

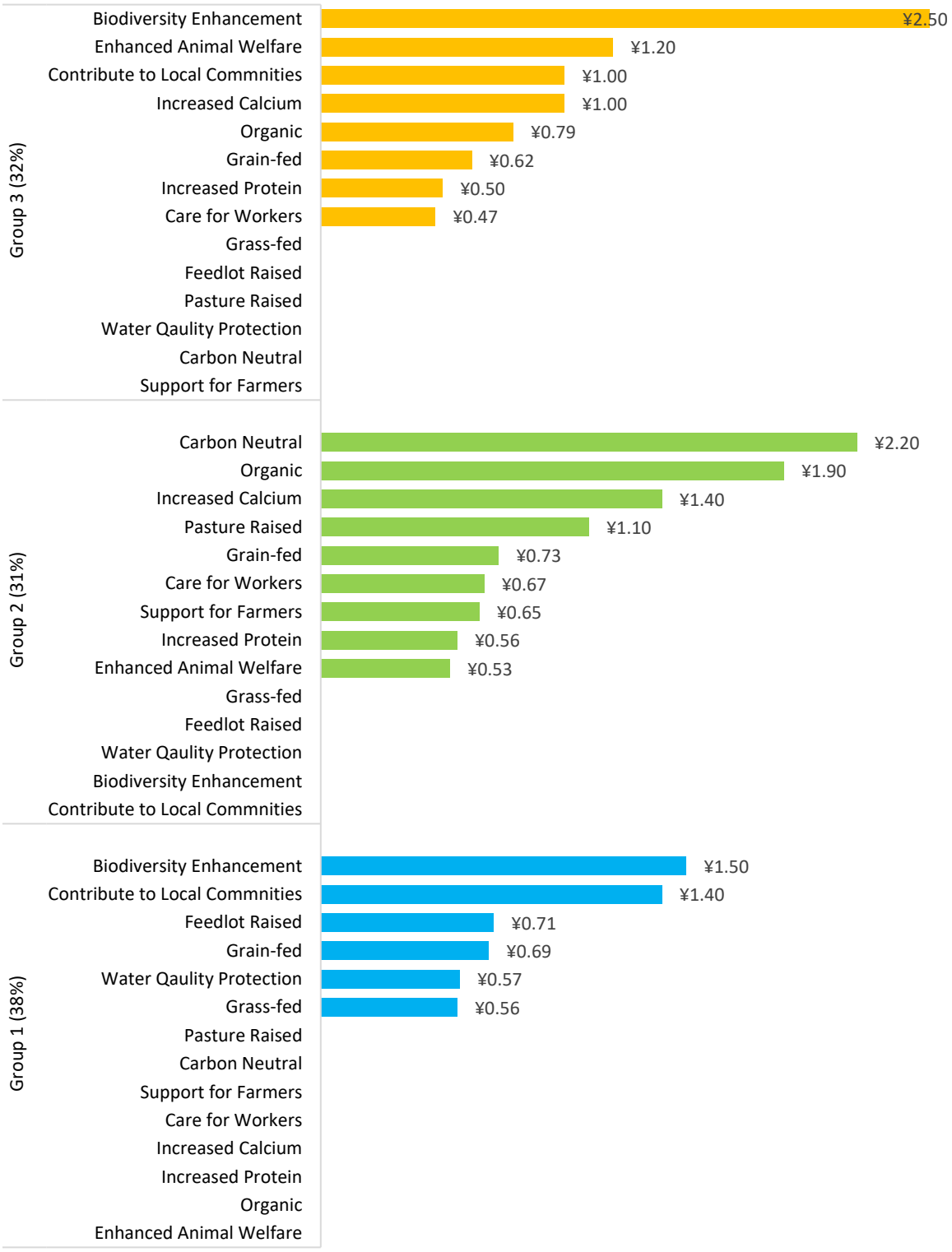


Figure 3.23 UHT milk attribute willingness-to-pay by consumer group

- Consumers in Group One are the only ones willing to pay for water quality protection.
- While grass-fed is valued, these consumers are willing to pay more for grain fed.

- Consumer Group Two is the only group willing to pay for Carbon Neutral production.
- These consumers are also the only ones who value pasture raised claims.

- Consumers in Group Three value biodiversity outcomes and animal welfare more than other groups consumers.
- They consider care for worker and contributions to local communities to be valuable socially responsible attributes of production.
- These consumers value both increased calcium and protein levels.

3.6 Consumer group descriptions

This section describes each of the three consumer groups identified in the statistical analysis, using the same questions we presented above. The objective is to highlight the differences and similarities between groups, which can be useful in identifying the types of consumers who are willing-to-pay for attributes relevant to an organisation's objectives. For example, an organisation interested in developing into the Carbon Neutral space will be able to use the information below to described the members of consumer Group Two, who are the group willing-to-pay for this attribute. As we go through the comparisons, the small bar charts on the right hand side will highlight the group with the largest values with a green bar.

- Consumer Group Three are more likely to be female and from a higher income household. While Group Two are more likely to be male, and members of Group Three have a slightly higher level of education (Table 3.2).

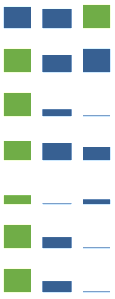
Table 3.2 Describing consumer groups: Demographics

Demographics	Group One	Group Two	Group Three	
Female	57%	47%	63%	
< 30 years old	28%	24%	27%	
30-44 years old	62%	64%	64%	
Suburban	2%	3%	3%	
Have children	79%	75%	74%	
University degree	86%	85%	89%	
Median income	¥220,000	¥220,000	¥240,000	
Income of lower quartile	¥180,000	¥180,000	¥200,000	

- Group Two has a lower purchase frequency over all dairy products, while Group One has the highest UHT purchase frequency of the three groups (Table 3.3).

Table 3.3 Describing consumer groups: Purchase frequency

Purchase **daily**	Group One	Group Two	Group Three
Pasteurised liquid Milk	41%	39%	44%
Liquid UHT Milk	45%	35%	43%
Milk Powder	15%	10%	8%
Cheese	13%	12%	11%
Butter	9%	5%	8%
No. 250ml units **weekly**	6	5	4
No. 1 litre units **weekly**	5	4	3



- Group Three consumers are more likely to have the highest NZ milk purchase frequency, and to rank NZ milk as better than milk from other countries (Table 3.4).

Table 3.4 Describing consumer groups: New Zealand purchasing

	Group One	Group Two	Group Three
Buy NZ milk at least weekly	38%	38%	46%
NZ produces the best milk	23%	26%	31%
Rank NZ in top three best milk producers	53%	55%	63%
Important reasons for purchasing NZ milk			
Distinctive taste	44%	47%	54%
Higher quality	47%	52%	61%
Value for price	45%	51%	59%
Curiosity to try different product	38%	40%	49%
It is a high-end product	44%	48%	57%
High nutritional value	48%	50%	62%
Social responsibility of production	46%	51%	60%
High food safety	49%	53%	60%
Traceability to producer	46%	50%	60%
Organic production	49%	51%	59%
Expertise of farmers and producers	45%	47%	55%
High quality of natural environment	50%	51%	58%

- While the importance of ideal characteristics is similar across groups, Group Three consumers are more likely to consider health enhancing characteristics in their ideal UHT milk product than other groups consumers (Table 3.5). This group is also more likely to consider absence of preservatives, organic and social responsibility as ideal characteristics.

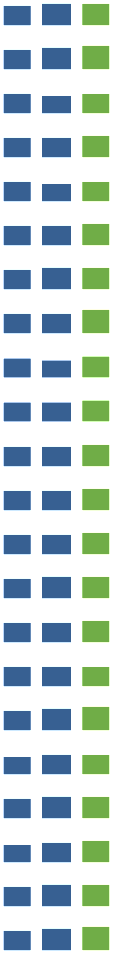
Table 3.5 Describing consumer groups: Ideal UHT milk product

Important Attributes	Group One	Group Two	Group Three
High calcium content	82%	84%	90%
High protein content	86%	82%	90%
No sugar	72%	67%	73%
Long shelf life	71%	67%	68%
Free from GMOs	79%	85%	85%
Individual serve packaging	79%	79%	84%
No additives/preservatives	86%	88%	93%
Fermented	71%	65%	71%
Low fat	77%	74%	81%
Flavoured	70%	64%	71%
Full fat	66%	63%	66%
A2	79%	76%	81%
Fresh milk	84%	82%	91%
Added probiotics	80%	79%	83%
Organic milk	81%	82%	87%
Environmentally sustainable	82%	84%	88%
Socially responsible farms	80%	83%	87%
Lactose free	72%	66%	73%

- Overall, consumers in each group consider certification by government as more important than by independent private providers (Table 3.6).

Table 3.6 Describing consumer groups: Factors of high food safety

Important Factors	Group One	Group Two	Group Three
Chinese government certification	78%	84%	89%
Exporting government certification	80%	83%	91%
Independent private certification	78%	71%	81%
Country of origin	79%	79%	85%
Familiar Retailer	77%	75%	78%
Socially responsible producer	77%	81%	87%
Traceability to farm	82%	84%	86%
Reduced use of agrichemicals	81%	82%	91%
Use of QR codes for traceability	80%	75%	83%
Use of Block-chain for traceability	76%	78%	85%
Use of Bar-codes for traceability	79%	77%	85%
Process traceability	75%	82%	83%
Genetic traceability	77%	82%	83%
Inputs traceability	82%	84%	87%
Disease and pest traceability	78%	79%	83%
Location traceability	75%	80%	81%
Date of manufacture	82%	87%	91%
Use of RFID tags	75%	75%	79%
Expiry date information	79%	86%	89%
Batch number information	73%	81%	83%
Organic production	79%	84%	87%
High quality of on-farm environment	81%	86%	91%



- Consistent across all consumer groups, food safety, environmental protection, and good working conditions are the most important factors associated with socially responsible production (Table 3.7).

Table 3.7 Describing consumer groups: Factors of social responsibility

Important Factors	Group One	Group Two	Group Three
Fair wages	74%	71%	78%
Good working conditions	81%	85%	88%
County of origin	76%	80%	86%
Engagement with local communities	71%	71%	78%
Environmental protection	82%	88%	89%
Freedom from discrimination	73%	75%	77%
Freedom to join trade union	74%	66%	70%
Education of workers	72%	70%	81%
Supporting farmers	74%	74%	82%
Animal health and welfare	81%	80%	85%
Company accountability	74%	80%	85%
Food safety and quality	85%	92%	92%

- Consistent across groups, environmental quality on-farm is considered the most important factor associated with high quality UHT milk (Table 3.8).

Table 3.8 Describing consumer groups: Factors of high quality UHT milk

Important Factors	Group One	Group Two	Group Three
Company reputation	77%	82%	87%
Taste	79%	79%	88%
Expertise of farmers	80%	83%	84%
Country of origin	78%	81%	88%
Environmental quality on-farm	84%	86%	92%
Grain-fed animals	79%	81%	87%
Barn-housed animals	74%	72%	76%
Transport processes	79%	77%	83%
Grass-fed animals	79%	83%	83%
Pasture-raised animals	77%	82%	87%
Organic production	76%	85%	87%
Better animal health and welfare	81%	79%	88%
Environmentally sustainable farms	82%	82%	89%
Food safety	83%	83%	91%

- Group Three are more likely to associate high nutrition UHT milk with factors reflecting a 'natural' product including environmental quality on farm, high calcium and protein, no additives, no preservatives, no artificial colours, and organic (Table 3.9).

Table 3.9 Describing consumer groups: Factors of high nutrition UHT milk

Important Factors	Group One	Group Two	Group Three
Liquid milk	81%	86%	88%
Powdered milk	66%	66%	74%
Environmental quality on-farm	80%	83%	88%
Transport processes	78%	80%	85%
High calcium content	83%	84%	88%
High protein content	80%	83%	91%
No sugar	72%	64%	78%
GE Free	79%	82%	88%
No additives	82%	84%	90%
Grass-fed animals	78%	82%	84%
Pasture-raised animals	79%	79%	86%
No artificial colours	81%	81%	88%
Fermented	72%	73%	75%
Low fat	69%	72%	80%
Full fat	67%	65%	73%
Preservative free	78%	82%	89%
Added probiotics	73%	75%	79%
Raw milk	79%	78%	83%
Organic milk	79%	82%	87%
Environmentally sustainable farms	81%	86%	89%
Food safety and quality	82%	87%	90%
Investment in innovation	70%	67%	76%

- Members of Group Three are more likely to want more sustainability information, be worried about the long-term effects of conventional dairy production, and try to lead a healthy lifestyle (Table 3.10).

Table 3.10 Describing consumer groups: Attitudes towards environment, health, price and trust

At least partly agree	Group One	Group Two	Group Three
I would like to have more information about the environmental sustainability of the milk I consume	82%	83%	89%
The environmental impact of dairy production is well managed	82%	81%	89%
Dairy production processes have low human health impacts	68%	60%	64%
I try to lead a healthy lifestyle as much as possible	86%	86%	91%
I am worried about the long term effects of pesticides and additives in conventional modern dairy production	80%	81%	89%
I trust the quality claims made by Chinese brands	78%	81%	83%
I trust the quality claims made by foreign brands	71%	74%	80%
I could be interested in buying milk with a sustainability label detailing environmental, economic and social measures	83%	85%	87%
I think higher priced milk is better quality	73%	78%	80%
I think higher priced milk is more nutritious	69%	77%	77%
I think higher priced milk is safer	70%	78%	80%

- While daily internet access rates could be considered to be relatively high, consumers in Group Three have slightly lower access compared to the other two groups (Table 3.11).

Table 3.11 Describing consumer groups: Frequency of internet access

Daily Access	Group One	Group Two	Group Three
Mobile device e.g. smartphone	81%	79%	78%
Home computer e.g. desktop	66%	62%	58%

- All groups have similar patterns of use of digital media when searching for which product to purchase (Table 3.12).

Table 3.12 Describing consumer groups: Use of digital media for researching product to purchase

Which to buy	Group One	Group Two	Group Three
Weibo	9%	9%	8%
Taobao	54%	53%	63%
WeChat	25%	21%	22%
Alibaba	29%	31%	37%
Jingdong	62%	71%	71%
TMall	64%	66%	75%
Food company sites	27%	26%	29%
Food blogs	19%	12%	12%
QQ Zone	10%	7%	5%
Baidu	11%	9%	9%
Youku	11%	6%	4%
Forums	9%	5%	5%
LinkedIn	9%	7%	9%
Retailer websites	39%	43%	45%
Zhihu	8%	4%	6%

- Baidu is the most popular site for all groups when researching production (Table 3.13).

Table 3.13 Describing consumer groups: Use of digital media for information on how a product is produced

How a product is produced	Group One	Group Two	Group Three
Weibo	41%	39%	49%
Taobao	25%	26%	24%
WeChat	37%	41%	48%
Alibaba	25%	23%	29%
Jingdong	27%	31%	28%
TMall	25%	29%	25%
Food company sites	36%	36%	43%
Food blogs	32%	37%	43%
QQ Zone	31%	31%	42%
Baidu	58%	57%	64%
Youku	33%	31%	43%
Forums	38%	42%	50%
LinkedIn	33%	35%	44%
Retailer websites	28%	31%	28%
Zhihu	43%	46%	55%

- Similar patterns of smart technology use across groups (Table 3.14).

Table 3.14 Describing consumer groups: Use of smart technologies for information searching and purchase

Use Often	Group One	Group Two	Group Three
Information Searching			
Barcodes	39%	32%	42%
QR Codes	40%	38%	36%
RFID/NFC	26%	16%	18%
Product Purchasing			
Barcodes	25%	26%	27%
QR Codes	32%	39%	30%
RFID/NFC	15%	13%	13%

- Making purchases is the most frequent use of smartphone applications for all consumer groups (Table 3.15). Members of Group Three are more likely to use smartphone apps for discounts/coupons.

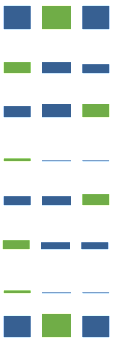
Table 3.15 Describing consumer groups: Use of smartphone applications

Currently use	Group One	Group Two	Group Three
Health (general)	44%	49%	51%
Dietary information	44%	42%	50%
Sustainability information	38%	32%	35%
Environmental information	35%	34%	38%
Budgeting	36%	30%	30%
Purchasing	51%	52%	60%
Nearest stockist location	34%	32%	38%
Product reviews	42%	43%	48%
Traceability	35%	32%	31%
Loyalty/rewards programmes	33%	32%	43%
Discounts/coupons	42%	43%	56%
Product delivery	30%	27%	28%

- Very similar pattern of retail channel use across consumer groups with supermarkets being the most used retail channel for all groups, and direct form producer the least used (Table 3.16).

Table 3.16 Describing consumer groups: Percentage of milk expenditure by retail channel

Average per cent	Group One	Group Two	Group Three
Supermarket	29%	30%	29%
Specialty store	17%	16%	14%
Online from domestic	17%	19%	19%
Online from overseas	7%	4%	6%
Fruit market	14%	15%	16%
Wholesale/discount store	5%	5%	5%
Direct from producer	4%	3%	4%
Convenience store	7%	7%	7%



- For those shopping online, the main reason for doing so is variety for Groups One and Three, and availability for Group Two (Table 3.17).

Table 3.17 Describing consumer groups: Main reason for shopping online for milk

	Group One	Group Two	Group Three
There is a greater variety of products	16%	14%	20%
I like the convenience of having products delivered to my home	14%	15%	16%
I like being able to order products that are better or not available locally	14%	16%	18%
Products are generally higher quality	11%	9%	6%

- For those shopping online, supermarkets are the most often used channel for all consumer groups, followed by TMall, then Jingdong (Table 3.18.). Consumers in Group Three are more likely to place emphasis on retailers they trust and have previous experience with.

Table 3.18 Describing consumer groups: Use of online retail channels

Use Often	Group One	Group Two	Group Three
Wholesale/discount suppliers	29%	22%	23%
Direct from producers	21%	17%	24%
Supermarkets	39%	49%	54%
Yiguo	13%	8%	8%
Specialty stores	26%	22%	31%
Jingdong (JD)	33%	34%	43%
SuNing	15%	11%	18%
Yi Hao Dian	16%	11%	13%
Womai	11%	7%	7%
Organic stores	18%	17%	26%
Taobao	27%	22%	28%
TMall	32%	35%	44%
Amazon	15%	14%	15%
Pinduoduo	12%	11%	9%
Only suppliers that I know and trust	15%	14%	21%
Only retailers that I've used before	19%	14%	23%

Chapter 4
Conclusions

This report presents the results of a survey of UHT consumption in China. The survey was of just under 1,000 respondents who were selected as purchasing UHT at least once a month.

The survey assessed purchase behaviour and consumption frequency. It asses country of origin purchases and how the quality was ranked by country. China was the main source of UHT being purchased by 74 per cent of respondents weekly or more frequently. This was followed by New Zealand at 40 per cent, then Australia at 33 per cent and the Netherlands at 24 per cent. New Zealand was ranked second highest of the countries included for quality with 26 per cent of respondents ranking New Zealand as best compared to 30 per cent for Chinese UHT. The qualities associated with New Zealand sourced UHT were high food safety, quality, nutritional value, organic and environmental standards.

The factors associated with high quality milk were food safety, with 59 per cent stating this was very important. The factors important for food safety included reduced use of agrichemicals with 49 per cent stating this was very important and organic production again 49 per cent stating that was very important. Forty eight per cent thought that high quality of the natural environment was very important, and 48 per cent stating that environmental quality on farm was very important.

Over half the respondents use mobile apps to purchase UHT, with 18 per cent of expenditure on line domestically and 6 per cent from overseas. The most expenditure is at supermarkets at nearly 30 per cent. Supermarkets are also the main online channel, however 21 per cent stated they often purchased directly from the producer.

The survey included a choice experiment to assess the Willingness to Pay by consumers for different attributes associated with kiwifruit. The consumers were then segmented, using a latent class model, into 3 classes each with different characteristics and preferences. The differences between the demographic groups was not large with most having a university degree, have children and most were in the age ranges 30-44 years old.

Group one (38 per cent of the sample) is willing to pay the highest premiums for contribution to local communities at 33 per cent followed by biodiversity enhancement at 35 per cent, of the average milk price. They also were willing to pay a premium for feedlot raised and grain fed and then water quality enhancement at 16, 15 and 13 per cent respectively. This group had the highest purchase of UHT milk.

Group two (31 per cent of the sample) were willing to pay the highest premium for carbon neutral milk at 50 per cent, followed by 44 per cent for organic and then 32 per cent for increased calcium. They were also willing to pay a premium of around 15 per cent for grain fed, support for farmers and care for workers. This group has the lowest purchasing frequency of the groups, had a higher percentage of male in the sample, and tended to be older.

Group three (32 per cent of the sample) were willing to pay the most for biodiversity enhancement at 56 per cent followed by enhanced animal welfare 27 per cent increased calcium at 23 per cent and the same for contributing to local communities. This group tended to be older, had a higher income, liked New Zealand sourced product the most across the sample and the highest purchase frequency of New Zealand UHT.

Appendix A: Statistical Method

This appendix provides technical details of statistical analysis of choice data. The appendix includes a brief description of the theoretical foundations of choice analysis followed by statistical probability estimation approaches, focusing on contemporary models applied in this report. Lastly, the method used in generating monetary estimates is described.

A.1 Conceptual Framework

In Choice Experiments (CEs), researchers are interested of what influences, on average, the survey respondents' decisions to choose one alternative over others. These influences are driven by people's preferences towards the attributes but also the individual circumstances such as their demographics or perceptions of the choice task (e.g., the level of difficulty or understanding) (Hensher et al. 2015).

Each alternative in a choice set is described by attributes that differ in their levels, both across the alternatives and across the choice sets. The levels can be measured either qualitatively (e.g., poor and good) or quantitatively (e.g., kilometres). This concept is based on the characteristics theory of value (Lancaster 1966) stating that these attributes, when combined, provide people a level of utility[1] *U* hence providing a starting point for measuring preferences in CE (Hanley et al. 2013; Hensher et al. 2015). The alternative chosen, by assumption, is the one that maximises people's utility[2] providing the behavioural rule underlying choice analysis:

$$U_j > U_i \tag{0.1}$$

where the individual *n* chooses the alternative *j* if this provides higher utility than alternative *i*. A cornerstone of this framework is Random Utility Theory, dated back to early research on choice making (e.g., Thurstone 1927) and related probability estimation. This theory postulates that utility can be decomposed into systematic (explainable or observed) utility *V* and a stochastic (unobserved) utility ε (Hensher et al. 2015; Lancsar and Savage 2004).

$$U_{nj} = V_{nj} + \varepsilon_{nj} \tag{0.2}$$

where *j* belongs to a set of J alternatives. The importance of this decomposition is the concept of utility only partly being observable to the researcher, and remaining unobserved sources of utility can be treated as random (Hensher et al. 2015). The observed component includes information of the attributes as a linear function of them and their preference weights (coefficient estimates).

$$V_{nsj} = \sum_{k=1}^{K} \beta_k x_{nsjk} \tag{0.3}$$

with *k* attributes in vector x for a choice set s. Essentially, the estimated parameter β shows "the effect on utility of a change in the level of each attribute" (Hanley et al. 2013, p. 65). This change can be specified as linear across the attribute levels, or as non-linear using either dummy coding or effect coding

[1]Related terminology used in psychology discipline is *the level of satisfaction* (Hensher et al. 2015).
[2]In choice analysis, utility is considered as *ordinal utility* where the relative values of utility are measured (Hensher et al. 2015).

approaches. The latter coding approach has a benefit of not confounding with an alternative specific constant (ASC) when included in the model (Hensher et al. 2015).

A.2 Statistical Modelling of Choice Probabilities

The statistical analysis aims to explain as much as possible of the observed utility using the data obtained from the CE and other relevant survey data. In order to do so, the behavioural rule (eq. 1.1) and the utility function (eq. 1.2) are combined (Hensher et al. 2015; Lancsar and Savage 2004) to estimate the probability of selecting an alternative *j*:

$$\Pr_{nsj} = \Pr\left(U_{nsj} > U_{nsi}\right) = \Pr\left(V_{nsj} + \varepsilon_{nsj} > V_{nsi} + \varepsilon_{nsi}\right) = \Pr\left(\varepsilon_{nsi} - \varepsilon_{nsj} < V_{nsj} - V_{nsi}\right) \forall j \neq i \quad (0.4)$$

where the probability of selecting alternative *j* states that differences in the random part of utility are smaller than differences in the observed part. A standard approach to estimate this probability is a conditional logit, or multinomial logit (MNL) model (McFadden 1974). This model can be derived from the above equations (1.2 and 1.3) by assuming that the unobserved component is independently and identically distributed (IID) following the Extreme Value type 1 distribution (see e.g. Hensher et al. 2015; Train, 2003). Although the MNL model provides a "workhorse" approach in CE, it includes a range of major limitations (see e.g. Fiebig et al. 2010; Greene and Hensher 2007; Hensher et al. 2015):

- Restrictive assumption of the IID error components
- Systematic, or homogenous, preferences allowing no heterogeneity across the sample
- Restrictive substitution patterns, namely the existence of independence of irrelevant alternatives property where introduction (or reduction) of a new alternative would not impact on the relativity of the other alternatives
- The fixed scale parameter obscures potential source of variation

Some or all of these assumptions are often not realised in collected data. These restrictive limitations can be relaxed in contemporary choice models. In particular, the random parameter logit (RPL) model (aka, the mixed logit model) has emerged in empirical application allowing preference estimates to vary across respondents (Fiebig, et al. 2010; Hensher et al. 2015; Revelt and Train, 1998). This is done by specifying a known distribution of variation to be parameter means. The RPL model probability of choosing alternative *j* can be written as:

$$\Pr_{nsj} = \frac{\exp(\beta_n' x_{nsj})}{\sum_J \exp(\beta_n' x_{nsj})} \quad (0.5)$$

where, in the basic specification, $\beta_n = \beta + \eta_n$ with η being a specific variation around the mean for *k* attributes in vector *x* (Fiebig, et al. 2010; Hensher et al. 2015). Typical distributional assumptions for the random parameters include normal, triangular and lognormal distributions, amongst others. The normal distribution captures both positive and negative preferences (i.e., *utility* and *disutility*) (Revelt and Train, 1998). The lognormal function can be used in cases where the researcher wants to ensure the parameter has a certain sign (positive or negative), a disadvantage is the resultant long tail of estimate distributions (Hensher et al. 2015). The triangular distribution provides an alternative functional form, where the spread can be constrained (i.e., the mean parameter is free whereas spread is fixed equal to mean) to ensure behaviourally plausible signs in estimation (Hensher et al. 2015). Further specifications used in

modelling include parameters associated with individual specific characteristics (e.g, income) that can influence the heterogeneity around the mean, or allowing correlation across the random parameters. The heterogeneity in mean, for example, captures whether individual specific characteristics influence the location of an observation on the random distribution (Hensher et al. 2015). In this study, the frequency of visits to rivers, streams and lakes was used to explain such variance.

Another way to write this probability function (in eq. 1.4) (Hensher et al. 2015) involves an integral of the estimated likelihood over the population:

$$L_{njs} = \int_{\beta} \Pr_{nsj}(\beta) f(\beta|\theta) d\beta \tag{0.6}$$

In this specification, the parameter θ is now the probability density function conditional to the distributional assumption of β. As this integral has no closed form solution, the approximation of the probabilities requires a simulation process (Hensher et al. 2015; Train, 2003). In this process for data *X*, *R* number of draws are taken from the random distributions (i.e. the assumption made by the researcher) followed by averaging probabilities from these draws; furthermore these simulated draws are used to compute the expected likelihood functions:

$$L_{nsj} = E(\Pr_{nsj}) \approx \frac{1}{R} \sum_{R} f(\beta^{(r)}|X) \tag{0.7}$$

where the $E(\Pr_{nsj})$ is maximised through Maximum Likelihood Estimation. This specification (in eq. 1.6) can be found in Hensher et al. (2015). In practice, a popular simulation method is the Halton sequence which is considered a systematic method to draw parameters from distributions compared to for example, pseudo-random type approaches (Hensher et al. 2015).

A.3 Econometric Extensions

Common variations of the RPL model include specification of an additional error component (EC) in the unobserved part of the model. This EC extension captures the unobserved variance that is alternative-specific (Greene and Hensher 2007) hence relating to substitution patterns between the alternatives (Hensher et al. 2015). Empirically, one way to explain significant EC in a model is SQ-bias depicted in the stochastic part of utility if the EC is defined to capture correlation between the non-SQ alternatives (Scarpa et al., 2005).

Another extension which has gained increasing attention in recent CE literature, is the Generalized Mixed Logit (GMXL) model (Czajkowski et al. 2014; Hensher et al. 2015; Juutinen et al. 2012; Kragt 2013; Phillips 2014). This model aims to capture remaining unobserved components in utility as a source of choice variability by allowing estimation of the scale heterogeneity alongside the preference heterogeneity (Fiebig et al. 2010; Hensher et al. 2015). This scale parameter is (inversely) related to the error variance, and in convenient applications such as MNL or RPL, this is normalised to one to allow identification (Fiebig et al. 2010; Louviere and Eagle 2006). However, it is possible that the level of error variance differs between or within individuals, due to reasons such as behavioural outcomes, individual characteristics or contextual factors (Louviere and Eagle 2006).

Recent GMXL application builds on model specifications presented in Fiebig et al. (2010), stating that β_n (in eq. 1.4) becomes:

$$\beta_n = \sigma_n \beta + \gamma \eta_n + (1-\gamma)\sigma_n \eta_n \tag{0.8}$$

where σ is the scale factor (typically = 1) and $\gamma \in \{0,1\}$ is a weighting parameter indicating variance in the residual component. In the case the scale factor equals 1, this reduces to the RPL model. The importance of the weighting parameter is the impact on the scaling effect on the overall utility function (population means) versus the individual preference weights (individual means): when *γ* parameter approaches zero the scale heterogeneity affects both means, whereas when this approaches one the scale heterogeneity affects only the population means (Hensher et al. 2015; Juutinen et al. 2015). Interpretation of these parameters includes

- If *γ* is close to zero, and statistically significant, this supports the model specification with the variance of residual taste heterogeneity increases with scale (Juutinen et al. 2012); and
- If *γ* is not statistically significant from one, this suggests that the unobserved residual taste heterogeneity is independent of the scale effect, that is the individual-level parameter estimates differ in means but not variances around the mean (Kragt, 2013)

The scale factor specification (eq. 1.7) can also be extended to respondent specific characteristics associated with the unobserved scale heterogeneity (Hensher et al. 2015; Juutinen et al. 2015):

$$\sigma_n = \exp\{\bar{\sigma} + \tau\omega_n\} \tag{0.9}$$

where $\bar{\sigma}$ *is* the mean parameter in the error variance; and ω is unobserved scale heterogeneity (normally distributed) captured with coefficient *τ* (Hensher et al. 2015; Juutinen et al. 2015; Kragt, 2013). Juutinen et al. (2012), for example, in context of natural park management found that respondents' education level and the time spent in the park explained the scale heterogeneity ($\tau > 0$, p-value < 0.01). In this study, the respondents indicated levels of choice task understanding and difficulty were used to explain scale heterogeneity.

A.4 Estimation of Monetary Values

Typically the final step of interest in the CE application is the estimation of monetary values of respondent preferences for the attributes considered in utility functions. These are commonly referred to as marginal willingness-to-pay (WTP). WTP estimation is based on the marginal rate of substitution expressed in dollar terms providing a trade-off between some attribute k and the cost involved (Hensher et al. 2015) and is calculated using the ratio of an attribute parameter and the cost parameter. WTP can take into account interaction effects, if statistically significant, such as with the respondent demographics. WTP of attribute *j* by respondent *i* is calculated as the ratio of the estimated model parameters accommodating the influence of the random component (Cicia et al. 2013) as:

$$WTP_i^j = -\left(\frac{\beta_j + \varepsilon_{ij}}{\beta_{price} + \varepsilon_{ip}}\right) \tag{0.10}$$

The estimated mode parameters can also be used to estimate compensating surplus (CS) as a result of policy or quality change in a combination of attributes, using (Hanemann, 1984):

$$\mathbf{CS} = \frac{-1}{\beta cost}\left[\ln\sum_{j=1}^{J}\exp\left\{V_j^0\right\} - \ln\sum_{j=1}^{J}\exp\left\{V_j^1\right\}\right] \tag{0.11}$$

which calculates the difference in utilities before the policy or quality change (V_0) and after the policy or quality change (V_1) (Hanley et al. 2013; Lancsar and Savage 2004). Similar to WTP, the monetary estimation of this change is possible by using the estimate for the monetary attribute $\beta_{cost.}$. Lastly, there are some challenges associated with the empirical estimation of the WTP in the RPL based models. One approach is to use a fixed cost, which simplifies the WTP estimation (Daly et al. 2012) but which may not be as behaviourally a plausible consideration as allowing heterogeneous preferences towards the cost attribute (Bliemer and Rose, 2013; Daziano and Achtnicht, 2014). Conceptually, the estimated cost parameter is a proxy for the marginal utility of income for respondents and economic theory suggests individuals will respondent differently to varying income levels. The use of a random cost parameter however, presents complications in deriving population distribution moments from the ratio of two random parameters.

Appendix B: Latent Class Model of UHT milk choices

Table B.1 Beijing UHT milk choice Latent Class model

Utility parameters[1]	Class 1	Class 2	Class 3
Enhanced Animal Welfare	- 0.13***(0.03)	0.22***(0.03)	0.58***(0.05)
Organic	- 0.38***(0.04)	0.84***(0.05)	0.39***(0.04)
Increased Protein	- 0.24***(0.12)	0.24** (0.12)	0.22* (0.13)
Increased Calcium	0.09 (0.46)	0.60***(0.09)	0.49***(0.09)
Care for Workers	-0.43***(0.12)	0.30***(0.10)	0.20* (0.13)
Contribute to local Communities	0.68***(0.11)	- 0.42***(0.11)	0.56***(0.12)
Support for Farmers	- 0.16* (0.09)	0.25** (0.11)	- 0.28** (0.13)
Carbon Neutral	- 0.66***(0.11)	0.95***(0.12)	- 0.71***(0.15)
Biodiversity Enhancement	0.78***(0.07)	- 0.58***(0.09)	1.16***(0.13)
Water Quality Protection	0.23** (0.11)	- 0.55***(0.11)	0.03 (0.11)
100% Pasture Raised	- 0.06 (0.12)	0.44***(0.13)	- 0.25** (0.14)
Feedlot Raised	0.31***(0.08)	- 0.02 (0.09)	- 0.09 (0.09)
100% Grass-fed	0.25* (0.13)	- 0.16 (0.13)	- 0.30** (0.15)
Grain-fed	0.33***(0.07)	0.31 (0.07)	0.28***(0.09)
Price	- 0.98***(0.04)	- 0.83 (0.03)	- 0.97***(0.05)
Class Membership			
Purchase Frequency	0.74** (0.22)	0.42* (0.23)	
Environment Important	- 0.47***(0.23)		
Average class probability	0.38	0.31	0.32
Model Fit Statistics			
Log Likelihood function	-7,473		
Log Likelihood chi^2 stat (43 d.f.)	7,091***		
McFadden Pseudo R^2	0.32		
Number of observations	10,010		
Number of respondents	1,001		

***, **,* denote statistical significance at the 1%, 5% and 10% levels respectively for the null hypothesis that a parameter estimate is not significantly different from zero.

Standard errors in brackets.

[1] Parameter mean estimates indicates the estimated average value in the model for each different parameter