GRAINS and GLUTEN: Trends and Patterns
Funding for this project is provided by the Canada and Manitoba governments through Growing Forward 2, a federal-provincial-territorial initiative.
Mission: To give a voice to consumers, by gathering survey information on their opinions, preferences and experiences with food and health, for the benefit of all Manitobans.
Survey 15-02 Statistical Power:

There were 1081 responses representing a response rate of 27% of our panel. The sample obtained was sufficient to provide a confidence interval (margin of error) of +/- 3%. So for a typical calculation, we could say that we were 95% sure that the true value of a response number would be within +/- 3% of the number recorded.
The data for this survey was collected in June 2015.

One half of the respondents came from Winnipeg and one half came from the rest of the Province (49.3% Winnipeg/50.7% rest of Province).

Men represented 21.2% of respondents and women represented 78.7% of respondents.
Q1: You may see the following labels on foods. Which of them mean “whole grains” to you? (Select all that apply)

- Whole grain
- Stoneground whole grain
- Whole wheat
- Oats, oatmeal
- Brown rice
- Multigrain
- Ancient grains
- Bran
- Whole (other)
- Wheat, or wheat flour
- Wheat germ
- Wheatberries
- Durum wheat
- Stoneground
- Semolina
- Enriched flour
- Organic flour
- Degerminated

Valid N = 1035, missing = 46 (not applicable= 2, I don’t know = 25, no response= 19)
The first question in the survey asked respondents what labels meant “whole grains” to them. Respondents were free to choose as many of the options as they wished, thus the numbers reflect multiple responses from a single survey taker. When asked which labels meant “whole grains,” the most popular response, “whole grain,” (87.9%) was not surprising. This was followed by “stoneground whole grain” (66.6%) and “whole wheat” (59.8%). The top three answers all had the word “whole” in them. There is a significant difference between “whole wheat” and “Oats, oatmeal” (Z-score=4.99; p<0.05) and between “Oats, oatmeal” and “Brown rice/Multigrain” (Z-Score= 6.0257; p<0.01).

The top 3 choices are significantly more preferred than the remaining choices at the 95% confidence level. “Oats, oatmeal” stands by itself. Brown rice/Multigrain/Ancient grains are equally liked. There is another significant drop off in preference from “Ancient grains” to “Bran” (Z-Score =6.0257; p<0.01).

“Stoneground” by itself was not highly associated with whole grains (11%). Other uses of the word “wheat” in a label did not score highly with respondents (durum wheat, wheatberries, wheat germ, wheat or wheat flour were grouped from 15.7% to 17.4%).
Q2: Which of the following foods do you believe are a good source of whole grains? (1) (Select all that apply)

Valid N= 1026, missing= 55 (not applicable= 3, I don’t know= 29, no response=23)
Q2: Which of the following foods do you believe are a good source of whole grains? (2) (Select all that apply)

Valid N=1026, missing=55 (not applicable=3, I don’t know=29, no response=23)
Q2: Which of the following foods do you believe are a good source of whole grains? (3) (Select all that apply)

Summary of Q2 highest scores
Good source of whole grains

<table>
<thead>
<tr>
<th>Food</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole grain barley</td>
<td>72.2</td>
</tr>
<tr>
<td>Oatmeal</td>
<td>62.7</td>
</tr>
<tr>
<td>Whole wheat bread</td>
<td>62.5</td>
</tr>
<tr>
<td>Brown rice</td>
<td>62</td>
</tr>
<tr>
<td>Whole rye</td>
<td>60.7</td>
</tr>
<tr>
<td>Rolled Oats</td>
<td>59.2</td>
</tr>
<tr>
<td>Wild rice</td>
<td>56.9</td>
</tr>
<tr>
<td>Quinoa</td>
<td>56.9</td>
</tr>
</tbody>
</table>
Q2: Which of the following foods do you believe are a good source of whole grains?

- Respondents chose foods they believed were a good source of whole grains in question 2. They were free to choose as many of the options as they wished, thus the numbers reflect multiple responses from a single survey taker. Respondents chose *Whole grain barley* (72.2%), *Oatmeal* (62.7), *Brown rice* (62.0), *Whole wheat bread* (62.5), *Whole rye* (60.7), *Rolled oats* (59.2), *Quinoa* (56.9%) and *Wild rice* (56.9%) as the top 8 foods.

- There is a significant drop to the next highest choice *Whole grain cornmeal* (49.4%) (Z-Score= 3.41; p<0.01). The top 8 choices are significantly more preferred than the remaining choices at the 95% confidence level.

- Whole grain barley is chosen significantly more than oatmeal (Z-Score= 4.62; p<0.01).

- Respondents are relatively unaware of the whole grain properties of foods such as *amaranth, couscous, sorghum* and *triticale*. 
Q3: Are whole grain products easy to get? (Select 1 answer)

A large majority of the respondents (97.5%) felt that whole grain products were *sometimes, frequently* or *always* easy to get.

The proportion of folks choosing *always* and *sometimes* were the same with *frequently* a significantly higher choice ($Z$-Score = -4.9905; $p<0.01$).

The average (mean) response to this question was 3.94, with a standard deviation of +/- 0.822.

Location (Winnipeg vs the rest of the Province) made no significant difference in the responses, nor did Gender.

Valid N=992, missing=89 (not applicable=2, I don’t know=58, no response=29)
Q4: Is it important for you to know whether the following products have been fortified? (Select all that apply)

- Bread: 86.2%
- Pasta: 67.2%
- Cold breakfast cereal: 65.6%
- Hot breakfast cereal: 60.8%
- Noodles: 46.1%
- Baked goods: 33.4%
- Snack bars: 32.6%

Valid N=610, missing=471 (not applicable=157, I don’t know=263, no response=51)
Q4: Is it important for you to know whether the following products have been fortified? *(Select all that apply)*

- It appears that many respondents (39%) did not find the question of fortification applicable, or did not know if it was important. They may not have known the definition of fortification.
- Those responding felt bread was significantly more important to fortify than pasta (Z-Score=7.86, p<0.01).
- Hot breakfast cereal was significantly more important to fortify than noodles (Z-Score=5.1656, p<0.01).
- Noodles were significantly more important to fortify than baked goods (Z-Score= -4.5046, p<0.01).
- Women were significantly more likely to feel that baked goods should be fortified (Χ²=6.66, df=1, p=0.01).
Q5: What are the main reasons why you do not eat whole grains? (Select up to 5 answers)

Main reasons do not eat whole grains (answers 4%+)

- Digestive considerations (gluten, IBS)
- Not part of a habit (don't think about eating/preparing)
- Too expensive
- Do not like the flavor/taste
- My family members will not eat them
- Do not know how to cook/prepare them
- Do not like the texture
- Time consuming, too much time to prepare
- They contain gluten
- Inconvenient, too much work to prepare them
- Health considerations (e.g. Celiac)
- Not part of my traditional diet or culture
- Do not appear very appetizing/appealing
- Do not like them
- I do not think they are healthy
- Never tried to cook/eat them
- I choose not to eat or try them
- Prefer to eat refined grain products

Valid N=285, missing=796 (not applicable=729, I don’t know=27, no response=40)
Q6: What are the main reasons why you do not eat whole grains more often?
(Select up to 5 answers)

- Not part of a habit (don't think of eating/preparing)
- Too expensive
- Digestive considerations (gluten, IBS)
- Do not know how to cook/prepare them
- My family members will not eat them
- Time consuming, too much time to prepare
- Inconvenient, too much work to prepare
- Do not like the flavor/taste
- Do not like the texture
- Not part of my traditional diet or culture
- Health considerations (e.g. Celiac)
- They contain gluten
- Too busy
- Do not appear very appetizing/appealing
- Prefer to eat refined grain products
- Do not like them
- I do not think they are healthy
- I don't eat whole grains

Valid N=405, missing=676 (not applicable=577, I don’t know=61, no response=38)
Q5/Q6: What are the main reasons why you do not eat whole grains or do not eat whole grains more often? 
*(Select up to 5 answers)*

- For these two questions, respondents could choose up to five reasons why they did not eat whole grains or did not eat them more often, thus the numbers reflect multiple responses from a single survey taker.

- About a quarter of our respondents do not eat whole grains (26%).

- The top three reasons in both questions were that they were not part of a habit (don’t think about eating/preparing). This reason was chosen significantly more than the rest of the reasons (Z-Score=3.86, p<0.01 / Z-Score=5.92, p<0.01), followed by *digestive considerations* (*gluten, IBS*) and that they were *too expensive*. 
Q7: What are the main reasons why you eat whole grains? (Select up to 5 answers)

Main reasons to eat whole grains

- Good for balanced diet, healthy lifestyle: 64.5%
- Source of fibre: 55.8%
- Nutritious food: 48.5%
- Helps regularity: 40.3%
- Filling, satisfying: 38.2%
- Less processed product: 37.4%
- Adds flavour, tasted good: 32.1%
- Adds texture: 26.2%
- Alternative to refined grains: 18.1%
- Source of vitamins and minerals: 15.0%
- Lower in fat: 13.8%
- Source of protein: 11.0%
- Advised to eat less refined grains: 10.3%
- Part of recipe (e.g. whole wheat muffins): 9.0%
- Good variety, can make different things: 5.6%
- Try something different: 5.5%
- Easy to prepare/make: 3.5%
- Inexpensive (economical, cheap, cost less): 3.5%
- Part of my traditional diet or culture: 2.6%

Valid N=968, missing=113 (not applicable=56, I don’t know=28, no response=29)
Q7: What are the main reasons why you eat whole grains?
(Select up to 5 answers)

- For this question, respondents could choose up to five reasons why they eat whole grains, thus the numbers reflect multiple responses from a single survey taker.

- The number one reason for eating whole grains was that they were *good for a balanced diet, healthy lifestyle*. This answer was chosen significantly more than the rest of the answers (Z-Score=3.8989, p<0.01).

- Similarly, *source of fibre* was significantly higher than *nutritious food* (Z-Score= -3.2302, p <0.01).
Q8: On average, how many times per week do you eat the following whole food or flour? (1) (Select 1 answer per line)

Weekly frequency whole food or flour

Valid N= 842-989, missing= 92-239
Q8: On average, how many times per week do you eat the following whole food or flour? (2) (Select 1 answer per line)

**Weekly frequency whole food or flour**

- **Triticale**
  - None: 94.7%
  - 0 to 1: 0%
  - 1 to 3: 4.4%
  - 3 to 5: 0.8%
  - 6 or more: 0.1%

- **Sorghum**
  - None: 94.7%
  - 0 to 1: 1%
  - 1 to 3: 4.1%
  - 3 to 5: 0.1%
  - 6 or more: 0.1%

- **Quinoa**
  - None: 43.5%
  - 0 to 1: 36.8%
  - 1 to 3: 16.2%
  - 3 to 5: 2.7%
  - 6 or more: 0.8%

- **Popcorn**
  - None: 48.8%
  - 0 to 1: 21.9%
  - 1 to 3: 23%
  - 3 to 5: 5.3%
  - 6 or more: 1.1%

- **Oatmeal, rolled oats**
  - None: 28.4%
  - 0 to 1: 21.4%
  - 1 to 3: 25.6%
  - 3 to 5: 15.1%
  - 6 or more: 17%

- **Multi-grain bread**
  - None: 30.7%
  - 0 to 1: 16.3%
  - 1 to 3: 12.4%
  - 3 to 5: 15.1%
  - 6 or more: 17%

Valid N= 842-989, missing=92-239
Q8: On average, how many times per week do you eat the following whole food or flour? (3) (Select 1 answer per line)

Weekly frequency whole food or flour

- None
- 0 to 1
- 1 to 3
- 3 to 5
- 6 or more

Valid N= 842-989, missing= 92-239
Q8: On average, how many times per week do you eat the following whole food or flour? (4) (Select 1 answer per line)

Weekly frequency whole food or flour

Valid N= 842-989, missing= 92-239
Q8: On average, how many times per week do you eat the following whole food or flour? (5) (Select 1 answer per line)

Weekly frequency whole food or flour

- Wild rice:
  - None: 44.8%
  - 0 to 1: 10.6%
  - 1 to 3: 1.1%
  - 3 to 5: 0.2%
  - 6 or more: 1.2%

- Whole wheat tortillas:
  - None: 56.5%
  - 0 to 1: 29.7%
  - 1 to 3: 1.8%
  - 3 to 5: 1.2%
  - 6 or more: 0.2%

Valid N= 842-989, missing= 92-239
Q8: On average, how many times per week do you eat the following whole food or flour?

- Whole wheat, whole grain, oatmeal, brown rice, and multi-grain products were reported as being consumed the most times per week.

- There is a consistency with question one where consumers reported consuming the same foods that they had defined as whole grains (whole wheat, oats/oatmeal, brown rice, and multigrain).

- White rice and white bread, buns/rolls were also frequently consumed.
Q9: When purchasing whole grain products, how often do you read the information found on food packaging? (Select 1 answer per line)

![Whole grain food packaging reading frequency chart]

- Valid N=925-1015, missing=66-156
Q9: When purchasing whole grain products, how often do you read the information found on food packaging? (Select 1 answer per line)

- Of the four types of information found on food packaging, our respondents were most likely to read ingredient lists, followed by nutrition labels, health claims and then other claims. The four means were significantly different from each other (Ingredient-Nutrition: $t=3.404$, df=1004, $p<0.01$; Nutrition-Health: $t=19.904$, df=985, $p<0.01$; Health-Other: $t=7.558$, df=923, $p<0.01$).

- While these activities were all significantly positively correlated, respondents were much more likely to read ingredient & nutrition lists together and health & other claims together.

### Correlations

<table>
<thead>
<tr>
<th></th>
<th>Nutrition labels</th>
<th>Ingredient lists</th>
<th>Health claims</th>
<th>Other claims</th>
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<td>Nutrition labels</td>
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<td>Ingredient lists</td>
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<tr>
<td>Health claims</td>
<td>.583*</td>
<td>.575*</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Other claims</td>
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<td>.556*</td>
<td>.895*</td>
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*Correlation is significant at the 0.01 level (2-tailed).

### Descriptive Statistics

<table>
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<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
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<tbody>
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<td>Nutrition labels</td>
<td>3.54</td>
<td>1.145</td>
<td>1015</td>
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<tr>
<td>Ingredient lists</td>
<td>3.61</td>
<td>1.127</td>
<td>1013</td>
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<td>Health claims</td>
<td>2.84</td>
<td>1.214</td>
<td>993</td>
</tr>
<tr>
<td>Other claims</td>
<td>2.68</td>
<td>1.230</td>
<td>925</td>
</tr>
</tbody>
</table>
Q10: When purchasing whole grain products, which of the following information do you find trustworthy? (Select all that apply)

- Nutrition labels
- Ingredient lists
- Health claims
- Other claims

Valid N=865, missing=216 (not applicable=39, I don’t know=132, no response=45)

While ingredient lists are considered more trustworthy than nutrition labels (Z-Score=-7.75, p <0.01), health claims fall far below both for trustworthiness (Z-Score=26.37, p <0.01).

This is consistent with question 9, where consumers report reading the information on ingredient lists the most.
Q11: When choosing a product made with whole grains, do any of the following factors influence your food purchases? *(Select up to 3 answers)*

**Main reasons to purchase whole grains**

- **Provides essential vitamins & minerals**: 77.1%
- *Adds fiber to my diet*: 38.4%
- Fills me up longer: 28.1%
- Aids in my digestion: 25.4%
- Helps with my weight management: 21.6%
- Typically lower in fat: 16.4%
- Helps to reduce my risk of heart disease: 16.2%
- Gives me energy: 10.5%
- Lowers my risk of colorectal cancer: 10.0%
- Helps to lower my high blood pressure: 9.1%
- Helps to reduce my risk of diabetes: 6.9%
- Typically lower in calories: 6.7%

Valid N=953, missing=128 (not applicable=56, I don’t know=34, no response=38)

*Significantly different from following category (Z-Score=17.11, p<0.01); **Significantly different from following category (Z-Score=-4.76, p<0.01)

A variety of reasons to purchase are claimed with the two highest related to fibre, vitamins & minerals.
Q12: Do you have a gluten intolerance or sensitivity? (Select 1 answer)

Frequency of gluten intolerance or sensitivity

89.8%

No, I do not have a gluten intolerance or sensitivity

2.2%

Yes, I have a diagnosed gluten intolerance (i.e. Celiac Disease)

2.7%

Yes, I have a non-diagnosed gluten intolerance

5.4%

Yes, I have a gluten sensitivity

9.2% of our respondents reported a problem with gluten. Comparatively, a UK study found 13% of their respondents reported gluten sensitivity (Canadian Celiac Association http://www.celiac.ca/?page_id=883)

Valid N=967, missing=114 (I don’t know=83, no response=31)
Q13: How many slices of the following bread products do you consume per week? (Select 1 answer per line)

Weekly consumption of bread products

Statistically, the consumption of multi-grain bread and rye bread is the same (t=1.66, df=887, p=0.097; no significant difference between means).

The consumption of wheat bread is significantly lower than multi-grain (t=4.88, df=844, p<0.01) and rye bread (t=3.28, df=830, p<0.01).

Valid N=782-969, missing=112-299
Q14: Why do you choose gluten-free products? (Select all that apply)

Main reasons to choose gluten-free

- To decrease sensitivities (e.g. IBS symptoms) 44.7%
- To improve general health 33.3%
- To help avoid processed foods 22.0%
- Following medical advice 21.4%
- To maintain or lose weight 16.4%
- Following health recommendations from other books, TV or social media 14.5%
- Following health recommendations from the "Wheat Belly" book 11.9%

Valid N=159, missing=922 (not applicable=788, I don’t know=63, no response=71)
Q14: Why do you choose gluten-free products? *(Select all that apply)*

- Respondents were free to choose as many of the options as they wished, thus the numbers reflect multiple responses from a single survey taker.

- Significantly more respondents chose gluten-free products (159/1081 = 14.7%) than said they had a gluten intolerance (99/1081 = 9.2%) in question 12 (Z-Score= 3.98, p <0.01). A variety of reasons were given that were not related to gluten sensitivities.

- The most frequent answer (decreasing sensitivities) is significantly higher than the next specific answer (improving general health) (Z-Score= 2.07, p <0.05).

- Citing decreasing sensitivities as the number one reason to choose gluten-free products reflects the respondents who reported gluten intolerance. However, the choice of gluten-free products reflects additional non-medical reasons that consumers are finding this option attractive.
Q15: Please indicate your level of agreement with the following statements? (Select 1 answer per line)

Where: 1= Strongly disagree 4= Neutral 7= Completely agree

- It is easy to find gluten-free processed foods: 4.24
- Gluten-free products taste awful: 3.92
- There are not enough gluten-free products in my favourite stores: 3.80
- Gluten-free products purchased at the grocery store are affordable: 3.10
- Restaurants offer a wide variety of gluten-free meals: 2.99
- Gluten-free products are important for my health: 2.99
- Gluten-free products are healthier than other products: 2.87

Valid N= 516-704, missing= 377=565
With the exception of “gluten-free products taste awful,” all opinions on the statements are significantly different from neutral (4).
Q15: Please indicate your level of agreement with the following statements?
(Select 1 answer per line)

Additionally, all statement opinion means are significantly different from the statement that follows as you read down the bar chart, with the exception that “tastes awful” and “not enough gluten-free products in favorite stores” are not significantly different from each other (t= - .99, df=439, p>0.05).

<table>
<thead>
<tr>
<th>Pair</th>
<th>Description</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td>It is easy to find gluten-free processed foods - Gluten-free products taste awful</td>
<td>0.388</td>
<td>2.199</td>
<td>0.102</td>
<td>0.185, -0.587</td>
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<td>Pair 2</td>
<td>Gluten-free products taste awful - There are not enough gluten-free products in my favourite stores</td>
<td>-0.111</td>
<td>2.359</td>
<td>0.112</td>
<td>-0.332, 0.110</td>
<td>-3.900</td>
<td>439</td>
<td>0.323</td>
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<tr>
<td>Pair 3</td>
<td>There are not enough gluten-free products in my favourite stores - Gluten-free products purchased at the grocery store are affordable</td>
<td>0.735</td>
<td>2.298</td>
<td>0.106</td>
<td>0.526, -0.944</td>
<td>6.921</td>
<td>467</td>
<td>0.000</td>
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<td>Pair 4</td>
<td>Gluten-free products purchased at the grocery store are affordable - Restaurants offer a wide variety of gluten-free meals</td>
<td>0.174</td>
<td>1.633</td>
<td>0.076</td>
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<td>Pair 5</td>
<td>Restaurants offer a wide variety of gluten-free meals - Gluten-free products are important for my health</td>
<td>-0.548</td>
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<td>Pair 6</td>
<td>Gluten-free products are important for my health - Gluten-free products are healthier than other products</td>
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</table>
Q16: In general, how would you rate your health? *(Select 1 answer)*

Respondents rate their health as good (mean = 3.36)

Valid N=1052, missing=29 (I don’t know=1, no response=28)
Q16: In general, how would you rate your health? *(Select 1 answer)*

- There were no statistically significant differences between how men and women rated their health.

- There were no statistically significant differences in how respondents rated their health according to where they lived.
Q17: Have you been diagnosed with any of the following chronic diseases? (1) (Select all that apply)

Frequency of chronic diseases

- **Cancer**: 91.8%
- **Heart disease**: 9.3%
- **Chronic respiratory disease**: 7.4%
- **Diabetes**: 2.9%
- **Mental illness**: 93.7%

Current condition

Experienced in last 10 years

No
Q17: Have you been diagnosed with any of the following chronic diseases? (2) (Select all that apply)

Frequency of chronic diseases

- **Neurological illness**: 93.9%
  - Current condition: 2.6%
  - Experienced in last 10 years: 11.3%
  - No: 80.9%

- **Musculoskeletal diseases**: 65.8%
  - Current condition: 22.1%
  - Experienced in last 10 years: 1%
  - No: 12.9%

- **Multiple sclerosis**: 97.8%
  - Current condition: 1%
  - Experienced in last 10 years: 0.3%
  - No: 3.9%

- **Other**: 1.5%
  - Current condition: 12.9%
  - Experienced in last 10 years: 3.9%
  - No: 93.9%
Q17: Have you been diagnosed with any of the following chronic diseases? (2) (Select all that apply)

- 13.1% of the sample reported current heart disease, with 8.3% reporting a diagnosis within the past ten years.

- 9.0% reported current chronic respiratory disease, with 6.2% reporting a diagnosis within the past 10 years.

- 8.3% reported current diabetes, with 1.85% reporting a diagnosis within the past ten years. There were significantly more current diabetes diagnoses reported outside of Winnipeg ($X^2=5.204$, df=1, $p<0.05$)

- 20.1% reported current musculoskeletal diseases, with 10.3% reporting a diagnosis within the past 10 years.
This snapshot analysis has attempted to explain the survey results question by question.

In some instances, additional aspects have been analyzed.

If you have remaining questions and would like to discuss what additional insights this data holds, please contact our offices. Our staff is more than willing to help you understand the information that we have collected on Manitoba consumers.
Funding for this project is provided by the Canada and Manitoba governments through Growing Forward 2, a federal-provincial-territorial initiative.