



An Analysis of Canada's Investment Value-chain Gaps: An Agriculture & Agri-Food Perspective

Agriculture and Agri-food Canada, Ottawa

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Purpose

1. To investigate with Canadian experts, leading investment gaps in the agriculture and agri-food value-chain
2. To assess details and validate four key value propositions in Canadian agri-food: I. oilseeds processing, II. protein fractionation, III. functional foods, and IV. clean technology in the agri-food sector
3. To articulate and clarify the perceived barriers to further investment in and the development of competitive advantage in Canadian agriculture and agri-food



List of Organizations Interviewed, Aug-Oct 2017

1. Food Innovation & Research Studio, George Brown College (Toronto)
2. Tech Access Canada (Ottawa)
3. Consultant - JD & Associates (Guelph)
4. Farm Management Canada (Ottawa)
5. Consultant (Food Starter/Advanced Technology for Food Manufacturing – FS-ATFM) (Kitchener)
6. Investeco Capital (Toronto)
7. Canadian Agri-food Policy Institute (Ottawa)
8. Former George Morris Centre consultant (Guelph)
9. Alberta Innovates-Bio Solutions lead (Edmonton)
10. InfraReady (Saskatoon)
11. Canadian Agri-food Trade Alliance (Ottawa)
12. Griffith Foods (Toronto)
13. Canadian Oilseeds Processors Association [COPA] (Winnipeg)
14. Manitoba Agriculture Research Health Network [MARHN] (Winnipeg)
15. Food & Consumer Products of Canada (Mississauga)
16. Food Processors of Canada (Ottawa)
17. Canadian Federation of Agriculture (Ottawa)
18. Global Investment Attraction Group [GIAG] (Guelph)
19. Richardson Centre for Functional Foods & Nutraceuticals (Winnipeg)
20. Asia Pacific Foundation (Vancouver)
21. Flax Council of Canada (Winnipeg and Saskatoon)
22. Vineland Research & Innovation Centre (St. Catherines)
23. Ag West Bio (Saskatoon)
24. Consultant (Agricultural Adaptation Council [AAC]/Food & Beverage Ontario [FBO]/AAFC-Food Processing Council/Wing's Foods) (Mississauga)
25. Think Ingredients (Toronto)
26. Bioindustrial Innovation Canada (Sarnia)
27. Dane Creek Capital (Mississauga)
28. Haplo Tech (Winnipeg)
29. Ontario Agri-food Technologies (Guelph)
30. Ontario Precision Agri-Food (Guelph)
31. Bio-Amber (Ottawa)
32. Cargill Canada, (Winnipeg)



Investment Gaps

1. Pre-Commercialization
2. Advancing SME Manufacturing
3. Niche and Specialty Crops
4. Advancing Applied Technologies in Canadian Agri-food Value-chains



Investment Gap: Pre-Commercialization

Preparing for Market Readiness

- Pre-commercial support to **verify** new food crops/product nutritional value (most goes to established crops)
- Support verification process of **value** for new pre-commerce products/processes
- Investment capital (e.g. PPP, venture capital, process innovation = i.e. SR&ED)



Investment Gap: Pre-Commercialization

The Flax Council knows where we spend that bit of money, is it agrifood functional food, or increasing production, and supporting primary agricultural capacity? At this point it is the latter. Certainly, we can look at others, but we are restricted in what we can do because we are going on our own.

Flax Council of Canada

In terms of tech readiness levels, there are not enough alpha/beta testing programs and policies to get ready for commercialization.

Tech Access Canada



Investment Gap: Advancing SME Manufacturing

- ▶ Experts: SMEs nimble to preparing for domestic/int'l marketplace change (e.g. non-GMO products)
- ▶ Invest in SMEs for capacity in: trade readiness, market focus, culture of markets, regional regulations, e-commerce
- ▶ Increase share of Canadian agricultural inputs used in food processing to 45% by 2020. – Food Processing Industry RT, 2017



Investment Gap: Advancing SME Manufacturing

Logistically, if there are no co-packing plants, this discourages SMEs. Plants are in a bottleneck, especially because many SMEs have gone away. The loss of SME manufacturing capacity makes us less able to get to commercial scale.

Investeco Capital

The opportunity for investment is in SME manufacturing because they are finding new market niches, creating the conditions for more of these innovative brands to launch, and becoming successful.

Investeco Capital

Large scale investments like Dr. Oetker will be far and few between. SMEs, such as Fiera Foods are exporting raw baked, high value-added products with quality ingredients. They convert something of higher value, per weight, with advanced baking technologies.

Consultant to AAC and FBO

We have virtually no polymer manufacturers [in Canada]. When large companies see a small company, we have to be able to produce enough [supply].

Bio-Amber

One way that has been very effective to introduce [Canadian] products to new markets is contracts manufacturing, guiding foreign investors to manufacturers who do contract manufacturing. With the current retail structure, many SME manufacturers have developed excellent private label/contract manufacturing systems and would be happy for the additional volume and opportunity to spread risk.

Food and Consumer Products Canada



Investment Gap: Niche and Specialty Crops

Advancing Canadian Niche and Specialty Crops

The Rising Demand

Jumping off the artisanal breads trend, ancient grains like spelt, kamut and amaranth are now a hot commodity due to their interesting flavors and array of nutrients.

RESTAURANT HIT INDEED,

in the latest "What's Hot in 2014 Culinary Forecast" survey of restaurant chefs by the National Restaurant Association (NRA), 79 percent of chefs surveyed said ancient grains are a growing trend on restaurant menus. In fact, they rank ancient grains 15th out of the 50 top trends.



Source: National Restaurant Association's "What's Hot in 2014 Culinary Forecast"

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Ancient Grains-April 2014

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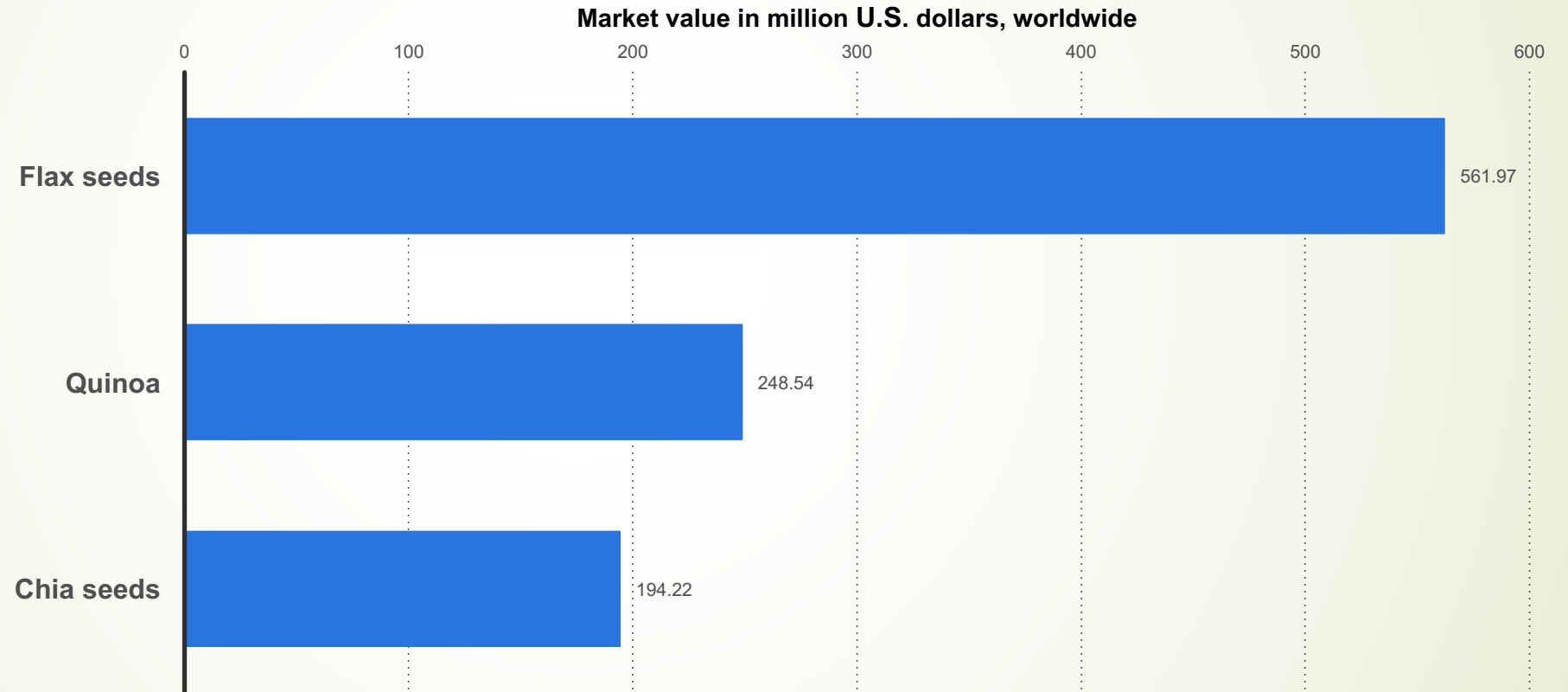
- Currently *limited* financing for: capacity, R&D, processing, value-added of specialty (e.g. barley, flax, sunflower, cannabis, hemp, etc.)

We are looking at barley fractionation, comparing the quality, and protein of Australian vs Canadian barley. We will partner with an Asian company to take out the protein and enzymes, to get a better feed source and weight gain in their animals. New demand for plant-based proteins, bring barley back as a rotational crop. A different crop for a different marketplace.

Cargill Canada



Market Value of Ancient Grains, Worldwide, 2015, by type





Investment Gap: Niche and Specialty Crops

Advancing Canadian Niche and Specialty Crops: *Cannabis*



Constellation Brands buys \$275 million stake into Canopy Growth Corp in Nov. 2017.

Opportunities with cannabis (e.g. R&D, processing, manufacturing, marketing)

Canada could be a first mover to export and lead across a range of [cannabis]-related products and technologies

Tech Access Canada



Investment Gap: Applied Value-chain Technology

Applied technologies in Canadian agri-food value-chains:

Hardware Applications (more risk?)

- Machinery and Equipment/Robotics (often importing currently)
- Non-thermal Processing
- High-Pressure Packaging (HPP)
- Microwave Assisted Thermal Sterilization (MATS)
- Additive Manufacturing (3D Food Printing)
- Applications to naturally extending shelf-life
- Drone Delivery Systems



Investment Gap: Applied Value-chain Technology

Hardware Applications

In Niagara, there is an innovation program for grapes and wine, you can buy equipment, and half the cost of it will be paid for. We subsidize the import of EU technology, we don't have the technology for our own food production industry, we are innovation takers. We need a buy-Canadian program, the automation should be here so we get the benefit.

Vineland Research & Innovation Centre

[Food companies] want machinery...different machinery, product lines, different facilities, packaging. A client wanted HPP, but it is expensive, they are a start-up, and do not have the volume, you need to be a Pepsi to make HPP worthwhile

Food Research & Innovation Studio, GBC

40% of food never makes it to the table, there are opportunities to preserve food better

Griffith Foods



Investment Gap: Applied Value-chain Technology

Systems and Software Applications

- ▶ Predictive Data/Information Analytics (Crop selection, Trends predictions)
- ▶ Artificial Intelligence – Machine Learning
- ▶ E-commerce platforms (e.g. Amazon, Alibaba)
- ▶ Applications in User Behaviour (Tracking Buyers, Neuro-marketing, Demand Responsiveness through the Value-chain)
- ▶ Personalization down the demand-chain, selecting nutritional profiles in crops

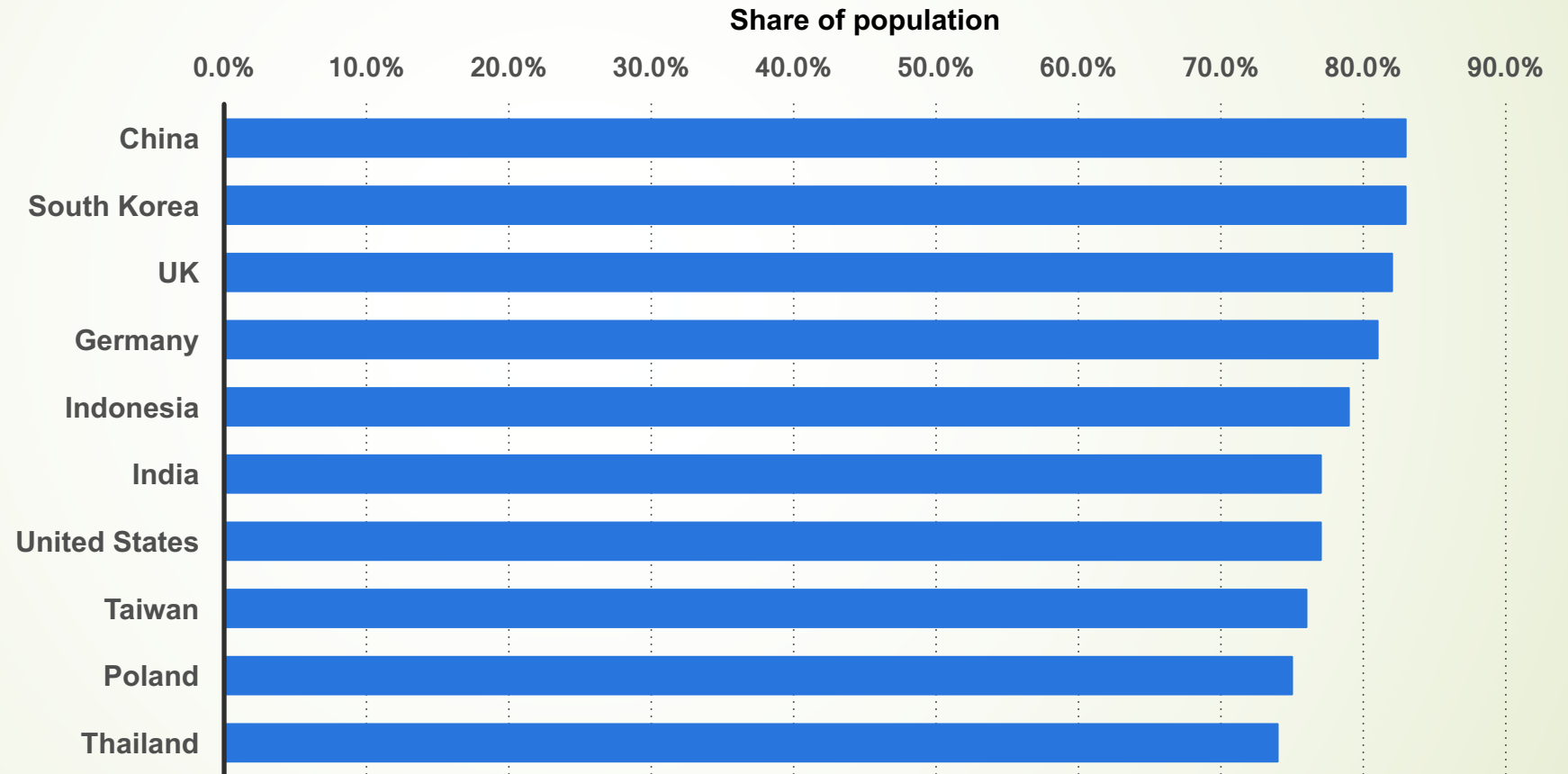
The Grains Roundtable endorsed a letter, on behalf of the GRT industry members to Transport Canada requesting the maintenance of existing databases and to further examine the potential for a 'data hub'. GRT, April 2017

Crop insurance data is collected yearly and could be used to augment BIMAT data to make it timelier, to help build business case for individual processing plants, industry requires more specific micro-level data (e.g. crop type, variety, yield, biomass volume, area infrastructure). – IBVCRT, April 2016

Growers are not paid for protein value, but rather for bulk [volume]. We [should] recognize value in the field, and get grower groups [to see] foods for health value chains. We need to look at component [parts] value because we are able now to measure the value in the field. We have precision agriculture, and drones to [better] understand component values in the field.



Global markets with the highest online shopping penetration rates as of 2nd quarter 2017





Investment Gap: Applied Value-chain Technology

The whole game is changing because of technology. Think of direct-to-home meal kits, drones dropping off your food. If I was a large retailer, I would be nervous. Millennials do things differently. There are now apps that notify [both the consumer, and the retailer when foods are about to waste].

Investeco Capital

The aspect of tech change that we need to be most aware of is access to data, data solutions, AI is happening quickly, in terms of knowledge. Can we be first out of the gate. As a tool for farmers, the value of data is unknown at this point, but data, digitization, automation, it has to be part of the new infrastructure that is capable of gathering this data.

Ontario Precision Agri-food

Specific to food processing in the next generation of products, how do you take [example], sugar out of the plant [for fuel, for other products]. How do we access the value we have. It is back to data, and the value chain needs to be respected.

Ontario Agri-food Technologies

In terms of technological change, we need to learn how to use data available to us to make informed decisions. Every tractor collects information from the moment the motor starts running. We need a mechanism to decipher what information is important. We need to invest in technologies that allow us to move from data collection to data analysis, and ultimately a change in behaviour as a result of what the data reveals.

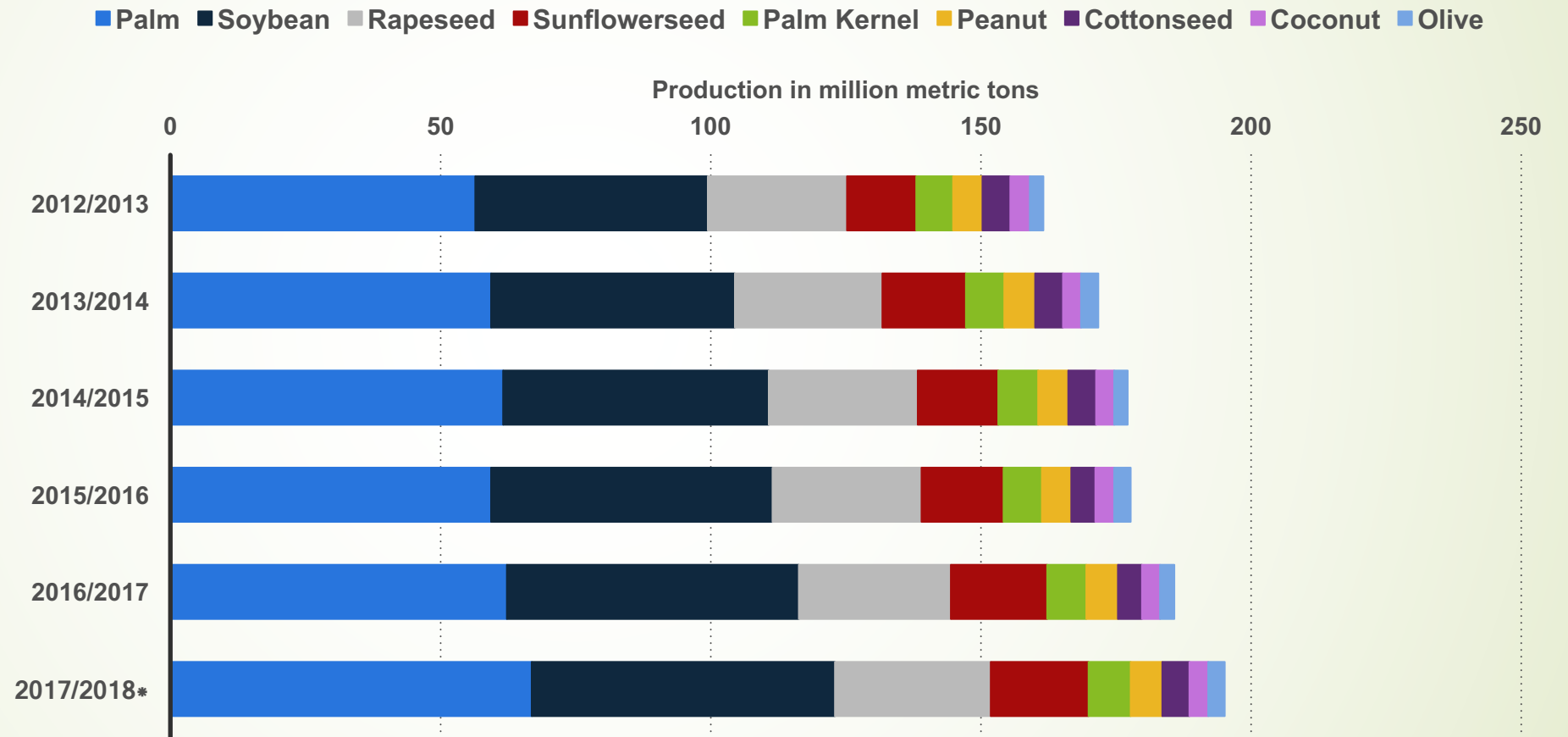
Farm Management Canada

There is a big business potential for companies that do data prediction for trends in food industry. What are the trends that are coming out, and what ingredients could be developed to solve the problem? Let's say we knew this 10 years ago [in Canada], the better we could be at [marketing it]

Think Ingredients



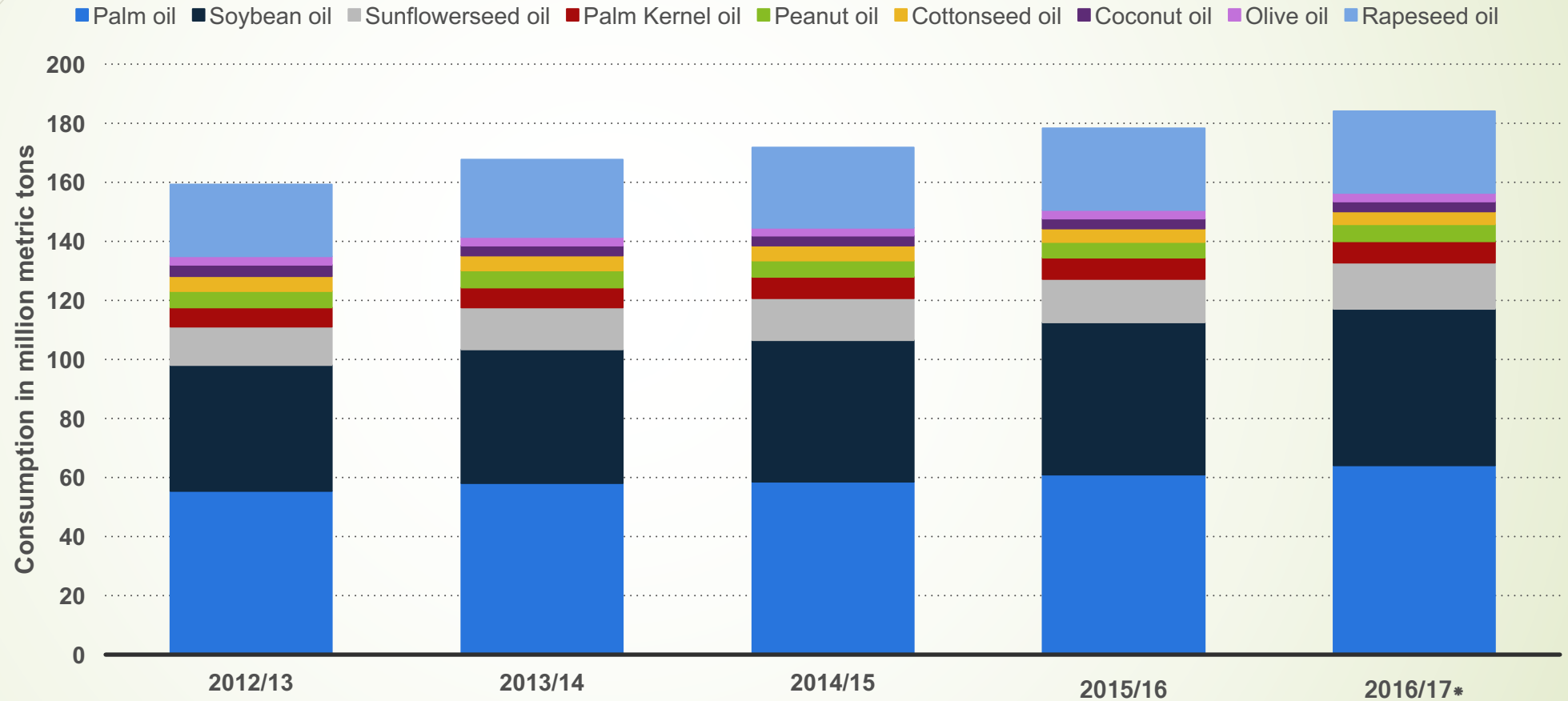
Production of major crop oils worldwide from 2012 to 2017



Source: US Department of Agriculture; USDA Foreign Agricultural Service [ID 263933](#)



Consumption of crop oils worldwide: 2013 to 2017, by type



Source: US Department of Agriculture; USDA Foreign Agricultural Service [ID 263937](#)



Key Value Propositions: Validation

Oilseeds Processing

Investments and issues are going into addressing the GMO-free canola niche market, which is a growing market. Also [large players, BASF, ADM, Cargill] are looking at high omega-3 for aquaculture, investing in alternate ways to feed fish.

Canadian Oilseeds Processors Association



Key Value Propositions: Validation

Protein Fractionation

- Challenges and Opportunities
 - Processed vs. whole foods
 - From animal, or plant-based?
 - Validation of health performance and label claims
 - Costs of equipment, scale, location strategy, R&D, markets and marketing

When you fraction protein, the by-product is starch. e.g. pea starch is available in the market, without [greater opportunities]. In 10 years, protein fractionation will look like oilseeds processing today.

InfraReady



Key Value Propositions: Validation

Protein Fractionation



Roquette breaks ground in September 2017 w. \$400 million pea protein plant in Manitoba

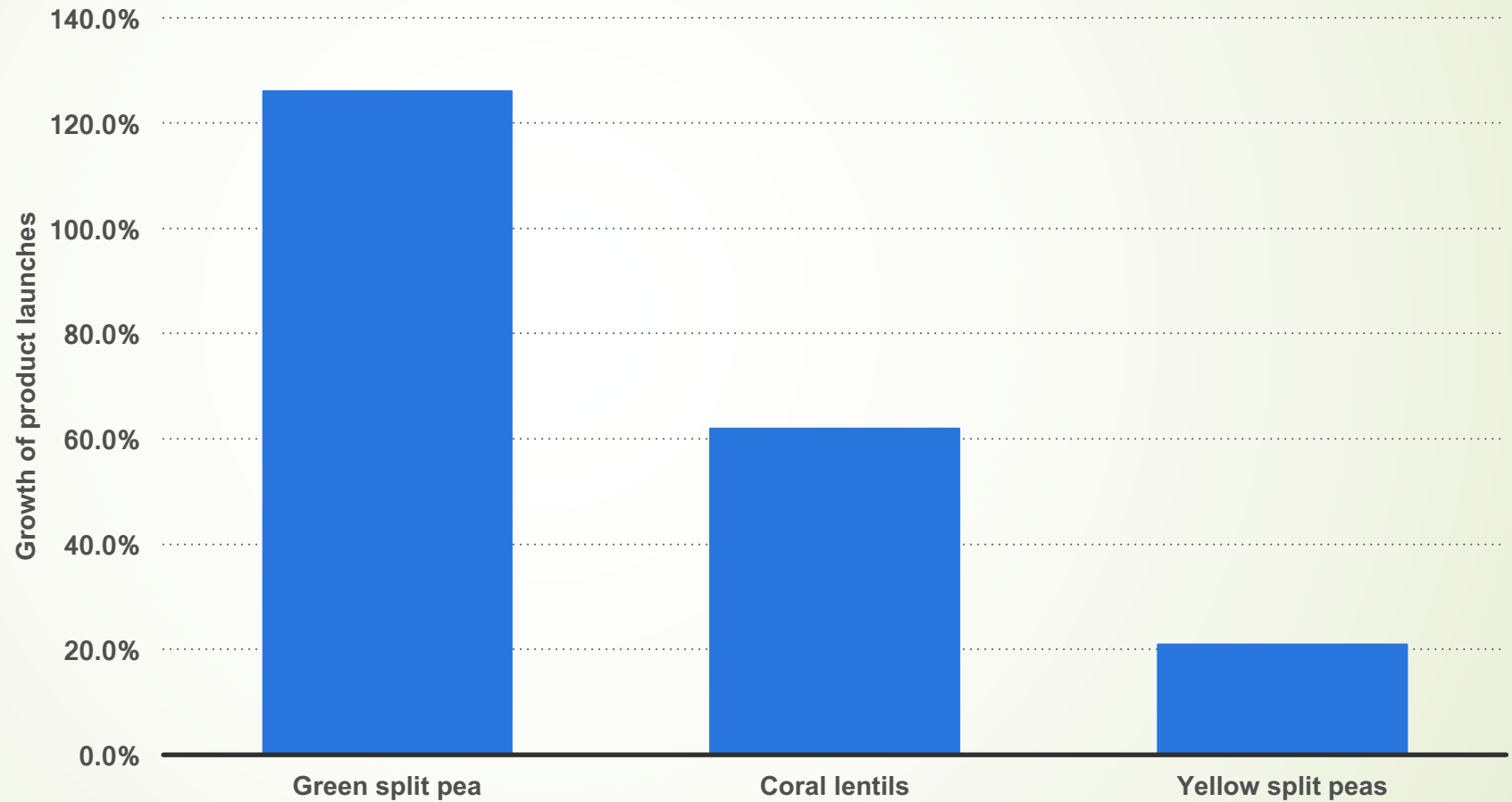
Investment Gaps in Canadian Agri-food



Verdient Foods, in Vanscoy, Saskatchewan to become the largest organic pea protein facility in North America in 2018.

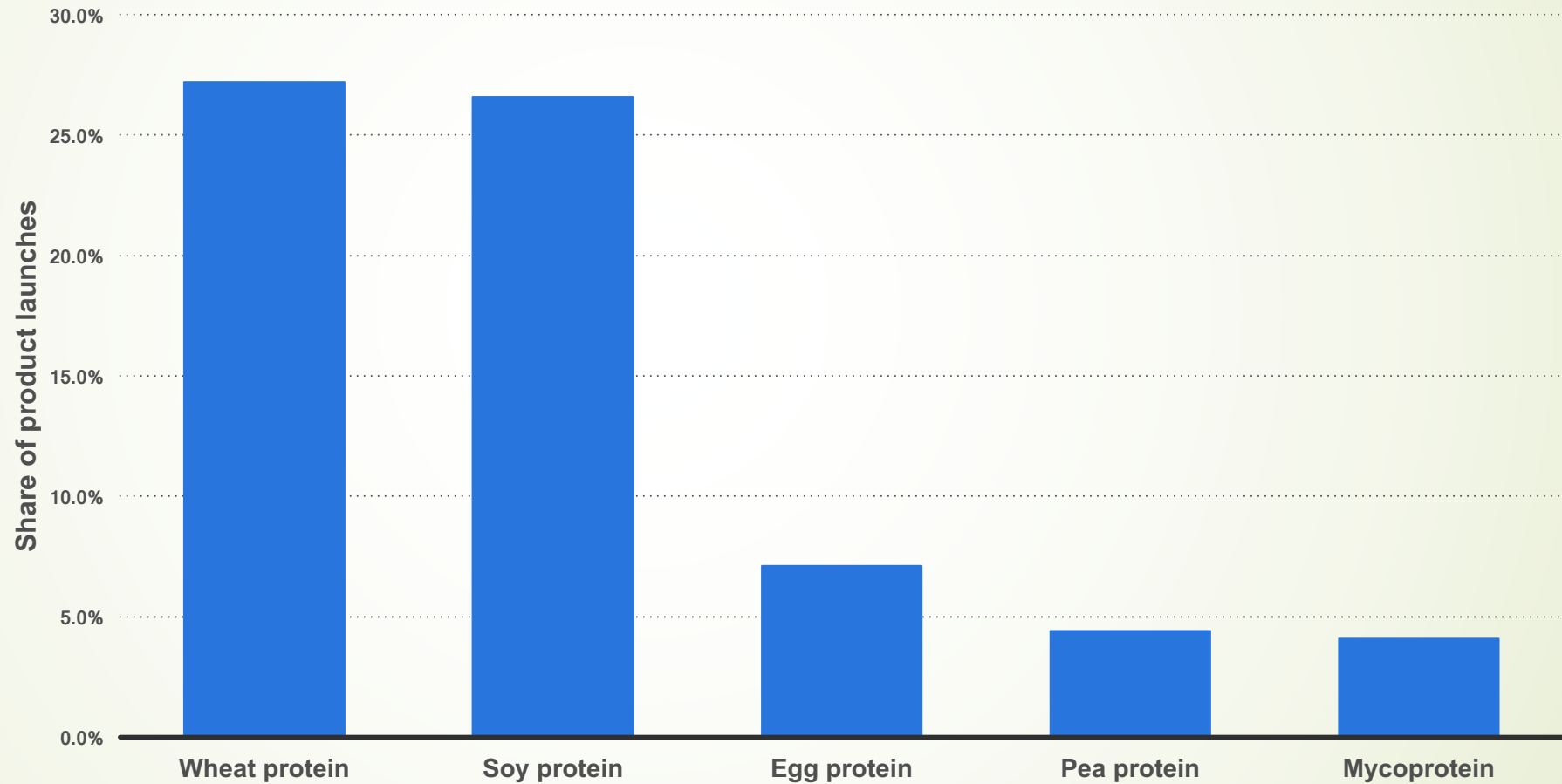


Growth of food and drink launches containing pulses worldwide, 2014-2016, by type



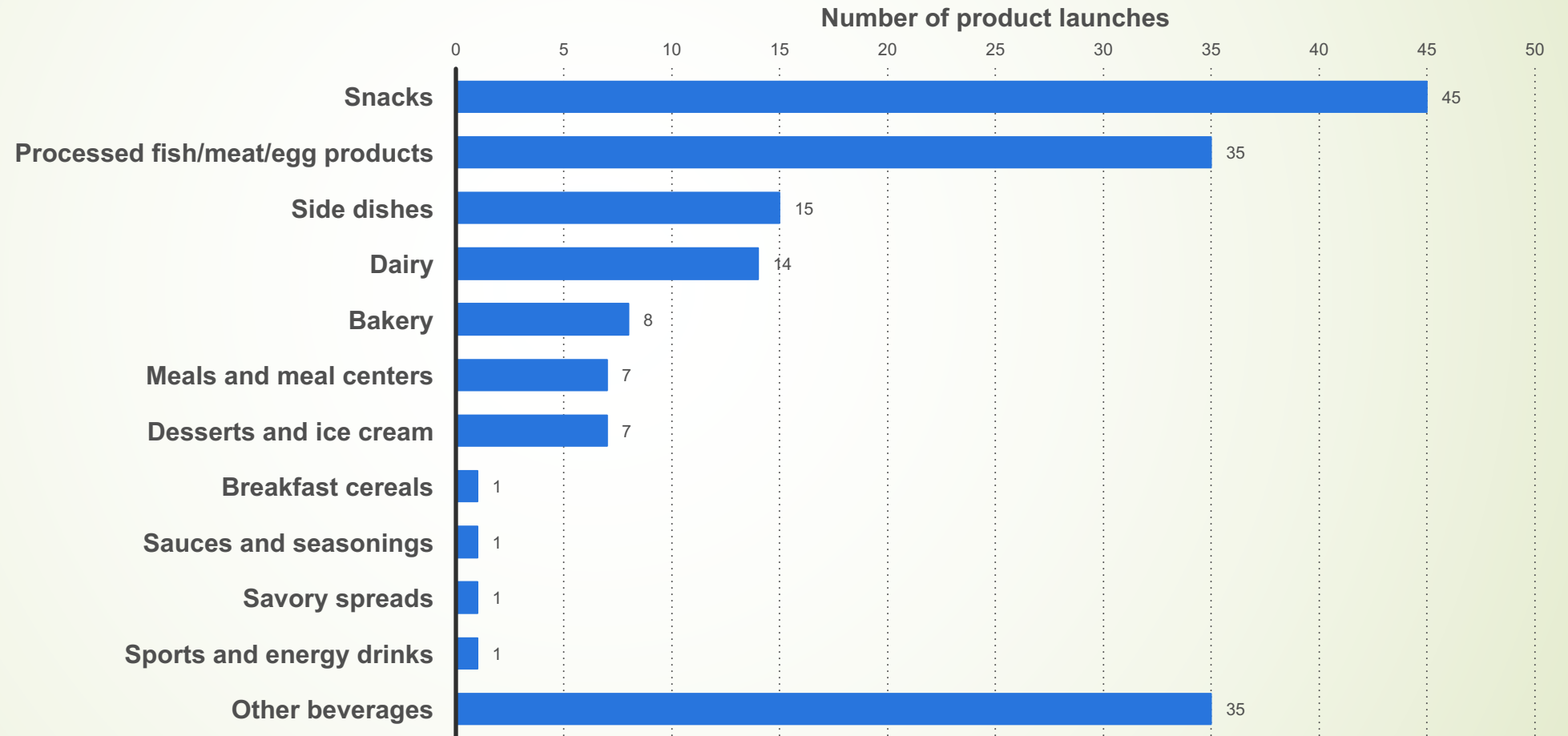


Share of meat substitute product launches worldwide, 2015, by type of protein





Number of F&B product launches with pea protein isolate, worldwide, 2011-2015, by category





Clean Technology Applications in Agriculture and Agri-food

- ▶ Value-chains
 - ▶ Raw material input infrastructure: source crops of consistent supply-quality-quantity
 - ▶ A market demand for 'sustainability' (e.g. Ford auto-parts)
 - ▶ Metrics for carbon/GHG reductions



Key Value Propositions: Validation

Clean Technology Applications in Agriculture and Agri-food

The bio economy opportunity... comes down to people. There have not been the drivers to this point, as it has not been well-shared or documented [the impact metrics], but there is a tremendous opportunity to move away from petro-based products

Cargill Canada

One of the problems we have had in the past, and down the pipe is as long as the sectors only look from a perspective of food commodities, and food related commodities, then we will miss out on the bio-tech revolution.

Bio-Amber





Key Value Propositions: Validation

Functional Foods

- ▶ Canada's fast growing agri-food subsector.
- ▶ Competition over types of protein (feed, insects, animal vs. plant sources)
- ▶ Gaps in terms of producing a stable and consistent supply of input ingredients
- ▶ New opportunities with increasing demands in emerging markets.
- ▶ Companies will not fill gaps if regulatory is inconsistent or overly burdensome.

There is a gap in producing insect proteins, and market acceptance at the consumer level. It will be years before there is cricket protein on the human side, but feeding fish, or pets, not quite the cultural 'sell'.

Dane Creek Capital

A lot of innovation will come from health foods from traditional societies, transplanted to our contemporary needs. We invest in simple production methods, and towards heritage.

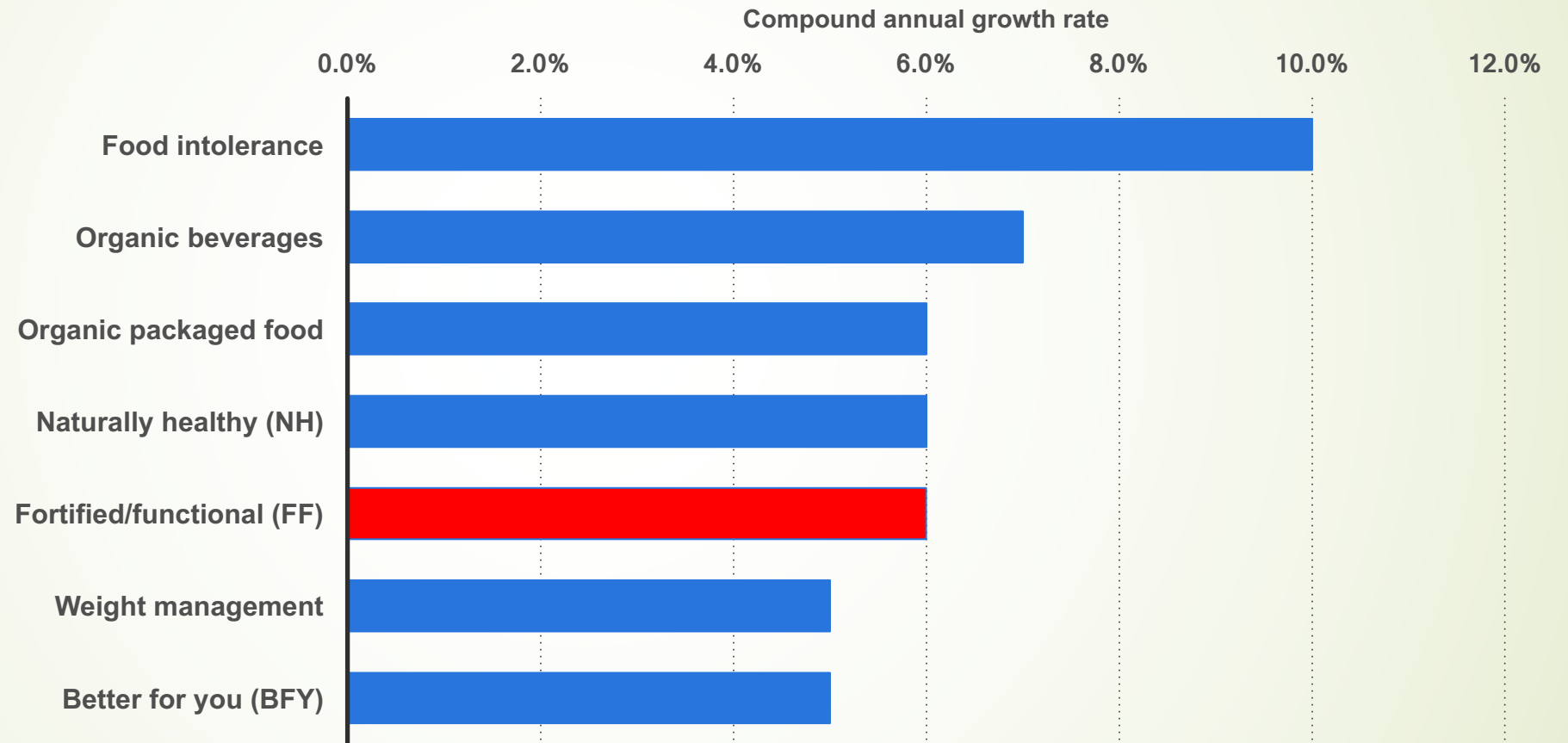
Investeco Capital

There is also a poor job in institutional nutrition, long-term care, hospitals. Nutritional issues are not well understood. We don't understand what [elders] need.

MARHN

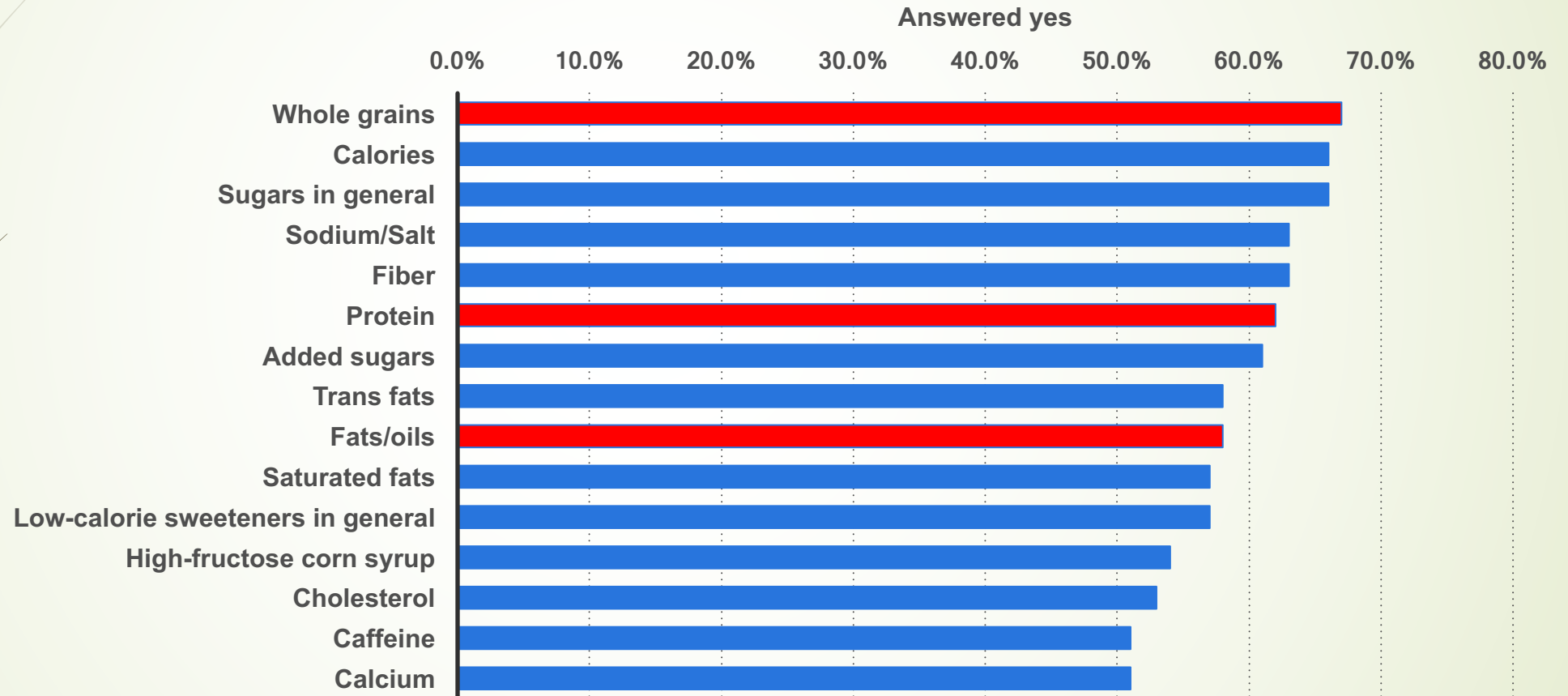


Estimated CAGR of the Health & Wellness Food Market Worldwide by segment, 2011-2015



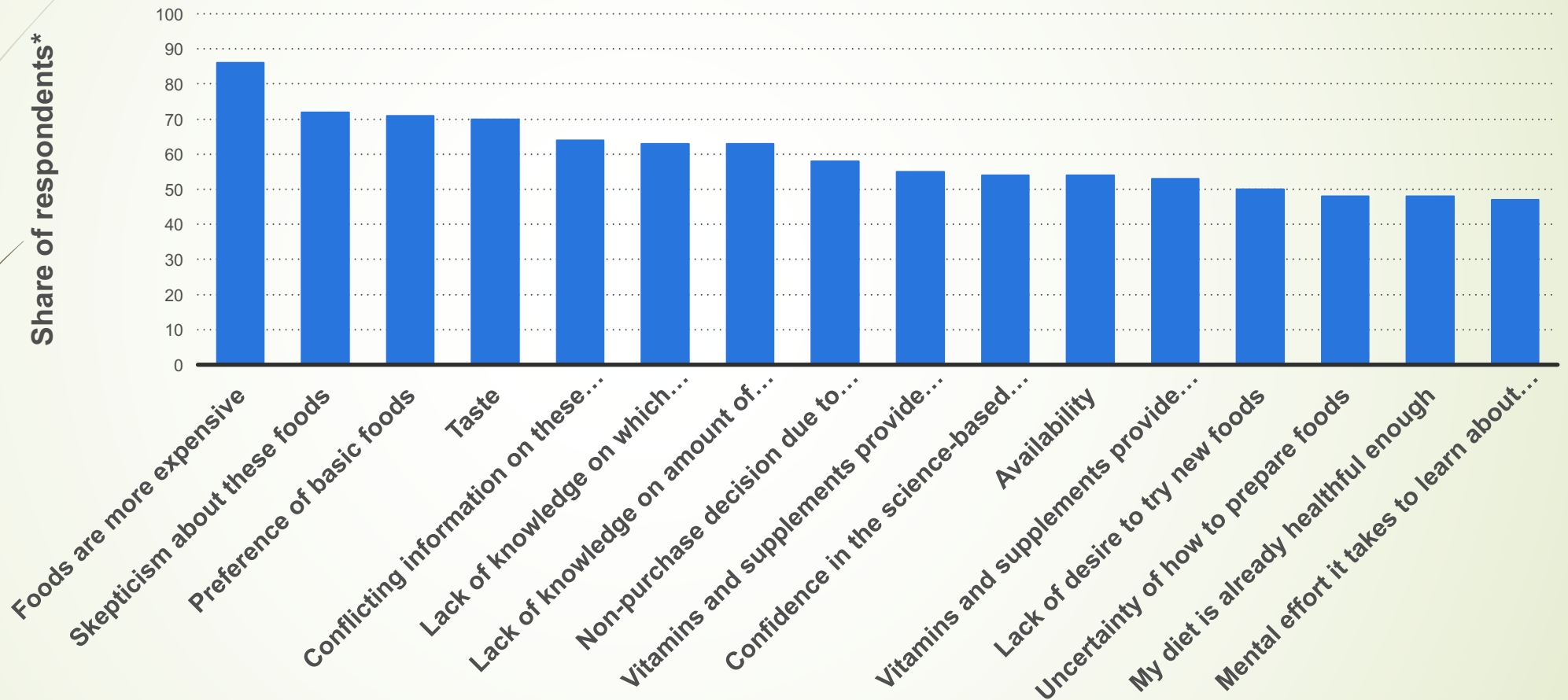


Over the past year, when making decisions about buying packaged F&B, have you ever considered whether or not they contain the following, USA 2015





Perceived barriers stopping US consumers from eating functional foods, 2013





Barriers: Pre-Commercialization

- Barriers to access to capital (e.g. domestic banks, venture capital)
- Ease of capital and funding MNEs vs. SMEs

Industry further described how most innovation comes from smaller, early stage companies that need support to move from laboratory/pilot stage to commercialization. Currently, GoC support for commercialization often becomes available once company reaches a certain level of success – IBVCRT, April 2016

2/3rds of the federal budget goes towards programs that safeguard against price and production loss, and only 1/3rd towards capacity and commercialization that builds business skills.

Farm Management Canada



Barriers: Niche and Specialty Crops

- ▶ Literacy around trade and export specialty market demands
- ▶ Limited research and marketing support for grains and oilseeds that lack a built-in check-off system (e.g. flax)

The utility of examining the producer check-off model to support research was mentioned, although there were questions about whether it could be implemented for the food processing industry.

FPIRT, May 2017

In [rural] Manitoba [we have been hesitant to expand our SME] because of labour shortage.

Flax Council of Canada member

For smaller, niche crops like quinoa, and hemp, there are no check-offs, so SMEs pay for the entire research. Programs for these niche categories would help getting product to market.

Ag-West Bio

A number of companies are seeking to do research on cannabinoids, and functional foods with cannabis. Canadian companies are the movers on this, however, it is [heavily] regulated to work with cannabis.

Richardson Centre for Functional Foods



- A clear and coherent policy on the use-sharing-application and privacy issues concerning the collection of data across the value-chain
- Right of access to data, and the ability to use this data.

We looked at data and data ownership, the American Farm Bureau (USA), 3rd party ownership of data, in terms of competitiveness. These issues are coming up with our general managers, we are not quite at the role of big data as other parts of the world, compared to California, and the Netherlands. There are issues around data sharing, data ownership.

Cdn. Federation of Agriculture



Barriers: Clean Technology

- Limited public procurement opportunities for business that have long profitability timelines (e.g. bioproducts).
- Public procurement of certain products or services, namely those in clean tech and bio-products could increase profitability in short-term.



Barriers: Functional Foods

- Infrastructure linking R&D to product readiness for commerce. Value-chain literacy around nutritional demands, health regulation requirements

The issue with most companies is the struggle establishing good manufacturing practices (GMP). We have one company that is looking to develop and commercialize a product but a main factor is they do not know where to go with the regulations. The stumbling block is HR heavy with regulatory knowledge on how to design the project.

Richardson Centre for Functional Foods



General Barriers

Labour (skilled/semi-skilled)

- Regional and geographical factors; USA programs; Rural areas

Health regulations

- Health Canada Food product labeling

*Foods for health is the term used. Consuming something with a health impact for human or animal. Terminology is critical to be inclusive, for investment, to not miss things because of phrases. What is in [research discovery] is de-risking. **If a discovery still has regulatory uncertainty and more trail-and-error, why bother.** MARHN helps de-risk, benchmark, and enhance, so innovation is easily transferred.*

MARHN



General Barriers

Trade Focus

- USA (remains not fully realized)
- Asia
 - China: growing middle-class also want quality
 - E.g Kidmann Ranch case in Australia
 - Japan model: build partnerships-infrastructure
 - India/Bangladesh: adjust to local needs, and changing diets (McCain's frozen, and dietary guidelines for starches)

Foreign Direct Investment (FDI) from China into Canada is a cultural shift. There are regulations around building permits, materials for construction, standards, rules, if they come to invest, there better be a way to manufacture

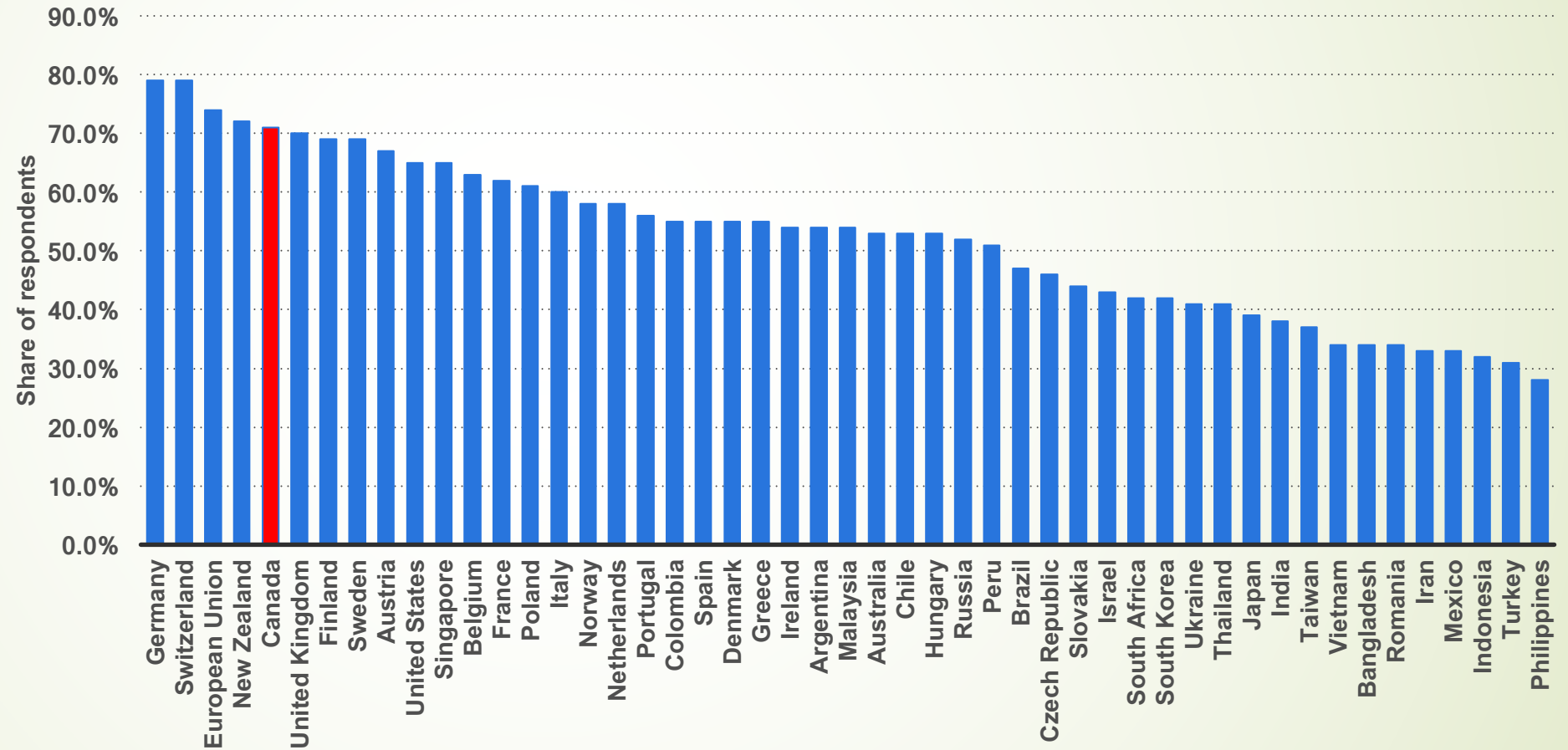
Consultant to AAC and FBO

In Asia, we see e-commerce platforms are where consumers are doing their shopping. The amount of Canadian lobster and shrimp being sold via JD.com daily was astonishing to witness. While e-commerce platforms are making it easier for SMEs to export globally, there is a huge learning curve. The question is how can the Canadian government helps SMEs take advantage of opportunities like this, in China, Korea, Japan or other places in Asia.

Asia Pacific Foundation



China: Perception of products made in selected countries: 2017





Conclusion

Strengths and opportunities in *Brand Canada*

- Value-chain literacy around opportunities: Healthy, Safe , Foods
- Carbon Pricing and Sustainability
- A Canadian agri-food data and information science revolution
- Fostering the vitality of commercialization and capacity in the SME agri-food manufacturing sector
- Specialization, Personalization of the Product and the Consumer