

# **Honey Authenticity Testing by NMR: A Market Impact Assessment**

*Prepared for:*

**Alberta Beekeepers Commission  
and  
Grande Prairie Regional Innovation Network**

*Report By:*

**Dr. Ray Bergstra  
MTN Consulting Associates**

**September 2019**



**MTN Consulting Associates**



## Table of Contents

Introduction .....	3
Project Objectives .....	3
Project Approach .....	4
Summary .....	4
Key Findings .....	6
Discussion.....	10
Conclusions .....	13
Future Issues to be Addressed by ABC .....	14



**Disclaimer**

*The opinions, findings, conclusions and recommendations expressed within this report are those of the consultants and represent the best possible assessment of information available at the time of the completion of the study. The results of this report do not bind Alberta Beekeepers Commission to act on or commit to any of the conclusions and recommendations.*



## Honey Authenticity Testing by NMR:

### A Market Impact Assessment

#### Introduction

Alberta Beekeepers Commission (ABC) is interested in the potential value to its membership of a honey quality and authenticity program that will increase revenues to Alberta beekeepers. There were three primary drivers for this study.

1. Honey is one of the leading targets for food fraud and therefore there could be value for Canadian producers to differentiate Alberta/Canadian honey from potentially adulterated imports currently in the marketplace.
2. Dr. Peter Awram of Worker Bee Honey is working towards establishing a nuclear magnetic resonance (NMR) spectroscopy-based methodology and business. NMR is considered as a valuable and reliable technique to be used as a standard for measuring honey characteristics and for detection of fraudulent honey products.
3. Alberta/Canadian honey that is documented as traceable and authentic could attract increased value from export business, particularly from the US.

From this perspective, it is postulated that once implemented, the NMR methodology has the potential to become

- a) a standard QA/QC and traceability documentation process for producers,
- b) a product certification and marketing tool for producers, wholesalers and retailers,
- c) part of an improved product surveillance process at CFIA for both domestic and imported honey products.

If successful, an established honey traceability and quality system in Alberta and Canada as a whole would enable our honey producers to be fully aligned with quality and antifraud systems being developed abroad, and in particular, in the US.

#### Project Objectives

The objective of this feasibility study is to determine and validate the benefits (financial or otherwise) for developing a standardized program for use in Alberta (and Canada), based on NMR for establishing product quality, traceability, and integrity. This will include:

1. A market system analysis of the honey industry
2. Gaining an understanding of the brand and value of Canadian honey for export to its key markets, with a particular focus on US.
3. Determination of the potential for Canadian honey shipments to the US to attract higher pricing.

4. Assessing any procedures and policies under development in the US that may impact Canada's honey exports.
5. Validate cost estimates for implementing and operating a standardized honey analysis system.

## Project Approach

Discussions were held with a range of players within the honey industry value chain, including honey producers, packagers, retailers, as well as those involved in the regulatory and policy side of the industry.

Previous work on this subject concluded that NMR database methodology is becoming accepted globally as reliable and viable honey analysis tool for detecting adulteration with non-honey sugars. The key questions raised during this series of interviews were:

- Is honey adulteration an issue in the Canadian market?
- Do market drivers and/or conditions exist that would support the cost and effort related to implementing a traceability and authenticity quality system for honey?
- Would NMR analysis be a significant part of a traceability and authenticity quality system for honey?

A total of 15 interviews have been completed, which included industry experts from government, honey producers, honey packagers and retailers.

## Summary

Adulterated honey is real. The 2019 publicized report from CFIA highlights that honey authenticity is a clear issue facing the food industry as 24% of samples taken of imported honey products were found to contain unacceptable levels of added sugars. NMR methods were used in this study, and of the 52 samples of deemed unacceptable, 44 were identified as adulterated by NMR. This type of surveillance is part of CFIA's ongoing mandate to monitor incorrect labeling and false food claims and CFIA has authority to prevent and penalize this activity. Year-on-year data is not available and therefore the market impact of CFIA's surveillance of imported honey won't be known for several years.

Canadian honey is not well marketed. There is a consistent feeling among stakeholders that there is an opportunity to increase the marketing effort and market value of Canadian honey from two perspectives - differentiation from imported products and increasing penetration into the Canadian market. It was reported that only 40% of Canadian households have honey in the pantry. However, honey producers are not currently well positioned to implement an integrated marketing plan nor do they see a clear strategy or benefit of an enhanced product quality and authenticity certification system.

From the perspective of Alberta Beekeepers, honey marketing has not been a focus. Canadian consumers are believed to already place value and trust in locally produced honey and these consumer views are unlikely to be impacted by a quality certification mark promoted by beekeepers. Common sales channels include local packaged sales and some direct exports, but the most volume is sold via bulk sales to honey packagers and marketers (Bee Maid, Golden Acres and McCormick). Therefore, to have significant impact under this business model, any marketing of Canadian honey would need to be led by the packagers and marketers.

Authenticated pure Canadian honey is marketable. The opinion of industry experts and service providers related to the honey industry is that in general, value can be gained by implementing quality, traceability, and authenticity systems but any effort in this area must receive strong producer and packager support, a willingness to implement, complete with technical support and a marketing and communication plan. It should be noted that producers are becoming better positioned relative to authentication and verification as their entire production systems became subject to CFIA Safe Food for Canadians regulatory procedures in 2019. Once these quality management and traceability systems are implemented, the addition of a QC test that authenticates the honey sample will be less of an administrative burden since the documentation systems will already be in place for CFIA.

There is a need for a national approach. The Canadian Honey Council at this time is primarily focused on establishing best practices in beekeeping and in this way supports the honey producers. CHC does not have a significant marketing function, unlike its US counterpart, the American Honey Producers Association. Establishing a national honey marketing program, with the help of agriculture marketing experts, is considered a critical step for addressing the fundamental issue of building the brand of Canadian honey, with the follow-on benefits to Alberta producers. With increased pressure from global imports, the lack of a recognized quality control system support with strong communications and marketing may leave Alberta (and Canadian) honey in a vulnerable market position.

There is competition from global exports. With respect to the US market, gaining share of the US import market is not likely to be solved by a Canadian honey authentication system on its own. Honey imported into the US is considered as a commodity, and imports from Asia and South America have been driving down prices. While there is consensus that adulterated honey exists among the imported products, there are other aspects of the US market, such as consumer demand and preferences, which would not be addressed by an authenticated Canadian honey standard.

Honey quality systems are in play. True Source Honey is a voluntary honey traceability system that is meant to ensure the origin of honey through 3<sup>rd</sup> party audits and product labeling. However, honey fraud remains an ongoing problem, and True Source may be considering strengthening its system. A second potentially important effort is underway in the US to combat fraudulent honey in the market is GenuHoney.™ GenuHoney was created to fulfill the gap in the industry for a comprehensive honey authentication solution. INSCATECH is a food industry service provider in the area of fraud detection. Through a combination of forensically-based authenticity audits, independent sample procurement, testing, and technology, INSCATECH would support the GenuHoney quality claim by

offering beekeepers, packers and retailers, honey authenticity validation solution. The market uptake of this quality system is not known at this time, but it is believed to be hampered by potentially high costs of testing and site audits.

Further details of this study are provided below, along with recommended next steps.

## Key Findings

### *Honey Producer Perspective*

Honey producers (beekeepers) represent a wide range of operations, from full scale industrial style production to small hobby producers. Many of the larger commercial producers are located in Alberta and they are generally aware of issues related to honey adulteration. However, honey adulteration is just one of a number of challenges that are facing honey producers at this time and overall, beekeepers are focused on issues such as following the lead of government regulations, bee health experts, and honey packagers/marketers. Further, the technical aspects of honey authenticity testing, including the accuracy and value of NMR spectroscopy is difficult for most producers to assess.

Some of the key points arising from discussions with beekeepers are as follows:

- a) Producers market their products through a range of channels, such as
  - local/direct/private sales,
  - bulk sales to packagers/marketers (Bee Maid, McCormick),
  - direct exports to countries such as Japan.

With respect these sales channels, unless beekeepers sell direct to countries like Japan, which already has QA/QC systems in place (including audits), they have a needed QA/QC tests. For example, for local and private sales, producers market based on word of mouth and a general trust in a locally produced specialty food product. Meanwhile, packagers like Bee Maid currently maintain their own QA/QC systems as required for their sales and markets, and they do not currently pass any requirements for analytical testing on to the honey producers.

- b) During the course of this market research, new CFIA traceability requirements related to the “Safe Food for Canadians Act” are being implemented by Alberta beekeepers. It is interesting to note that while the regulations have been several years in coming, it was not until July 2019 that the beekeepers responded in a significant way. Prior to this time, many of the beekeepers were not clear on what CFIA was requiring or how to implement a QA/QC system. Once Bee Maid and McCormick stated that their suppliers must have QA/QC/traceability systems in place as required by CFIA and a model for process documentation and record keeping was available, beekeepers are now adopting the procedures and are meeting the requirements of CFIA audits.

- c) Beekeepers feel that with CFIA regulations currently in place, they are being held to a higher standard than imported products. They would like to see equivalent standards applied to all imported honey.
- d) In terms of incorporating additional testing to document honey authenticity, producers do not see a clear business case for including NMR or similar methods. Producers are aware of concerns for authenticity but believe that the overriding factor is that US market is more price conscious and less concerned about product quality. Some producers have heard that US has been importing larger volumes from India at a low price, with no authenticity issues, and therefore, some other marketing approach would be required to establish a higher value for Canadian honey.

### *Honey Packager and Marketer Perspective*

Honey packagers and marketers, such as Bee Maid, McCormick (Billy Bee) and Golden Acres Honey are very important players within the Canadian honey value chain. With virtually all honey producers being small local businesses, honey producers benefit from supplying honey packagers, which then can market to large scale retailers or export to larger global markets. This is a common model (often a co-operative) for agriculture commodities.

The following are comments from honey packagers, based on their view of the market.

- a) Once honey has been aggregated by a packager, a significant portion of its value has been eroded. This is because honey is considered a niche market and the best value can be realized when it is sold as a local pure product where consumers have a connection to the producer. While a product produced by Bee Maid could be branded as “Canadian Pure”, its value in Canada is not increased this way since most Canadian consumers believe that all Canadian honey is pure. It is generally believed that the Canadian market already assumes that their honey is a quality Canadian product and therefore there may not be much to be gained by conducting authenticity testing. However, since CFIA published some honey analysis results showing some level of adulteration, there may well be value gained vs. imported products.
- b) Honey authenticity is a national issue that should be addressed by a national approach, which raises several critical concerns:
  - CHC has been focused on providing best practices for beekeeping and honey production and does not have a budget or staff for marketing aspects of honey.
  - Two main regions of Canada (the prairies and central Canada) have opposing perspectives, since most honey is produced in the Prairies, whereas Ontario and Quebec are significant importers. Nonetheless, one key goal for Alberta honey production would be to have a bigger market share of (and displace imports to) Ontario and Quebec.
  - Packagers reported that the overall market for honey has not been fully realized as only 40% of households have honey on their shelves. Therefore, the opinion of the packagers/marketers is



that in addition to higher interprovincial sales, overall market growth is a second key area to address to improve the honey industry in Canada.

- In terms of an advanced quality system that covers authenticity, beyond being a national approach, it would also need to have engagement with all parts of the value chain, from producer to retailer. Companies like Bee Maid supply all of the major food retailers in the country, and so the potential to implement an “Authentic Canadian Honey” claim would only work if all parties agreed to promote the quality claim.
- c) The packagers were also clear about their opinions about the US market. This continues to be a low cost market and trying to move Canadian product into a higher value range is unlikely to succeed based on the high level of competition on a global level. As soon as the product is imported, it becomes a bulk honey product that competes with other high volume imports from other countries. In addition, US consumers are typically not mindful of differences between various types of honey. Further to this, if an individual Alberta producer were to try to market and export their own brand of honey, they would be competing with local US-produced honey, and would be working against trends of buying locally produced products. Therefore, any increased effort to market Canadian honey to the US would be difficult and high cost.

### *Food Retailer Perspective*

A limited survey of major food retailers in Alberta indicated that nearly all honey products on the shelves were Canadian honey - both Bee-Maid as well as locally produced and packaged brands. In some cases, such as in smaller rural towns, a retailer may source honey only from a local beekeeper due to favourable logistics and local brand value.

The major food retailers in Canada do not generally take a lead role in marketing the attributes of the products on their shelves. They place trust in their suppliers in terms of product quality and integrity and it is up to the suppliers to comply with and support any quality claims that are made on product packaging. Retailors also tend to be primarily concerned with quality, traceability, and food safety documentation as provided by their immediate suppliers rather than producers. Therefore, for most honey products at the major retailers, compliance with the new CFIA food safety regulations, and any other quality claims, would be the responsibility of packagers/marketers like Bee Maid or McCormick.

Alberta retailers have not experienced instances of adulterated honey products. They are confident that Canadian honey is good quality and they are generally not concerned with any specific QC programs at the farm producer level. Having said this, retailers are aware of trends where consumers are becoming more aware of food safety, integrity, and source. Several factors have played a role in this increase of awareness, include products like marketing Fair Trade coffee and recent media coverage of improper food labeling such as with white fish and honey. A case in point is the Netflix documentary series “Rotten”, as the first episode was about honey production and included the potential for adulteration by addition of sugar.

In the area of product positioning and pricing, retailers set product pricing based on costing and recommended retail pricing provided by the manufacturer/suppliers. However, retailers will push back on high suggested retail pricing if it considered unreasonable. In the event that premium pricing is recommended by a supplier, it must be supported by a marketing effort such as in-store promotions.

As mentioned above, retailers believe that most consumers regard basic grades of Canadian honey as good quality and most customers do not look for product quality certification labels.

### *View from Industry Experts*

A number of industry experts, including service providers and government specialists expressed their views on honey adulteration and enhanced quality assurance. Key points are noted as follows:

- a) There are a number of enhanced quality and traceability systems in place in the agriculture and food industry. Some examples include certifications for “non-GMO”, “Organic”, and “Free Range” [eggs]. These systems generally rely on 3<sup>rd</sup> party auditors for verification. Quality Assurance International (QAI) is a certifying body for organics but also does traceability and environmental verifications. Provision Analytics provides certification for traceability, food safety, as well as other operational analytics. These systems must justify their cost, which can be up to \$10,000 annually, a cost that is borne by the owner/operator of each site, whether it is a production site or packaging site.
- b) One expert is of the opinion that implementation of a more robust traceability, quality and honey authenticity system would help the organic honey regulations which, at this time, may not be as well defined as could be. Organic honey is currently more about process as it is typically difficult to control the floral sources, as bees may stray to non-organic crops even though they are meant to stick with organically produced floral sources. Due to this hard-to-control nature of the bees, it is possible that existing organic producers may resist a rigorous honey authenticity program that includes traceability analysis by NMR because there is a reasonable likelihood of finding non-organic crop sources in honey marketed as “organic”.

### *Reports of Fraudulent Honey*

The recent publicized report from CFIA highlighted that honey authenticity is a clear issue facing the food industry, as 24% of samples taken of imported honey products were found to contain unacceptable levels of added sugars.

- Of the 52 samples of deemed unacceptable, 44 were identified as adulterated by NMR.
- The fraudulent products included those from 15 different “Declared Countries of Origin” with the leading adulterated products coming from India, Greece, Pakistan, and Vietnam.

- CFIA's analysis prevented 12,500 kg of honey from entering the Canadian market. To put this into perspective, Canada typically imports approximately 6.5 million kg annually – nearly all into Ontario and Quebec.
- None of the Canadian honey samples tested was found to contain added sugars.

As additional context to this report by CFIA, the implications of this work are not clear at this time. The testing was conducted as part of an overall mandate for CFIA to find food product that is improperly labeled or makes false claims, meaning that there is not a specific initiative to find adulterated honey and subsequent market surveillance is not guaranteed.

## Discussion

### *NMR Spectroscopy for Honey Analysis*

There are numerous hurdles facing an initiative to make NMR analysis routine for documenting honey quality and authenticity.

Lack of technical understanding of NMR. Nuclear magnetic resonance is not a simple analytical technique that is readily understood by anyone other than professional scientists (chemists, physicists, etc.). Since it is commonly associated with magnetic resonance imaging used in medical diagnostics (which is a very different application of NMR), it is difficult for beekeepers to accept that such a sophisticated analytical technique would be a reasonable way forward for everyday honey quality testing.

Lack of consensus to the “problem”. Most industry players agree that any changes to the honey production and marketing value chain must be supported by all segments of the industry and at this time, there is a lack of agreement and quantification of the honey adulteration problem in Canada.

- Even considering the number of imported samples found to be adulterated by CFIA, the confiscated quantity (12,000 kg) is only a small portion of the total volume of imported honey (6.5 million kg).
- Retailers are generally not concerned, and those consumers who might be, often have multiple brands of locally produced (and trusted) honey readily available.
- Beekeepers continue to be focused on best practices for hive health, as improvements in this area have historically had the biggest impact on year to year bee survival and avoidance of catastrophic diseases and pest infestations that have very serious negative impacts on their businesses.
- Numerous players in the honey industry believe that much more can be gained by Alberta/prairie honey producers through reduction of interprovincial trade barriers, and displacement of foreign imports to Ontario and Quebec by Alberta honey.
- In terms of low pricing currently being offered for Canadian honey by US importers, some view this as evidence to support the need to document authenticity, whereas others accept that bulk honey sold to the US is a commodity and it is not worth the effort that would be required to raise the value and brand image.

Culture of beekeepers/honey producers. Beekeepers are a small and independent sector of agricultural producers who have utmost pride in their products. A common sentiment is that they are producing a beautiful, healthy, natural product that does not require improvements, and possibly should be considered to be above federally mandated CFIA food safety regulations. When coupled with price pressures or any potential increase in production/operational complexity, attempts to improve or further demonstrate the quality of honey tend to meet resistance.

A perception of high cost. Related to the lack of technical understanding of NMR, there is a perception that implementing NMR as a routine QC test would bring in unacceptable increased costs to producers. Specifically, this would include the operational time to take and ship samples, the test cost itself, and possibly the cost of production site quality system audits.

Lack of national marketing effort. While the Canadian Honey Council continues its focus on best practices in beekeeping and keeping beekeepers informed, CHC does not currently have the financial support for a significant honey marketing honey program. This stands in contrast to the effort that has gone into Pulse Canada, for example, over the last 20 years. Pulse Canada is the national association of growers, traders, and processors and is focused nearly entirely on increase global markets and global market share of Canadian pulse production.

Lack of understanding of roles relating to regulations. In July of 2019, CFIA published their findings of testing a wide range of honey samples (imported products in particular) for adulteration (mainly sugar addition). However, until the report was issued, few had knowledge that this work was underway and neither is there a clear understanding of what actions CFIA did or will take. Related to this is the fact that there was no publicized response from Canadian honey producers or CHC, i.e. requesting action against adulterated imports or promotion of Canadian pure honey.

Difficulty in implementing a QA system. Based on the low level of understanding of quality systems, adding NMR analysis into QA/QC systems will require experience, education, and communication. At this time, there are gaps in knowledge throughout the industry regarding who would be responsible for NMR analysis or how a testing facility could be validated as “certified”, independent, and reliable.

### *Support for NMR*

In the event that the industry defines a path forward to document and market the authenticity of pure Canadian honey, there is compelling support for the NMR methodology currently being discussed and promoted.

Technical utility of NMR. NMR is a far reaching technique for honey QC analysis. Once a database of spectra of known honey samples has been developed, a single NMR test can be used to produce a full range of honey characteristics, including moisture, HMF content, floral source, and a confirmation that the sample’s NMR spectrum conforms to spectra of known pure honey samples.

The strength of the NMR method to detect anomalies is the basis of its value as an authenticating screening test and finding adulterated samples. Other more extensive analytical methods are commonly used to identify the specific adulterant or impurity, and would typically be conducted once when a screening test (like NMR) detected an anomaly. It should be noted that there is a distinction between *detection* and *identification* of chemical unexpected components when analyzing any material. An effective screening test would tend to be fast and lower cost for detecting a sample that doesn't look authentic. Additional, more detailed and potentially more costly testing can be used to identify the specific adulterant.

Global acceptance of NMR. As the method has been developed, it is becoming more and more accepted as a highly functional and reliable method for detecting adulterants in honey. CFIA's recent publication of adulteration detection using NMR is further indication its acceptance. It is believed that an analytical laboratory in Germany was used to conduct NMR tests for CFIA. If this was the case, it is likely to be the same lab that was involved with fraudulent honey cases in other countries, such as the cases in Australia in 2018.

### *NMR Testing Model and Cost*

In order to establish NMR as a QA/QC method for documenting honey quality, a number of elements and criteria should be met to satisfy standard industry procedures for the food analysis industry.

1. As noted previously, consensus of acceptance across the value chain would be required for the technology to have the best chance to provide a net financial benefit for the sector.
2. An education and transfer of information program would be required to bring ABC membership on board with the value of including NMR in their honey production processes.
3. The testing should be done by a 3<sup>rd</sup> party laboratory that is already in the business of analysis of agricultural and food products. There are many commercial laboratories operating in Alberta, including but not limited to Labs Mart, PBR Laboratories, CARO Analytical Services, and others.
4. The development of the NMR spectra database for Canadian and other honey products is already underway by Bruker (NMR machine manufacturer), Peter Awram (Worker Bee Honey), and possibly QSI in Germany. This database would need to be finalized and then a licensing agreement for use of the database be made with the commercial analytical laboratory.
5. Beekeepers looking to incorporate the method should build the testing plan into the QA systems that they have in place that meet the CFIA food safety and traceability requirements.
6. Industry standard sampling and shipping systems should be put in place, such as uniform sample kits with prearranged sample pick-up, testing, and delivery of results set up with virtually no disruption of day to day operations of honey production.

A high level cost assessment of the operation of an NMR testing system is provided below.

Suggested test costs, /sample	\$150
Estimated # of tests for AB honey, /yr	2,000
Total testing costs, /yr	\$300,000
NMR Equipment Cost	\$750,000
NMR Operating Costs, /yr	\$75,000
NMR Database License cost, /yr	tbd

Key points:

- if a single 3<sup>rd</sup> party laboratory were to run all of the NMR QC testing for Alberta honey production, the annual revenues would be in the \$300,000 range
- The rate of return on the investment and operations for an NMR machine by the 3<sup>rd</sup> party lab can be estimated in the 35% range.
- If Alberta honey production is 15 million kg per year, the average cost per kg for NMR analysis of 2,000 lots/samples of honey would be \$0.02 per kg.
- Smaller producers that have smaller lots of production/shipments would experience higher analytical costs on a per kg basis, potentially in the \$0.05 – \$0.10 per kg range.

## Conclusions

Our research into the Alberta and Canadian honey value chain suggests that the industry believes that there is an overall opportunity for Alberta Beekeepers to improve the marketing approach of Alberta honey. Overall, the challenges that need to be overcome are related to a lack of common focus of industry stakeholders and the absence of a national market development strategy and program. Two key aspects of a marketing strategy are a plan to address emerging competition, both nationally and globally, from lower cost and potentially adulterated globally traded honey. This raises the opportunity to market the high quality and purity of Canadian honey. While this marketing program should be a national approach, as the major producing and exporting region, Alberta will directly benefit from any Canadian honey marketing initiative.

Key conclusions from this study are provided below.

1. All stakeholders interviewed believe in the value of natural, made in Alberta/Canada honey. In an age of highly processed foods, coupled with trends supporting the use of local natural ingredients, and the need to cultivate bees as pollinators, honey production is expected to grow as a desirable industry.
2. Most producers and packagers agree that Alberta honey has an opportunity to increase its market share in Ontario and Quebec, particularly as lower priced imported honey has been documented by CFIA to carry a significant risk of adulteration.

3. Alberta honey producers, while desiring the highest possible price for their production are reluctant to incur additional costs (for QC testing) without assurance of financial benefits to their business.
4. Any effort to increase market demand and perceived value (read higher consumer prices) would benefit from a national honey marketing strategy. When considering the modes of operation of other agriculture producer groups, the Canadian Honey Council is positioned as being the organization best suited to take on this role. A marketing program would require agreement by each participant in the value chain as financial support for marketing would have to come from all stakeholders. It should be noted that with site approvals for traceability by CFIA, beekeepers already have a product quality claim available to them, i.e., “produced at a CFIA approved site” or “meets food safety requirements of CFIA”.
5. Any effort to create value using a quality/authenticity mark or statement would likely only take place with the support and leadership of large marketer such as Bee Maid. A potential scenario could be unacceptable price pressures in the market from known adulterated imports.
6. If honey industry stakeholders establish a path to increase the market value of Canadian honey through documentation of authenticity, NMR has the support internationally and from the method/equipment developers to be the method of choice. A key criteria however, is that the testing must be done by a qualified and independent laboratory.
7. A lack of knowledge surrounding NMR-based analytical methods is a key barrier that must be overcome, but since the recent CFIA testing utilized NMR, it is likely that with education, communication, and a business case, honey industry stakeholders would support an NMR – based QA/QC system.
8. With the adoption of honey traceability and process documentation systems currently underway in Canada, an important hurdle to an enhanced QA/QC system that would document honey authenticity is reduced. With a CFIA-approved process documentation model in place at producer sites, adding a testing procedure like NMR would not involve any significant implementation or documentation costs. A QA/QC test would be simply an added step the documentation system.

### Future Issues to be Addressed by ABC

One of the key challenges facing ABC is to move forward with initiatives that will support its membership, whereas the marketing of authenticated Canadian honey is clearly a national issue, particularly as a large portion of honey is handled by two national packagers – Bee Maid and McCormick. Secondly, there was not general stakeholder support for an NMR-based quality system.

Below are recommendations for the next phase of work, which would take a broader view of improving the market approach (and businesses) for Alberta Beekeepers and which would include further review to determine the market conditions under which NMR analysis may have value.

1. Explore the potential to fund and create a marketing function within CHC. Models to consider include Canadian Dairy Farmers and Canada Pulse, with recognition that these organizations have a much larger producer base and unilateral commitment to raise the profile of their products.
2. Create a mechanism to encourage discussions with each region and with the major players in the value chain, including retailers, to come to a consensus regarding possible steps for establishing higher value for Canadian honey vs. imports.
3. Clearly identify barriers facing Alberta producers from selling into the Ontario and Quebec markets, i.e., displacing imported honey.
4. Develop a national plan for supporting Canadian production and reducing the potential for low cost and adulterated imported products entering the market.
5. Provide a more detailed understanding of evolving events underway in the US related to blocking low cost adulterated imports and promoting authenticated honey products (from Canada).