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Managing Opportunism in Value-Added Supply Chains: Lessons from Organics

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Abstract
In recent years there has been an increasing demand for specific characteristics in food products pertaining to origin, quality, health and environmental factors. This demand creates value-added opportunities, but requires differentiation and vertical integration of the supply chain. Due to the credence nature of many products, it is difficult to determine if products reflect the traits under which they are marketed. Cheating through misrepresentation and unauthorized practices presents a threat to the development of identity preserved production and marketing (IPPM). In Canada, value-added IPPM systems have not been highly formalized except for the organics sector, but new traits from biotechnology may lead to greater market segmentation. Fraud is always a potential problem when there exists an incentive for opportunism, but there is a general lack of direct research applied to identity preserved production. Through interviews with organic supply chain stakeholders in the organics sector, we will achieve a better understanding of the efficacy of formalized quality-control regulation. By understanding which characteristics of these supply chains are susceptible to opportunism, future research will determine how to incorporate more effective regulatory mechanisms within the constraints of the high enforcement costs of complete information required for new value-added production.

Key Words: opportunism; supply chains; organics; cheating; fraud; value-added

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1. INTRODUCTION

Agriculture is going through a fundamental transformation from a loosely connected array of related markets into a set of increasingly vertically managed supply chains. Technology (e.g. advanced breeding and biotechnology) is making it possible to 'engineer' new differentiable traits in crops and animals, while, at the same time, it offers new possibilities to test for and detect value-enhancing or value-reducing traits. Meanwhile, consumers and, by extension, processors are becoming more demanding about the quality and provenance of their food. As a result, the global agri-food sector is investing heavily in new supply chain structures to match those converging supply and demand trends.

Consumer demands regarding the quality and provenance of food products has fundamentally altered the composition of many food supply chains. Such demands result in a willingness to pay on behalf of consumers for purity preserved throughout the supply chain to the final consumer good. The increasing demand for identifiable traits in food products regarding quality and provenance have resulted in increasingly segmented markets with producers attempting to satisfy market demand with identity preserved goods (Phillips & Smyth, 2004). Advances in biotechnology, precision agriculture, measurement technology, food safety, competition and the role of nontraditional players are all factors that have driven the phenomenon of identity preservation and the subsequent market segmentation (Bender, 2003). Nevertheless, maintaining product differentiation for many food products is notoriously difficult as it is often unfeasible or costly for consumers to completely ensure the identity of an agricultural product. As a result, the development of IPPM has been slow despite demands for such products due to the inherent challenges in moving beyond the commodity market supply chain model (Bender and Goldsmith, 2004). This minimizes the potential of value-added production through weakened consumer

confidence as it increases the risk of fraudulently marketed products by opportunistic actors seeking premiums. The complexity of guaranteeing the credible transaction of agricultural products means that information-lacking consumers are continuously wary of products, and the enticement of premiums means that information-holding producers have an incentive to sell goods in the highest price segment possible. The challenge for regulators, both governments and industry organizations, is to provide a timely response to innovations and changing demand in the market in an environment of high transaction costs for information procurement (Giannakas, 2002).

Identity preservation was originally developed as a grading system to determine the quality of products. Segregation systems have been also enacted for environmental health and safety concerns, but there is a notable distinction between these systems and the identity-preserved production and marketing of particular traits as the latter is enacted to capture value-added premiums (Smyth and Phillips, 2002). Within the last decade many governments including Canada and the United States have adopted new regulations for organic products in order to promote market development and combat fraud (CFIA, 2010; USDA 2010). Similarly, coexistence regimes are being developed across the globe to allow for the parallel containment of genetically modified and conventional genetics including, notably in the European Union. The Co-Extra project had a total budget of €22 million of which €12 million came from the European Commission (EU, 2006). Transcontainer had a budget of €5.38 million of which €4.17 million came from the EU (EU, 2010).

Such investment in formalized coexistence measures has not occurred in Canada. Many of the agricultural markets with commercialized GE varieties have seen high rates of adoption such as canola and soybeans, whereas other commodities with little to no commercialized products such as flax and wheat face strong political barriers to GE development. In Canada the market

for organics represents one of the most formal segmented agricultural supply chains and functions as a complex framework of new, existing, federal, and provincial regulatory standards strongly influenced by the industry actors. The market for GMO coexistence, as with most identity preserved traits in Canada, is far less formalized and functions on a contractual contingent basis with little regulatory oversight. The future agricultural landscape in Canada will have to reconcile increasing GE and organic production, creating a unique problem and an opportunity at the same time: regulation must provide the greatest freedoms to producers as is economically feasible while protecting markets; the advanced state of organics regulation can provide clues at how to prevent fraud in any new composition of regulation.

As the demand for second and even third generation GE crop, fruits and vegetables develops, many of which are expected to have enhanced health attributes, IPPM systems will be required to deliver these products to the market via value-added supply chains. As in the organics market, product purity will be essential, both for producers functioning within the IPPM system and consumers that are paying premiums to purchase the healthier products. In an attempt to learn more about the potential threat of opportunistic behaviour and GE products, we examine a well established supply chain that delivers value-added products to the market, the organic supply chain.

This paper examines opportunistic behaviour in the Canadian organics industry in relation to the ever-changing regulatory regime in order to assess the threat to future identity preservation efforts in Canada. Recent fraud events across the globe have resulted in convictions. Opinion studies of organic agriculture show concerns of the effects of these issues on consumer confidence and market access, a trend that is similar in other markets with asymmetric standards and regulation. Government, at the request of the organics industry, has stepped in to formalize regulation, but it has been unclear if this is a necessity to combat fraud due to a lack of risk-

analysis, or simply in order to bolster positive perception of the industry. Interviews were conducted with relevant stakeholders who oversee various aspects of the organic supply chain. The interview responses have been evaluated on five qualitative metrics and five quantitative metrics. The analysis will apply economic concepts of information, institutions and supply chain management to determine if the process of regulatory overhaul has addressed issues of opportunism and whether any lessons can be applied to other segmented markets.

2. VALUE-ADDED SUPPLY CHAIN OPTIONS

The definition of product differentiation can have several nuances, depending on the justification for the differentiation. Frequently the terms identity preserved production and marketing and traceability are used interchangeably in supply chain literature. Misconceptions exist about the distinct role that each of these systems plays in the supply of agri-food products.

Identity Preserved Production and Marketing

The first product differentiation system, IPPM, has evolved over time in the grain and oilseed industry. Purchasers of raw products became more demanding about the quality and purity of the product they were purchasing, so the grain handling system gradually developed distinct channels to market the differing grades of grains and oilseeds. All grains and oilseeds are purchased by a grading system in today's marketplace; this grading system has premiums that rise as one moves from low to high grades. The relationship of premiums to differing grades for private market incentives is the definition of an IPPM system.

Identify preserved production and marketing systems are initiated by private firms in the grain and oilseed industry to extract premiums from a marketplace that has expressed a willingness to pay for an identifiable and marketable product trait or feature. An IPPM system is

a “closed loop” channel that facilitates the production and delivery of an assured quality by allowing identification of a commodity from the germplasm or breeding stock to the processed product on a retail shelf (Buckwell, Brookes, & Bradley, 1999; Lin, 2002). These IPPM systems are predominantly voluntary, private firm based initiatives that range between systems that are loosely structured (e.g., malting barley) with high tolerance levels and those with rigid structures (e.g., non GM European markets) with minimal tolerance levels. Firms operating in the minimal tolerance field achieve this by developing and adhering to strict protocols that specify production standards, provide for sampling, and ensure appropriate documentation to audit the flow of product.

A survey of the literature on IPPM shows that although there is growing discussion about IPPM systems, there are very few working definitions. Lin (2002) suggests that an identity preservation system is a more stringent (and expensive) handling process and requires that strict separation, typically involving containerized shipping, is maintained at all times. IP lessens the need for additional testing as control of the commodity changes hands, and it lowers liability and risk of biotech and non-biotech commingling for growers and handlers.

This definition conflicts with the one offered in this paper, as Lin sees IPPM as having a limited role in the movement of grains and oilseeds due to extremely low tolerance levels. Lin’s definition of IPPM and segregation still deals with the same system—one that is initiated voluntarily by private firms in an attempt to capture premiums. It is shown below how IPPM systems differ from segregation systems.

The remainder of the literature on IPPM systems relates to theoretical and operational uses of IPPM systems. Bullock, Desquilbet, and Nitsi, (2000) and Bullock and Desquilbet (2001) discuss differentiation between GM and nonGM products, and Herrman, Boland, and Heishman (1999) examine the feasibility of wheat segregation. Bender, *et al*., (1999), Bender and Hill (2000), and

Good *et al*., (2000) have released a series of papers on handling specialty corn and soybean crops, with costs being the focus, not the defining of the system used to handle the specialty crop. Additionally, Miranowski, *et al*., (1999) offer some perspectives on the economics of IPPM, and Kalaitzandonakes, Maltsbarger, and Barnes (2000) provide a solid theoretical model for examining the cost of identity preservation.

Numerous IPPM systems operate in Canada and around the world. Some extend only between the breeders and the wholesale market or processor, while others extend right up to the retailer. Their structure depends on the attribute being preserved. Some novel oils, such as low linolenic oils that are more stable in fryers, only have value at the processing level while others, such as high oleic oils, have health attributes that can be marketed to consumers. Identity preserved production and marketing systems are important for providing information to consumers about the provenance of a product, as those attributes are not visible or detectable in the product itself.

Traceability

Traceability is commonly used in the food industry. Retail products found with unacceptable bacteria levels or intolerable levels of pesticide or chemical residues need to be quickly and completely removed from store shelves. Traceability systems allow for retailers and the supply chain to identify the source of contamination and thereby initiate procedures to remedy the situation. For example, a meat-packing firm recently rejected a shipment of live hogs from a Saskatchewan Hutterite colony due to the presence of antibiotics. Upon administering the antibiotic, the animals were not to be slaughtered for a defined period and the Hutterite shipment was well within this period. In this case, the Hutterite colony was banned from shipping to the meat-packing plant.

The key focus of traceability is increasingly on food safety. For the purposes of this paper, traceability will refer to systems that focus on ensuring food safety. Recently, the focus for developing traceability systems for new sectors of the marketplace has shifted from food safety towards extracting premiums from the marketplace. Extracting market premiums could never be the driver for developing a traceability system. In and of themselves, traceability systems do not define quality—they simply trace it. If market premiums are the driver, then the developers need to use an IPPM system, as these systems are properly structured to capture premiums.

The International Organization for Standardization (ISO) defines traceability as the "ability to trace the history, application or location of an entity by means of recorded identifications" and Codex has adopted this as their working definition for all Codex standards (Codex Alimentarius Commission, 2001). The EU (2001) defines traceability quite clearly in relation to GM products. Directive 2001/18/EC defines traceability as the ability to trace GMOs and products produced from GMOs at all stages of the placing on the market throughout the production and distribution chains facilitating quality control and also the possibility to withdraw products. Importantly, effective traceability provides a "safety net" should any unforeseen adverse effects be established.

The economic literature from supply chain management defines traceability as the information system necessary to provide the history of a product or a process from origin to point of final sale (Wilson & Clarke, 1998; Jack, Pardoe, & Ritchie, 1998; Timon & O'Reilly, 1998). Although Dickinson and Bailey (2001) suggest that their results from a laboratory auction market regarding features of meat traceability show there is willingness by consumers to pay premiums for traceability, the key focus must be on food safety. Prior to adopting traceability systems, there must be a clear indication of specifically what aspects of food safety can be improved by the adoption. Marginal improvements in food safety would be a dubious reason for proceeding; rather, there must be a clear and evident improvement in the level of food safety.

Traceability systems have been developed for beef products in Canada. Traceability was developed in conjunction with a quality assurance system to reassure export markets about the quality of Canadian beef products. However, it should be noted that this system has been met with great resistance at the farm level, as producers do not want to allow government regulators onto their farms or provide regulators with any sensitive farm information.

Instances of fraud and mislabeling not only harm the consumer who has paid a premium for an inferior good, but harms the entire industry as consumers lose faith in suppliers and regulators and consumers become increasingly skeptical of regulation (Giannakas, 2002; Bonti-Ankomah and Yiridoe, 2006). The fear of loss of market access is particularly important to the individual actors as the fragile nature of consumer demand means that the market for organics can be particularly volatile (Ferguson *et al.*, 2004). The relative newness and constant fluctuation in organic markets often leads to asymmetries in demand, creating insufficient supply to satisfy demand (Willer and Yussefi, 2007). This incentivizes the substitution of lower-quality goods to capture market premiums. Recently, there have been instances of proven fraud in organic agriculture resulting in criminal convictions in other jurisdictions. This problem resulted in a 2008 Australian case, ACCC v G. O. Drew Pty Ltd, in which a producer was convicted of knowingly marketing conventional eggs as organic to meet a supply gap and extract a premium (Paul, 2008). A case of mislabelling and deception in accounting practices in the United Kingdom occurred between 2004 and 2006 resulting in a 2010 conviction. The case was remarkable for its scope with potentially over 100 million eggs being fraudulently marketed leading to a three-year jail sentence (BBC, 2010). Even in cases where a conviction is not achieved, reported fraud can have a market impact. In 2006 in the US, the Cornucopia Institute, an agricultural policy organization, launch complaints to the USDA against two large organic milk suppliers, Horizon Organic and Aurora Organic Dairy (Orlando Sentinel, 2006). This

resulted in PCC Natural Markets, a Seattle-based grocer, to drop Horizon products from its stores due to the formal complaints, but also from consumer concerns (Seattle Times, 2006). This case highlights consumer fears that burgeoning organic markets will result in a decrease in standards as large-scale industrial production increases. There have been many other earlier instances as well, with some of the most prominent cited by Hamilton and Zilberman (2006, p. 628).

Instances of proven fraud have been scarce in Canada, but there has been little systematic examination of Canadian supply chains to determine the incidence and characteristics of opportunistic behaviour. There are a couple of Canadian cases prosecuted under consumer protection laws before the implementation of organic standards under existing law. The current regulation has little enforceability until 2011. Often, the demand for regulation is a product of perceived necessity rather than a requisite necessity founded upon risk-analysis. In other words, in the Canadian organic sector, the industry demands for increased regulation were born out of a desire to instil confidence more so than a reaction to a dedicated risk analysis of potential fraud events. While these two aims are not mutually exclusive, it begs the question as to whether or not the true impact of opportunism can be gauged in agricultural supply chains and whether or not the present regulatory regime is a sufficient response. Moreover, the future development of new identity-preserved products will require regulation that can benefit from the lessons learned from the regulatory response in the organics industry. It is widely agreed that market segmentation will continue to increase in agriculture as consumers become increasingly cognizant of food provenance and marketers take full advantage of increased willingness to pay for particular attributes. The health attributes of future GE varieties will be a leading driver.

Organic regulation in Canada has sought to address many of the aforementioned concerns of segmented supply chains. Organic identity preservation in Canada has evolved from voluntary industry-driven standards to an increasingly formalized framework of federal regulation,

provincial regulation, third-party certification, conformity verification bodies and many other influential industry players actively engaged in partnerships with authorities. Third-party certification has been utilized in Canada, and many jurisdictions, well before governments formalized organic-specific regulation as a market signal of the validity of end products. Some provinces have decided to develop standards regulating sale within their borders. Many countries have adopted standards to help ensure uniform practices and enforcement and to ensure a single organic label to avoid confusion among consumers. Canada adopted its federal standard in June, 2009 under the provisions of the Canadian Organic Regime (CFIA, 2010). Existing consumer protection law in Canada provided basic provisions for mislabeling and misrepresentation and will remain the status quo of regulation as the CFIA has stated that the enforcement of the new regulation will be educational until 2011 in order to allow producers to adapt to the new requirements.

International equivalency has been an emerging area as asymmetric global standards present a threat to true identity preservation. Canada has entered into several agreements and industry groups working with the Canadian Food Inspection Agency (CFIA) continue to work to remove barriers to trade presented by equivalency issues. As the CFIA standard will only apply to international and interprovincial trade, intra-provincial transactions remain an area of concern. Some provinces have adopted their own standards as rigorous as federal regulations, others have opted for a memorandum of understanding with the federal government, while others remain without a dedicated response. Nevertheless, the CFIA will continue to react to suspected incidents of mislabeling and misrepresentation, but enforcement will remain limited, at least until 2011 when the stream of commerce policy expires.

3. ANALYTICAL FRAMEWORK

The issues of fraud, mislabeling, and asymmetric standards have their basis in the economic theories of information. Akerlof's (1970) market for lemons demonstrated the standard model whereby market prices and product quality can be affected when producers hold more information than consumers. Nelson (1970) developed a model in which various consumer goods are categorized according to the ability of a consumer to determine the utility of the good at the point of purchase distinguishing between search goods whose quality was determinable at purchase and experience goods which required consumption to determine quality. Some identity preserved traits are determinable at purchase, others after consumption, but fraud is most susceptible under a third group, credence goods. Credence goods are those whose utility cannot be determined, even after consumption (Darby and Karni, 1973). Darby and Karni explain that the credence quality greatly heightens the risk of fraud due to the prohibitive costs of fraud discovery. As a result, supply-side market failure is probable within the environment of increasingly segregated markets due to the credence nature of so many agricultural products. Giannakas (2002) explains that systematic research into the credibility of the labeling and marketing of agri-food products is lacking and demonstrated that the credence nature of organically labeled foods means that fraud is inevitable and that consumer deception reduces confidence and leads to demand-side failure. Moreover, the level of necessary monitoring is a product of the differences in prices between segmented products, so rapidly changing demands can have rapidly changing impacts on the necessity for regulation (McCluskey, 2000). Despite the fact that these analyses have been conducted for organic markets, McCluskey explicitly states that comparable conditions in other agrifood markets will yield similar incentives for fraud affecting market transactions (McCluskey, 2000, p. 8).

Regulating segmented markets is only useful if it effectively detects and rectifies deviations. The institution of organics regulation is composed of informal and formal rules that govern all actors (Zorn *et al*., 2009). Third-party certification and labeling is useful in organics regulation as a mechanism of overcoming the high search costs to which consumers would otherwise be subjected (Giannakas, 2002; Golan *et al*., 2001). Nevertheless, even with efficient third-party certifiers, segmented supply chains have market, managerial and political transaction costs that do not normally occur in conventional spot markets. The cost and benefit of complying with these rules is highly dependent on many economic factors including the price of organic versus conventional products, the quantities yielded by different production processes, the costs of production, the discount rate and the penalty in case of detection. The probability of detection also influences cheating and the existence of a large number of certification bodies necessitates the use of control bodies to ensure comparable standards enforcement to prevent producer from substituting towards the least-rigorous certifiers (Zorn et al., 2009). Hamilton and Zilberman (2006) further examine the issue of fraud under eco-certification policies explaining that labeling regimes institute reputation as a public good, but that an increasing number of individuals falling under a particular reputation, in other words an organic label, can increase the likelihood of fraud.

The economics of information and its applications to identity preservation is required to protect the output trait of a good that is produced to a standard in the case of organics, or for some discernable quality either measureable or not in a broad sense. More broadly, identity preservation systems must adapt to a supply chain governance structure that aligns to the way in which traits must be managed to ensure preservation. Input and output traits are becoming increasingly diverse and in many cases stacked, and exhibit both experiential and credence traits, which creates issues for governance. As a result, demand for identity preserved products is more diffuse and supply chains need to be more complex which in turn creates greater transaction costs

(Phillips and Smyth, 2004). The environment of bounded rationality increases the likelihood of opportunistic behaviour, especially when co-mingling is easy to perform, there is a quantity versus quality mindset, and there is no third-party auditing system as is the case with most identity preserved systems outside the organics industry in Canada. Mahoney (1992) argued that assuming opportunism, one can predict the degree of vertical integration in a supply chain based upon asset specificity (the degree to which a product demonstrates traits throughout the supply chain), task programmability (degree to which competitive results can be achieved from only specific agronomic practices), and non-separability (the degree to which value added throughout the supply chain can be clearly delineated). Low amounts of these determinants mean that a market more closely resembling the spot market is effective, but high amounts of these determinants necessitate greater amounts of identity preservation measures. Organics, like many emerging commodities with high-value output traits exhibit high levels of all three of these determinants. Recent changes to the regulation of the Canadian organics industry are a sign of increasing vertical integration.

The amount and incidence of cheating that actually occurs due to identity preservation is difficult to assess as there have been no extensive risk-assessment analyses conducted on this issue. The basis for this research is founded upon the concerns raised by Giannakas (2002), McCluskey (2000) and Hamilton and Zilberman (2006) which demonstrated an economic potential for cheating, the cases of agricultural fraud that have been reported and prosecuted, and the fact that combating fraud is a universally-stated goal of regulators and industry actors. Because statistics are not readily available, consultation with relevant stakeholders were determined to be the most effective method of assessing this issue. The organic sector was chosen as a case study because of its highly formalized regulatory regime which is composed and influenced by a variety of stakeholders. Organic identity-preservation regulation has been

expanded to a wide variety of commodities which reflect the diversity of Canadian agricultural production. The output trait of organics is a process that is generally not discernable through an effective traceability system and certainly not experientially so fraud may not be easily dealt with through normal market functioning thereby setting a high standard for regulation. Furthermore, organic agriculture represents very high value-added identity preservation which falls high on the marketing chain, similar to other health traits that will increasingly emerge in the consumer market (Bender, 2003). There are a number of other smaller identity-preserved systems functioning in Canada, but they are governed on a contractual basis without any specific regulation or third-party monitoring aside from voluntary assistance programs such as the Canadian Grain Commission's Canadian Identity Preserved Recognition System (Canadian Grain Commission, 2010). Contractual governance between private parties also means that the terms and the outcomes of transactions remain confidential. It is believed that by examining the development of the Canadian Organic Regime we can gain a better understanding of how to combat fraud in future identity-preserved systems.

Cronier's (2008) study of organic marketing in Canada serves as a basis for our consultation as relevant stakeholders were interviewed to share their specific knowledge from their unique position in the supply chain. Participants were chosen from three groups: certification bodies, regulatory bodies, and industry organizations. Participants were selected from across the country in order to provide a reflection of the diversity of Canadian agricultural production. Determining the incidence and the nature of fraud is difficult, and as such, it was understood that the participants would not be capable of making absolutely correct determinations for the whole of the Canadian organics industry. The goal was rather to utilize their specific knowledge of the daily functions that they perform within the supply chain to create a clearer picture of the industry as a whole. Furthermore, discrepancies between individuals could be examined for potential

causes and also as a determinant of how various actors perceive the supply chain to be functioning. The interviews comprised of both qualitative and quantitative questions in order to evaluate various variables regarding organic production in Canada (Table 1).

Table 1: Structure of interview questions

Qualitative Metrics	**Quantitative Metrics**
Problems with the status quo of regulation	Extent of the problem
Ares of the supply chain susceptible to fraud	Incidence of Fraud: a) Producer level b) Downstream level (retailers, brokers)
Efficacy of the Canadian Organic Regime's Standards	Level of fraud acceptable considering costs
Incidence and the potential for fraud	Relationship of premiums and fraud
Future issues	Relationship of premiums to fraud: a) Producer level b) Downstream

Interviews were conducted with 13 participants representing organic certifiers, regulators and the organic industry in Canada. Ethics approval for this survey was obtained by the authors from the University of Saskatchewan's – Behavioural Research Ethics Board (BEH #10-73).

4. RESULTS

4.1 Qualitative Results

4.1.1 Have you observed any problems with the status of organics regulation in Canada?

Participants generally agreed that regulation is progressing in the right direction and is quite effective. Most problems reported with the status quo of regulation were minor issues consistent with the development of any new or transitional regulation. Striking an effective balance between efficacy and cost as well as rigor and flexibility are still currently being debated. For instance, the issue of regulating parallel production was raised. Banning parallel production may reduce the incentive for fraud, but it is difficult in many markets as there is insufficient demand to justify complete transition for many producers. Moreover, large producers are often able to spin-off a portion of their production into a second entity on paper, but function as a single producer in practice, calling into question the practicality of any parallel production ban.

Another issue is the degree to which producers and processors should be subjected to any new regulations which could hinder their flexibility to make business decisions. Some participants explained that if the correct balance is not struck between these two issues you will either have costly regulation with no benefit which will incentivize cheating or on the other hand, have ineffective or asymmetric regulation.

Communication with consumers is always an issue and there is still a great deal of concern that the new logo is not a well-recognized creating another opportunity for fraud by marketing products as organics, but not necessarily with the logo. One participant explained that large portion of consumers recognize the operative word, but not the logo, the true sign of identity preservation.

Finally, a few minor technical issues regarding animal husbandry practices that are not sufficiently addressed in the standards were also noted. Also, the training of inspectors requires education in the proper inspection of animals for particular health concerns.

4.1.2 Are there parts of the organics supply chain that are more susceptible to opportunism?

A variety of potentially susceptible areas were noted. The most cited issue is the lack of local regulation in some provinces although some noted that due to the separation of powers between the federal government and the provinces that it ought to be up to provinces to regulate within their borders while leaving trade under the jurisdiction of the CFIA.

Retail-level misrepresentation is a commonly raised issue, notably under the condition of consumer ignorance where non-certified market claims are made. Even though the CFIA currently can utilize existing consumer protection regulation it is a difficult area to manage. Increased packaging can help, but generally defeats the purpose of environmental improvement and local production.

Some products that lie outside the standards such as fibres and cosmetics are still marketed as organic and this was cause for concern. There are hopes that increasing education about the certification label will reduce the chance for opportunism.

Many participants cautioned that too much regulation would actually incentivize fraud as the increased costs and supply gaps would force producers to cheat. For instance, many producers are unable to procure organic inputs such as manure for fertilizer and straw for mushroom production. This is particularly difficult at the transition stage, leading some to believe that certifiers ought to be given more flexibility to address local issues.

There could be better communication amongst authorities regarding suspended certification. For instance, if a producer is found to be non-compliant in the United States,

purchasers are often unaware and inventory may move to other jurisdictions even after certification has been pulled.

One issue of inconsistency was whether large producers or small producers were more likely to commit fraud. Some argue that small producers are less-scrutinized while others note that local forces of social control and the risk of loss of certification and public shame combat fraud as effectively as regulation. On the other hand, some mentioned that large producers have a greater capacity to cheat.

The final issue raised was the availability of less-rigorously standardized imports being brokered and sold.

4.1.3 What is your opinion of the new national organic standards adopted June 2009 and the Canadian Organic Regime in general?

Participants were universally in favour of the new organic standards and many were actively engaged in lobbying for the implementation. Increased uniformity in standards application was widely cited as a benefit and many appreciate the support of the CFIA even though some noted that the communication linkages between the federal regulators and certifiers could be improved.

There are some issues, many of which were mentioned earlier, but a technical committee is still in place to address these problems. For instance, there are still problems ensuring the interpretation amongst certifiers who have traditionally used varying standards but this is improving.

Increased uniformity was also noted as an important measure to strengthen the awareness of the organic logo and combat similar, but unsubstantiated claims such as ‘natural’ and ‘pesticide-free.’

4.1.4 Do you have any insights on the incidence of opportunism and the potential incentives that exist in the marketplace that would incentivize opportunism?

Most participants noted that major fraud issues are extremely rare, but that rumours are always common and it is sometimes difficult to distinguish between legitimate mistakes and intentional cheating. Most compliance issues occur in the transition stage which can help to weed out those producers who are less committed to the standards and may have a higher likelihood to cheat.

New technologies constantly push the boundaries of what is and is not allowed creating the potential for fraud. One participant noted that something as small as new cleaning products that may or may not be allowed can create enough of an economic incentive that producers would consider using it even if they were unclear of its status. Moreover, this creates a lot of questions for regulators which again raises of the question of the uniformity of standards versus the flexibility of implementation.

Many participants noted that many on-the-farm cheating events would be small corners cut to address a particular concern rather than rampant fraud. Disease, costlier inputs, and weather are all factors that could potentially incentivize fraud. Parallel production was raised again. One participant noted suspicions of blending non-certified material into inputs destined for organic production.

The high cost of certification and certified inputs create an incentive for fraud to offset the high transaction costs of maintaining the appearance of compliance. Access to the identity preserved market was cited as a draw for potential fraudulent behaviour. On the other hand fraud can be disincentivized through the high cost of non-compliance which carries and economic penalty, but also a social cost. Some participants explained that the shame of being caught committing fraud is often sufficient enough to deter any economic benefits cheating may garner.

This social governance may be more effective in areas of higher farm density and smaller acreage.

4.1.5 Do you see any potential issues that would need to be addressed by regulation or that would require new regulation?

Most participants felt that any extensive new regulation beyond the current regime would not be necessary and that the current framework can be adapted as needed. Flexibility is an issue as certifiers noted that producers often ask if new products or techniques are acceptable to which the certifiers have no option but to err on the side of caution. One participant noted that certifiers cannot learn their task from a manual and must be trained to be adaptable. Another noted that more collaboration between the CFIA in order to update certifiers on new issues and interpretations would be useful. The CFIA's plans for increased enforcement were mentioned, particularly increased scrutiny of label claims at the retail level.

The threat of GMO contamination was a concern. Many believe that coexistence is not possible and access to lucrative markets such as alfalfa and wheat would be entirely compromised by commercialized transgenic varieties.

Finally, with the flurry of regulation worldwide, there are increasing requirements at reducing redundancy and improving efficiency. One participant noted that many larger producers have to pay to be certified to several different standards that have only marginal differences.

4.2 Quantitative Results

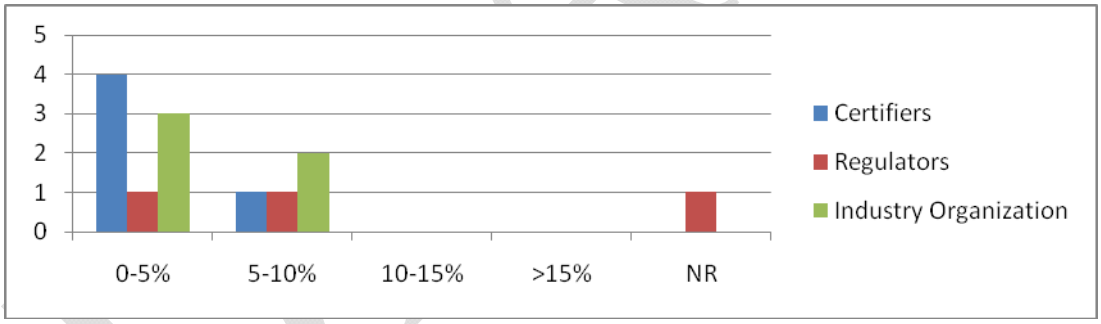
4.2.1 On a scale from 1 to 5, with 1 being no problems at all, and 5 being rampant cheating, participants were asked to rate the issue of organic fraud in Canada.

The mean response was 1.67 indicating that participants considered fraud to be a minor issue that has been addressed fairly well by regulation. All participants were in general agreement, as no one answered higher than 2.

4.2.2 In cohorts of 5%, the participants were asked to estimate the incidence of cheating in two areas:

a) Producer

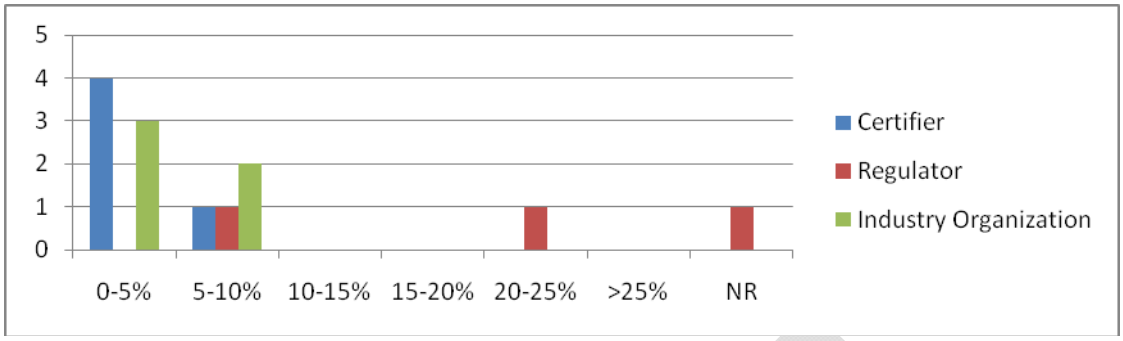
The incidence of producer fraud was ranked quite low with six participants choosing the 0-5% cohort and five participants choosing the 5-10% cohort.[1]



b) Downstream, which includes processors, brokers, and retailers

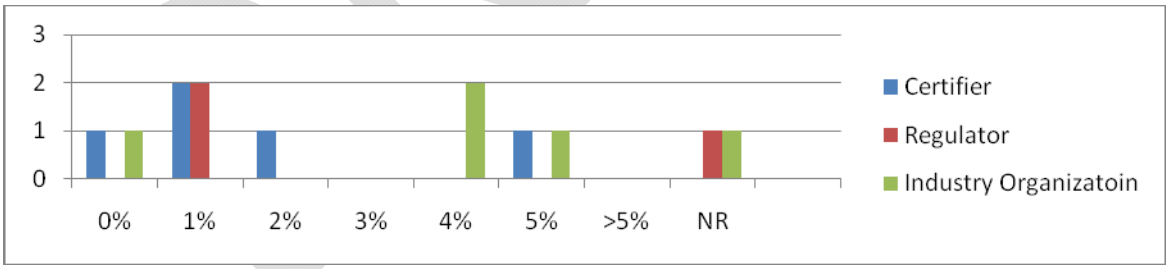
The incidence of downstream fraud was also ranked quite low. Interestingly, some participants noted that fraud is more likely to occur downstream while others mentioned the inverse, being that it was more likely to occur at the producer level.

[1] Some participants were able to actually calculate an exact percentage for the incidence of fraud among producers based upon their experiences.



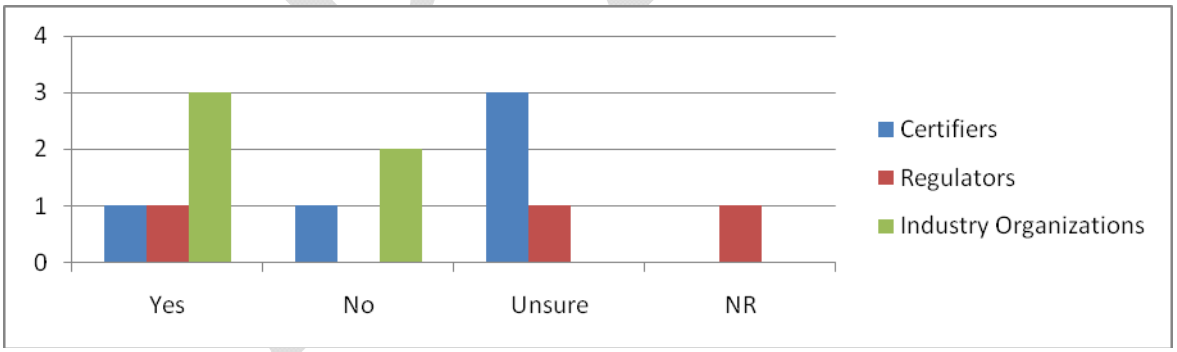
4.2.3 Participants were asked what an acceptable level of fraud (what percentage of end-products were produced or marketed fraudulently), would be considering the costs of regulation and enforcement.

Participant responses ranged from 0% to 5% with a mean of 2.18%. Phillips and Smyth (2004, p. 321) observed that identity preserved systems for canola in Canada were able to guarantee purity in the 98-99% range, demonstrating a similar target goal.



4.2.4 Participants were asked if they believed that there was a direct correlation between the premiums offered and the incidence of fraud.

The response to this question was mixed. Many participants were unsure, while others noted that as a basic principle, the higher the premium, the greater the level of cheating that will occur for most commodities. A few participants noted that the inverse could be true. For instance, one participant explained that the composition of the organization committing the fraud plays a bigger role than the price premium involved. Moreover, in markets where premiums are high, actors may not want to jeopardize the good returns by risking non-compliance, but where premiums have recently dropped, cheating may occur to help with cash flow. Also, where premiums are high, cheating events that increase supply can drastically reduce the premiums as the market price of many commodities is highly variable and only a few producers' change in output can greatly affect prices. One participant noted that commodities with the combination of high margins, parallel production, and inelastic demand such as organic eggs, are the most susceptible to cheating.



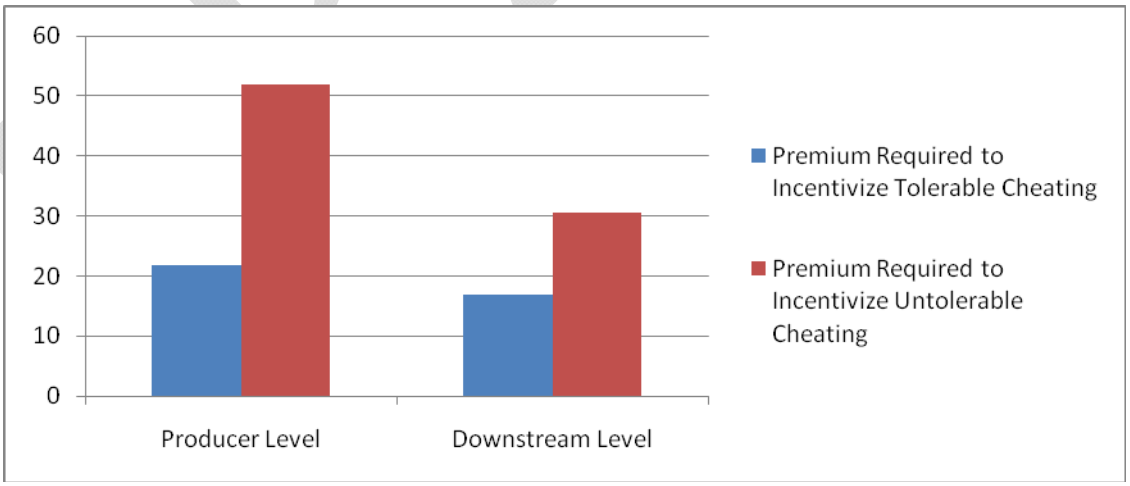
4.2.5 Participants were asked to estimate the relationship between cheating and price premiums by noting where the incidence of fraud goes from 1 non-existence to 2 some, but acceptable considering costs, to 3 where fraud is observable over the tolerable limit in two areas:

a) Producer: The mean level for a premium at which cheating began to occur, but remained within the acceptable threshold at the producer level was 21.88% greater than a conventional substitute.

The mean level for a premium at which cheating occurs over a tolerable level was 51.88% greater than a conventional substitute.

b) Downstream, which includes processors, brokers, and retailers: The mean level for a premium at which cheating began to occur, but remained within the acceptable threshold at the downstream level was 16.88% greater than a conventional substitute.

The mean level for a premium at which cheating occurs over a tolerable level was 30.63% greater than a conventional substitute.



Eight participants were able to respond to this question using the parameters provided while one other explained that at the producer level cheating is present but tolerable at any premium level

whereas at the downstream level cheating is not present at any premium level. In aggregate, responses showed that participants were likely to believe that premiums needed to be higher to incentivize cheating in producers than at downstream levels of the supply chain. One participant mentioned that in most commodities, the organic costs of production are at least 20% greater than conventionally produced substitutes and although cheating could potentially mitigate some of those costs, the price of maintaining certification meant that cheating could not occur at levels much lower than 20%.

5. IMPLICATIONS

Agricultural supply chains will become continually segmented as new traits enter the market requiring more vertically-integrated information flows. Second generation biotechnology will mean that even more products will be available on the market, many of which are expected to have a wider array of value-added output traits that will have a credence nature, therefore capturing market premiums and be susceptible to opportunism. The costs and rigor of developing traceability will be a constant burden on the development of these value-added markets so any governance mechanism that can regulate behaviour and mitigate fraud will be useful.

As discussed above, Darby and Karni (1973) posits that credence goods are those whose utility cannot be determined at point of purchase. When faced with an in-store purchase consumers have no ability to determine whether a product that is labeled as organic is truly organic or not. Consumer purchases of specialty-labeled products are based on trust and detection of cheating in value-added supply chains only damages the level of trust with consumers. In essence, value-added supply chains are only as strong as

their weakest link and in the absence of high levels of product testing or rigorous regulatory enforcement, the actions of one participant can cause a considerable degree of damage to the entire supply chain.

As future GE crop, fruit and vegetable varieties begin to materialize on store shelves, IPPM systems will be required, traceability will be mandatory and opportunism will be a liability. Based on the scientific research done to date, these new varieties will contain enhance health attributes and carry a premium. The value-added supply chain required to ensure these products reach the market unaffected by opportunism will have to be an extremely integrated supply chain. The market determinants that Mahoney (1992) articulates (as discussed above), will increasingly be brought to bear.

Based on the responses to this survey, opportunism is present in the organics supply chain, accounting for less than 10% of organic production. The increased integration of organic supply chains over the past decade has probably precipitated a downward decline in the prevalence of opportunism. This is due in part to both the increased standards enforcement mechanisms and that as brand name recognition increases, the risk of public identification of cheating carries a greater weight.

6. CONCLUSIONS

This analysis is simply a snapshot of a highly formalized identity preserved system that has responded to rapid changes in standards and regulations. Determining the workings of fraud and the subsequent impacts in any market is difficult, but the interviews have revealed many shared concerns that can be applied to any value-added identity preservation system. Overall, most

stakeholders feel that the organics sector has done a good job of combating fraud by ensuring two-way information flows that address emerging issues across the supply chain. Based on this, the following three observations can be applied to the expansion of identity preservation agriculture.

Information transition between all domestic stakeholders is crucial. The organics industry has done a good job in maintaining effective chain-of-custody procedure while strengthening standards conformity across the country which mitigates fraud. However, information regarding risk assessment may be neglected as a few interviewees felt that they could be better served by more communication about the CFIA's inspection activities. There was no clear consensus about what aspects of the supply chain are most susceptible, so greater communication can strengthen risk-assessment. Any IPPM system should translate both standards conformity and risk-assessment. Nevertheless, the reported harms of fraud events were mostly marginal, indicating that the regulatory regime is effectively providing information and serves to combat fraud.

Inter-jurisdictional information flows are crucial in any developing markets. Regulatory redundancy is costly and the organics sector is now addressing many marginally different standards via equivalency agreements. Emerging IPPM systems will cross borders so any collaboration that serves to create market linkages and reduce the costliness of regulatory replication will be highly valued activities. Risk-assessment is also essential and cross-border communications about potential fraud events can curtail the harms of non-compliance. Wherever products flow, the information of potential risks must flow.

Identity preservation systems working on a large-scale commodity production and destined for export will be easier to manage, but new traits will have to be addressed as claims become increasingly formalized and marketed at the local level. Nevertheless, volumes at this

level are small and must be balanced with cost. The federal/provincial response will have to assess where and how new claims are being marketed. Striking a regulatory balance is important as harm can occur from over-regulation by raising the likelihood of fraud in the short term. Social governance mechanisms have proven effective as the risk of non-compliance goes beyond the costs of lost production creating a disincentive for fraud. It is hard to know if this would translate to other identity preservation systems, but it must be kept in mind. Also, the three-year transition period was noted as an effective mechanism of identifying and removing potentially non-compliant producers before increasing risk and could be integrated into any IPPM system.

This study illustrates how information flows throughout a functioning identity preservation system to ensure accountability and combat fraud. The organics industry shows this can be achieved and learning from that sector's development any new IPPM systems can reduce costs and improve efficacy. That is not to say that IPPM systems should copy the composition of the organics sector, that must be determined on a contingency basis on the grounds of the principles of supply chain management, but there are many factors which are inclusive to many sectors that can be beneficial.

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