Summary of Studies Performed on Assessing the Sanitary Quality of Reusable Plastic Crates used Within the Fresh Produce Sector

Background

The use of RPC's in the fresh produce sector was promoted in Europe by retailers primarily to ease shelf stocking, ability to trace product through barcoding and allow for more controlled temperature regulation. A further key advantage promoted by RPC providers was that the RPC's could be re-used as oppose to being recycled as with paperboard. This was not only advantageous to retailers through negating the need for waste management but also provided a basis for suggesting the use of RPC's was sustainable. Yet, the aforementioned benefits were countered by the need to ensure that RPC's are effectively sanitized between uses. In logistical terms this required RPC's to be transported to a central facility for repair, sanitation and re-stacking into pallets. Consequently, the actual benefits of RPC's in terms of costs saving becomes less clear. Nevertheless, based on the successful use of RPC's in Europe, selected retailers within North America started to require suppliers to use reusable crates to pack fresh produce. However, there was some pushback from grower/packers due to the need to pay rental on RPC's thereby increasing operating costs and general concerns over damage to produce. Of more concern was the sanitary status of RPC's provided by IFCO (RPC distributor within North America) with anecdotal evidence of crates having labels from previous users and visible soils. There were experiences of produce being rejected from the US-Canadian boarder were reported as inspectors could not discern which of several labels were related to the product being shipped. There were also concerns of soiled RPC's carrying pests, spoilage microbes and human pathogens. In effect, it appeared that RPC's were not being adequately sanitized between uses.

Sampling studies to assess the sanitary status of RPC's

Based on the concerns from growers/packers, a series of studies were instigated to assess the sanitary status of RPC's within Canada. The study was performed between 2013 through to 2016 and involved sampling within Ontario, Quebec then later in British Columbia. Each of the sampling visits were performed using the general approach of visual assessment of randomly selected RPC's for labels, damage and visual soils. Additional tests performed provided an estimate of the bacterial loading along with sanitary indicators. ATP testing was performed given the method provides a rapid assessment of microbial load on surfaces and used to verify sanitation of RPC's by IFCO. The 2013 study focused on growers/packers within Ontario and Quebec involving 5 operations in total. A common theme between trials was the frequent occurrence of labels from previous users within Mexico and the US with broken crates also being observed. In addition, based on criteria that defined a clean surface, between 10-100% of RPC's failed to meet the standard although there was variation between grower/packer operations being recorded. The general conclusion from the study was to confirm the anecdotal evidence of unsanitary RPC's being delivered to growers/packers. The underlying reasons for

why unsanitary RPC's being delivered was not investigated but likely to be attributed to inadequate cleaning, lack of quality control checks or crates being directly return to growers/packers from retail (i.e. bypassing the sanitation step).

The report on RPC's received significant media attention and prompted calls from grower/packers supportive of the study. For example, a grower from Florida reported the frustration of IFCO failing to act on the concerns over the sanitary status of RPC's. As a result of study, senior managers from Lablaws requested a meeting to discuss our findings. In a frank meeting the management initially raised concerns over the purpose of the study but later admitted they were not aware such RPC sanitation issues existed. The response form IFCO was more defensive claiming that the crates were sanitized by a certified facility in Chicago with RPC's being tested against a microbial criteria developed in-house. Yet, the microbial criteria used to assess the sanitary status of RPC's have never been disclosed to date.

Sampling studies performed in 2014

A follow-up study was performed in 2014 and was essentially a repeat of those undertaken in 2013. The findings of the study illustrated no improvement on the sanitary status of RPC's with high microbial counts along with labels again being encountered. A similar study performed within the US by Dr Trevor Suslow of UCDavis reported similar findings to our own with regards to labels, visible soils and microbial counts from RPC's tested.

The report again received media attention and in response, IFCO published a guideline on good practices of using RPC's. In addition to general handling the guide also advised grower/packers to use labels that could be more easily removed by the wash process. Again, there was no mention or reference to the quality checks performed at the RPC central facility.

Sampling studies performed in 2016

Between the sampling study performed in 2014 and 2016 there were changes implemented by IFCO with respect to applying an ozone based wash system, in addition to the publication of new guidelines supplied to growers/packers in proper handling of crates. Moreover, from discussing with growers, there was a new practice of returning crates that were visibly soiled.

The sampling trials performed in 2016 followed the general procedures in previous years with an additional part of sampling visibly soiled crates (referred to as At Cause). In addition, to sampling grower/packers with Ontario and Quebec, grower/packers within British Columbia were also visited. The general findings of the sampling trials were that no differences in the sanitary status of RPC's sampled at the difference locations. There was also no difference between visibly clean and those with visible debris. It was also shown that ATP readings of RPC's could not be correlated to the microbial loadings on the crates.

When compared to previous years, there was a lower carriage of indicator microbes also an increased number of RPC's that failed on Total Aerobic Counts. Stickers from previous users were observed although to a lesser degree than previous years and no broken crates found.

Opinion on Sanitary Status of RPC's

RPC's have been established in Europe for over a decade with no reported issues relating to sanitary standards being reported. Yet, within North America there has been cause for concern over the sanitation of RPC's both in Canada and United States. It is acknowledged that sanitation of RPC's is critical given the risk of disseminating pests, spoilage microbes, plant and human pathogens. In terms of food safety, the risk of pathogens transferring between produce and crates has been demonstrated along with the potential of *Salmonella* to form biofilms on the surface of RPC's. Yet, of equal or greater concern is the potential of introducing pests/plant pathogens that could devastate crop production and be challenging to irradiate. It is for this reason that biosecurity is imposed at country boarders and even farms. Clearly, RPC's can be considered the weak link in biosecurity systems given there was previously little attention paid to sanitation. Yet, through sampling was initiated in 2013 it was evident that there were sanitary issues identified with RPC's that were recognized by growers/packers although not so by retailers who promoted use of reusable crates. The underlying reasons for the unsanitary status of RPC's could be attributed to units not being returned to the Chicago facility or inadequate sanitation of crates. Given that IFCO introduced a new wash process following release of the sampling trial results it can be assumed that the latter was the case. In addition to revising the wash process it is also likely that quality checks were increased as less damaged crates were observed in the 2014 and 2016 study. Nevertheless, although an improvement in sanitary status of RPC's was identified over the years it was noted that the proportion that failed based in microbial counts were unacceptably high. Although IFCO have opened a new Depot in Guelph to reduce the pressure on the Chicago facility it is unlikely to have a major impact on the sanitary status of RPC's given the inherent limitation of the sanitation process.

One contention of the RPC sampling trials was the standards applied to define a sanitary surface. The studies performed within Canada and US used the standards that defined a sanitary food contact surface as applied under food safety guides. Yet, it could be argued that produce placed in RPC's should be considered an agriculture product and hence, would not be considered high risk. In this respect it is interesting to note that IFCO have never made public the standards applied to define a sanitary crate. The reality is that without actual data on the persistence and transfer of microbes under natural conditions it is not possible to determine the microbial levels of concern. It could be argued that Integrated Pest Management (IPM) approach would be more appropriate. The underlying philosophy of IPM is that hazards cannot be totally avoided but only come as a concern if results exceed a defined level. That is, the actual levels of microbes present on crates is not as critical as the types (e.g. pathogens) recovered. Still, the defined level still requires to be determined through undertaking risk analysis of biological hazards of concern.

The sampling studies performed to assess the sanitary status of RPC's have focused on biological hazards with no studies performed on chemical threats such as pesticides. Although pesticides are rarely present at levels of concern there are issues when even trace amounts are present on fresh produce. This is especially relevant for organic produce that should have no detectable pesticide residues. In surveys performed, it has been reported that pesticides can be detected on over 30% of organic fresh produce. Pesticides are longer lasting and more challenging to remove by washing hence could potentially represent a hazard.

In conclusion, the sampling studies performed between 2013-2016 continue to highlight sanitary issues related to RPC's due to inadequacies in the applied washing/sanitation regime. Growers/packers cannot use visual assessment or ATP readings to assess the sanitary status of RPC's. Consequently the cleaning regime of RPC's needs to be revised along with standards, based on risk assessment, devised.