Microbiological survey of freshly squeezed juices from retail businesses across Victoria

Department of Human Services

Victoria
The Place To Be

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1. Executive Summary

A microbiological survey of freshly squeezed juices from retail businesses that squeezed juices on request was conducted across Victoria. The purpose of the survey was to improve knowledge and understanding of the microbiological risk of freshly squeezed fruit and vegetable juices.

Environmental Health Officers from 20 councils across Victoria, Australia collected 291 juice samples between March 2004 and May 2004 from retail businesses. All samples submitted were analysed for *Salmonella* spp. *Escherichia coli*, *Listeria monocytogenes* and coagulase positive staphylococci; sample pH was also determined. *Salmonella* was not detected in any juice samples. However, *E. coli* was detected in seven juice samples, two of which had levels greater than 100cfu/ml. *Listeria* spp. were detected in nine juice samples; *L. monocytogenes* was detected in one of these at a level of 25000cfu/ml and was assessed as being potentially hazardous. All juice samples analysed for coagulase positive staphylococci contained less than 100cfu/ml and were assessed as satisfactory.

Overall, the microbiological quality of the juice samples submitted in this survey was good despite the one sample that was assessed as being potentially hazardous.*

* Please note this report was independently reviewed before being published.

2. Introduction

2.1. Consumption and market

Results of the Australian National Nutrition Survey (1995) showed that a relatively high proportion of the people surveyed consumed fruit juice products. The Nutrition survey showed that 35.0% of all males surveyed and 37.7% of females surveyed consumed fruit juice type products daily[18].

In recent times, the demand for freshly squeezed juices has increased, as unpasteurised juices are preferred by the consumer because of the "fresh flavour" attributes. Traditionally, juice is consumed in the morning at breakfast time. However, the emergence of juice bars and a greater focus by manufacturers in establishing juice brands has extended consumption of juice products across the day.

The overall fruit juice and drink market category has grown by 4% sales volume in the last 12 months[21]. This growth in the fruit juice and drink market has been attributed to promotional activity, product innovation and the move to larger pack sizes. The fruit juice processing industry has seen a massive increase in the domestic production of fresh-type juicing.

This increase in the consumption of fruit/vegetables juice has seen a growth pull in the retail sector that has caused an increase in the number of retail businesses producing freshly squeezed juices in Victoria.

The areas most affected are major population centres in Victoria. However, this is an emerging market and many mixed retail businesses are expanding their product range to include freshly squeezed juices. Mixed retail businesses can be classed as businesses that handle a number of different food types. This has the potential to impact on rural areas in the future, especially coastal regions during the summer months, as many businesses begin to recognise the economic opportunities that exist.

2.2. Process

Freshly squeezed fruit and vegetable juices have little or no process steps that reduce pathogen levels, if contaminated, such as no kill step. Freshly squeezed juices are simply prepared by extracting, usually by mechanical means, the liquid and pulp of mature fruit or vegetables. The final product is an unfermented, unclarified, untreated juice, ready for consumption.

Most mechanical juicers use centrifugal force to separate the juice and residue (pulp) automatically. This makes it possible to prepare a variety of juices with minimal preparation. Fruits and vegetables usually require some preparation before being fed into the juicer. Fruits such as peaches, mango, oranges, melon and pineapple will need prior preparation due to the bitterness of the skin or to remove large pips and stones. Some vegetables, for example; carrots, need to be peeled and soaked in water due to their hardness. Once prepared, the fruit or vegetable can be feed into the juicer. The juice will be extracted and any pulp will be simultaneously removed by centrifugal force and ejected via an outlet pipe. During the process, contamination from raw materials, equipment or food handlers could be easily transferred to the final product. If pathogens such as *Salmonellae*, were present in freshly squeezed juices, individuals may be exposed.

2.3. Contamination

Pathogenic organisms can enter fruits and vegetables through damaged surfaces, such as punctures, wounds, cuts, and splits. This damage can occur during maturation or during harvesting and processing. A pathogen that has become internalised within a fruit or vegetable must be able to survive in the product until it reaches the consumer in order to become a public health hazard. Most fruit juice is sufficiently acidic to inhibit the growth of pathogenic organisms. Studies conducted on the internalisation, survival, or growth of microorganisms in produce and juices have shown a number of pathogenic organisms can be present and survive in a wide range of fruit and vegetables[14-15].
Salmonella has been reported to survive and grow rapidly on cut surfaces of cantaloupe, watermelon, and honeydew melon held at room temperature and the levels of contamination remained unchanged when the melons were held at refrigerated temperatures[15].

Several studies have demonstrated the survival of microorganisms, including human pathogens, in various juices. E coli O157:H7 has been found to survive in apple juice for up to 24 days at 4°C and orange juice for 24 days at refrigeration temperatures with very little decrease in numbers. Although it has been shown that pathogens can survive in orange juice, Salmonella and Listeria do not grow when the pH is below 4.4 [14-15].

2.4. Reported Outbreaks

There have been documented outbreaks of illness in humans associated with the consumption of unpasteurised fruit and vegetable juices and fresh produce. Pathogens responsible for these outbreaks include *Salmonella* and verotoxin producing *E coli*.[1-2.] In 1995, unpasteurised fresh orange juice contaminated with *Salmonella* was linked to an outbreak in a Florida Theme Park, USA. More than 60 visitors were affected[11]. In Australia, 427 confirmed cases of salmonellosis were reported in 1999 after the consumption of unpasteurised orange juice[18]. A total of 48 cases of *E coli* O157 were reported after drinking unpasteurised apple juice in Washington DC in 1996[12]. *L. monocytogenes* has also been identified as a pathogen that is of concern in relation to these products as the bacteria are present on the surfaces of raw fruits and vegetables. Outbreaks of listeriosis have been associated with ready to eat raw foods such as sprouts, fruit salad, and coleslaw. [3-4.]

The reported outbreaks of illness have historically been associated with unpasteurised packaged juices, rather than freshly squeezed juices. In Victoria, little information is available on the microbiological quality and associated illness of freshly squeezed juices. This survey investigates the microbiological quality of freshly squeezed fruit and vegetable juices and the processes and food handling practices from retail businesses that freshly squeeze juices on request across the state of Victoria, over a given period of time. Therefore, any results reported in this survey are an empirical evaluation over a given time period and geographic region.

3. Method

3.1. Sample collection

All samples were obtained on a voluntary basis from participating Councils across Victoria using the Council's existing sampling budget and the Council's requirements under section 32 of the Food Act 1984. Environmental Health Officers (EHOs) employed by Local Councils across Victoria collected juice samples between 15 March 2004 and 14 May 2004. EHOs were requested to obtain juice samples from retail businesses, including major retail juice bars, takeaways, restaurants, sandwich bars, health food shops, greengrocers, market stalls and any other registered food business which produced and sold freshly squeezed fruit and vegetable juices on request. All samples were purchased and then transferred to a sterile container.

The samples included the following juice types;
- Apple Juice (100%)
- Orange Juice (100%)
- Mixed juices (three or less ingredients)
- Watermelon (100%)
- Cantaloupe (100%)
- Carrot Juice (100%)
- Celery Juice (100%)
- Wheatgrass (100%)

It should be noted that the following juice samples were excluded from the sampling program:
- Fruit and Vegetable juices that contained dairy products e.g. smoothies
- Freshly squeezed juices in sealed packages
- Mixed juices (more than three ingredients).

Environmental Health Officers were also requested to obtain information from the premises using a set questionnaire (appendix A) on sample storage, sample preparation and sample processes. The samples were placed in insulated boxes and transported to the laboratory.

3.2. Sample analysis

The pH was measured on all the juices without dilution against AOAC – 981.12

Samples were examined for *Salmonella* spp., *L. monocytogenes, E. coli,* and coagulase positive staphylococci using Australian Standard 1766 - Methods for the microbiological examination of food.

Examination for coagulase positive staphylococci was performed in accordance with Australian Standard method 1766.2.4 – 1994. All results were requested to be reported as Not Detected in 0.01ml or the count per ml where a positive sample was confirmed.

E. coli testing was performed using the three tube Most Probable Number (MPN) technique (Australian Standard method 1766.2.3 – 1992). The MPN series was inoculated with 1ml of undiluted sample, 1ml of 10^{-1}, and 1ml of 10^{-2} dilutions in Lauryl Tryptose Broth. All results were requested to be reported as <0.3 per ml for negative results or MPN per ml for positive results *E. coli*.

L. monocytogenes testing was performed using the Australian Standard method AS/NZS 1766.2.16.1 – 1998. All results were requested to be reported as Detected or Not Detected in 25mls and where *L. monocytogenes* was detected it was requested to report as count per ml.

Salmonella testing was performed using the Australian Standard method AS1766.2.5 – 1991. All results were requested to be reported as detected or not detected per 25mls.*

3.3. Collation and analysis of results

Once the samples had been analysed a copy of the Certificate of Analysis and the completed questionnaire were provided to both the sampling council and the Food Safety Unit, DHS. Adverse results were to be followed up by the sampling council as per normal protocols. All results and completed questionnaires were collated and entered into a central database and analysed by the Food Safety Unit. The data was analysed using Microsoft Excel and Access software programs.

The samples were assessed against the ready- to-eat microbiological guidelines set by Food Standards Australia New Zealand[22] (Appendix B).

* Please note that all the microbiological methods used in this survey were prior to the release of the new Australian Standards for microbiological examination of food that were issued in July 2004.

4. Results

In total, 20 Local Councils across Victoria submitted 307 samples of fruit and vegetable juices for examination. Of these, 16 samples did not meet the sample criteria because they contained more than three ingredients, contained ingredients other than fruit or vegetable juice, were packaged juices or were not specified in the survey methodology. The 16 samples that did not meet the sample criteria were omitted from the results of the survey leaving a sample base of 291. The number of samples by juice type and the number of samples taken from premises type are shown in figure 1 and figure 2. The results for pH are shown in table 1.

Figure 1. Number of samples by juice type (n=307)

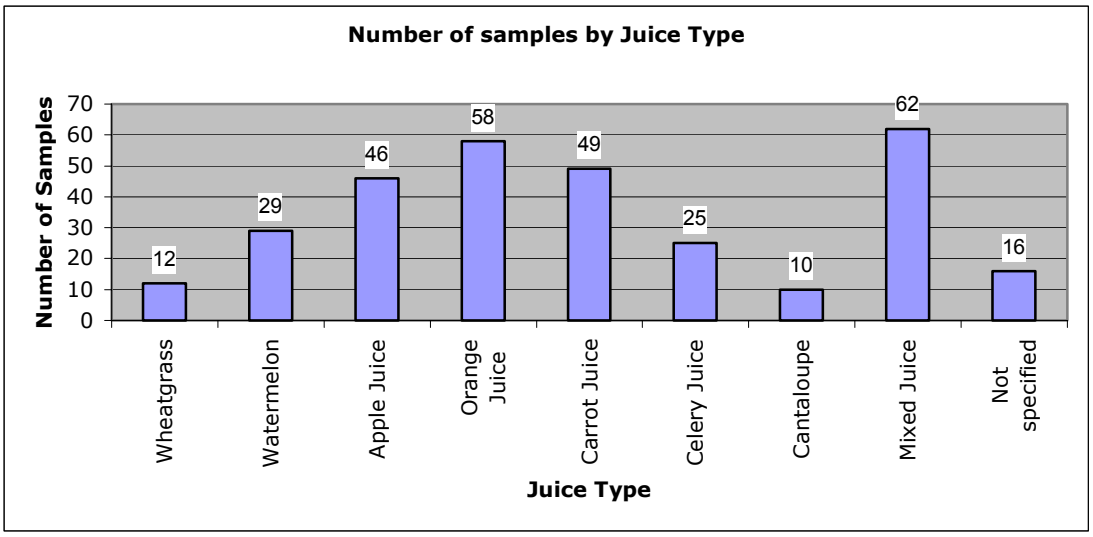
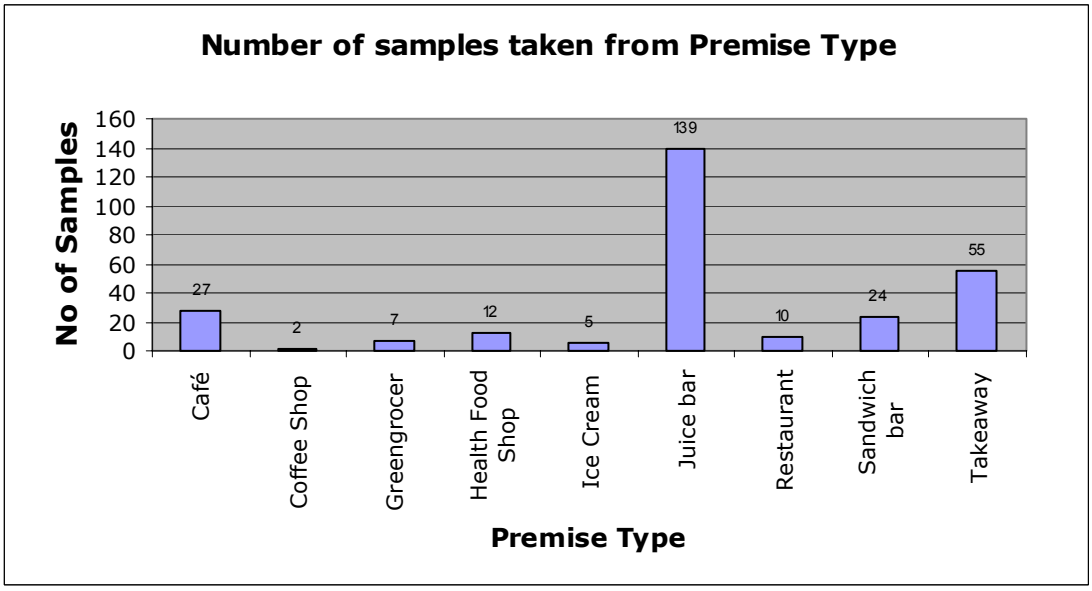


Figure 2: Number of samples taken from Premise Type (n=281)



Note: only 281 questionnaires returned with premise type information

Table 1: Ranges of pH of Juice samples

Juice Type	No. Analysed	pH range	pH mean
Apple	44 (46)	3.0 – 4.68	3.42
Orange	56 (58)	3.62 – 4.48	3.97
Carrot	49 (49)	3.56 – 6.66	5.48
Celery	23 (25)	4.24 – 6.25	5.25
Cantaloupe	10 (10)	4.06 – 6.55	5.33
Watermelon	27 (29)	3.83 – 5.8	4.9
Wheatgrass	10 (12)	5.11 – 6.13	5.76
Mixed juice	60 (62)	3.22 – 6.45	4.52

**Figures in brackets represents total number of samples taken for the survey of each juice type*

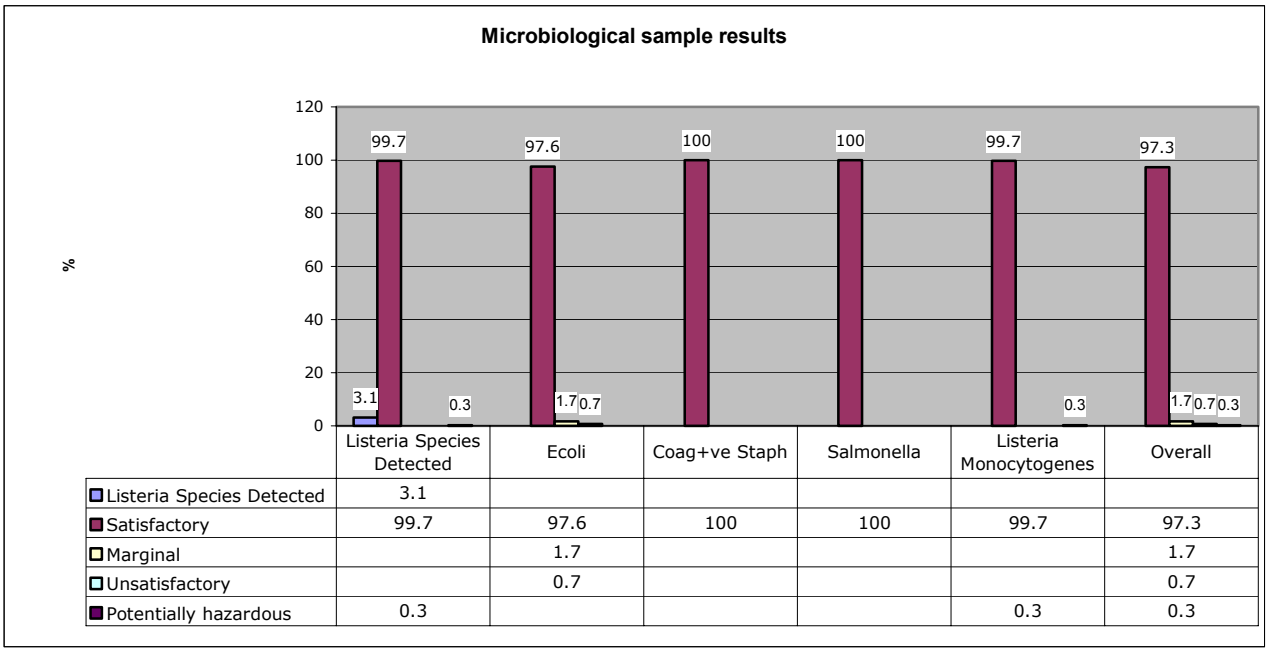
The microbiological results for all samples are cited in figure 3 and collated in appendix c.

4.1. Analytical results

Overall the microbiological quality of the juice samples submitted was good as 97.3%(n=283/291) were deemed satisfactory against the ready to eat guidelines. Only 0.3% (n=1/291) of the samples were deemed potentially hazardous. It should be noted that the other juice samples only 1.7% (n=5/291) were assessed as marginal and 0.7% (n=2/291) were assessed as unsatisfactory respectively in accordance with the guidelines.

4.1.1. Microbiological Results by pathogen

Figure 3: Microbiological Sample Results



	Listeria Species Detected	Ecoli	Coag+ve Staph	Salmonella	Listeria Monocytogenes	Overall
Listeria Species Detected	3.1					
Satisfactory	99.7	97.6	100	100	99.7	97.3
Marginal		1.7				1.7
Unsatisfactory		0.7				0.7
Potentially hazardous	0.3				0.3	0.3

Salmonella *(n=291) was not detected in any juice samples.*

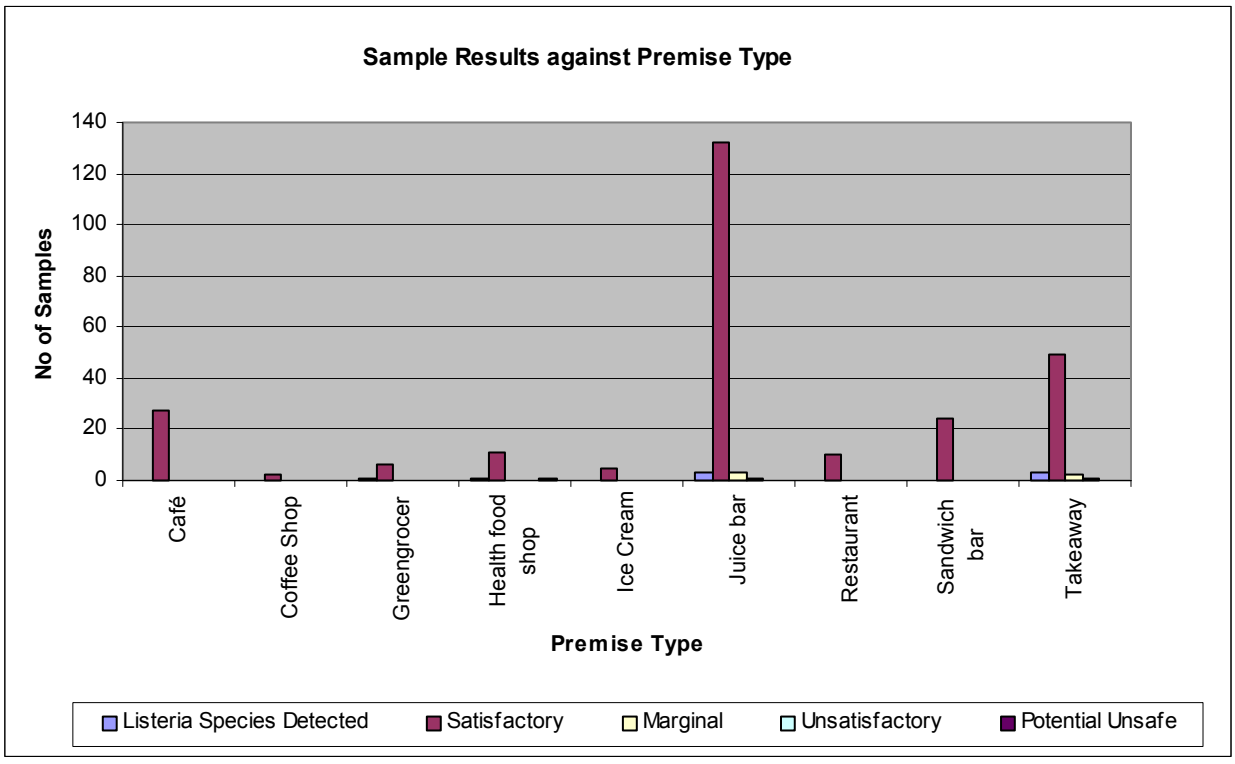
Five juice samples were assessed as marginal based on *E coli* levels detected. Two juice samples (cantaloupe and wheatgrass) had levels of *E coli* greater than 100cfu/ml and were deemed unsatisfactory in accordance with the guidelines. It should be noted that a number of samples that were assessed as being satisfactory had *E coli* detected. In total, 24 of 284 samples were deemed satisfactory when analysed for *E coli* had very low levels of *E coli* <3cfu/ml. In five samples *E coli* was detected at levels between 2.9 – 1.0 MPN/ml and 19 samples were detected with levels between 0.9 – 0.3 MPN/ml. Limit of detection for the survey for *Salmonella spp.* was the presence or absence in 25g and 0.3 MPN/ml for *E coli*.

Listeria spp. was detected in only nine juice samples and of which only one was contaminated with *L. monocytogenes*. The sample (celery) with *L. monocytogenes* had levels greater than 100cfu/ml (25000cfu/ml) and was assessed as being potentially hazardous. The remaining eight samples did not contain the notifiable human pathogen *L monocytogenes* and were assessed as being satisfactory in accordance with the ready to eat guidelines.

Only 281 of the 291 juice samples submitted were analysed for coagulase positive staphylococci. All juice samples that were analysed for coagulase positive staphylococci contained less than 100cfu/ml.

4.1.2. Microbiological Results by Premise Type

Figure 4: Sample Result against Premise Type



49.5% (n=139/281) of samples were purchased from juice bars. Of these 139 samples, 97.1% (n=135/139) were satisfactory when assessed against the guidelines. In contrast some of the specific premise types especially those that have a number of different food preparations or when juice products were not the prime product for sale the percentage of satisfactory samples dropped slightly. In takeaways the number of samples assessed as satisfactory was 94.5% (n=52/55) and for Health Food Shops the number dropped to 91.6% (n=11/12). It should be noted that the sample that was assessed as being potentially hazardous was from a Health Food Shop. However, the number of samples submitted against these premise types was low and no conclusion about the safety of these products can be made. Any results that were not deemed satisfactory probably related to the individual processes within the premises rather than premise type itself.

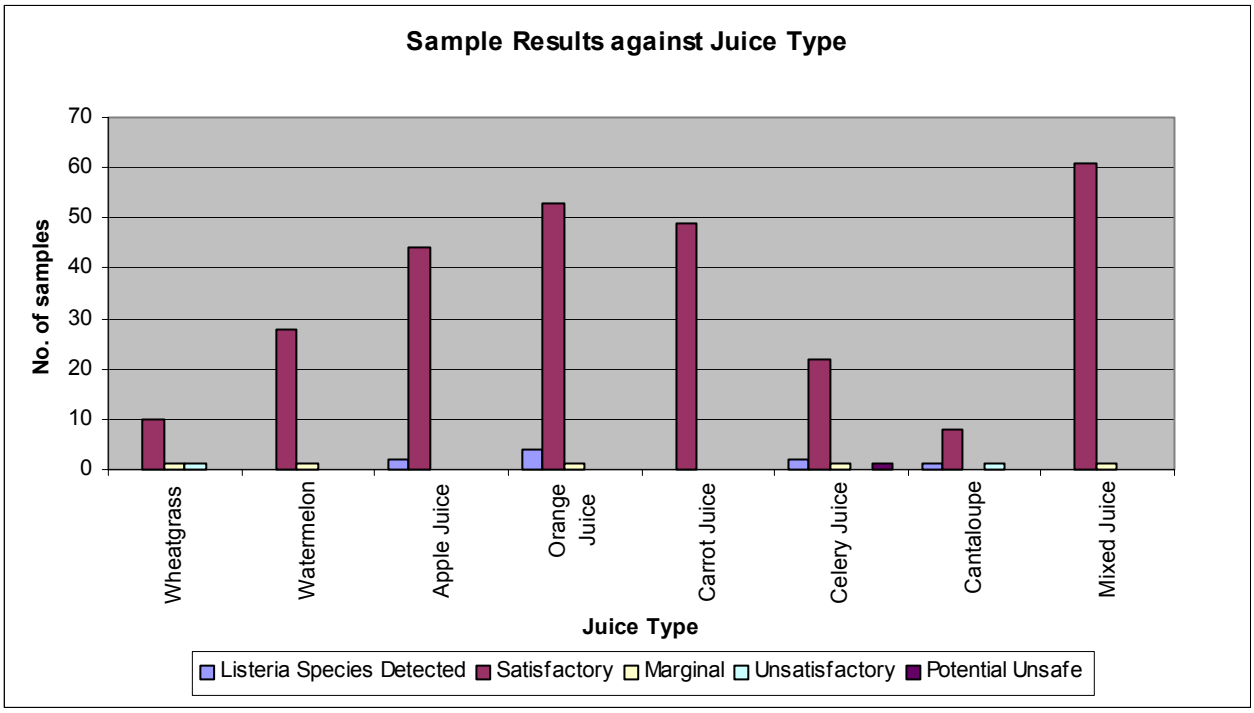
4.1.3. Microbiological Results by Juice Type

No firm correlation can be made between the microbiological quality and juice types, as there were insufficient numbers of samples in some juice types.

Figure 5 shows that all the carrot juice (n=49) and apple juice (n=46) samples submitted were deemed satisfactory.

Listeria spp were detected in two samples of apple juice. However, *L. monocytogenes* was not detected from these samples. *Listeria* spp. were detected in 6.9%(n=4/58) of the orange juice samples submitted however, again *L. monocytogenes* was not detected in any of these samples.

Figure 5: Sample Results against Juice Type



Overall 98.3% (n=57/58) of the orange juice samples submitted were deemed satisfactory and only one sample was assessed as being marginal due to levels of *E coli* being detected between 3 - 100cfu (15MPN/ml).

In contrast to carrot, apple and orange juice samples where the level of satisfactory samples was above 97.3%, the number of satisfactory samples fell below this figure in the following juice types; Watermelon, wheatgrass, celery and cantaloupe.

Only 12 wheatgrass samples were submitted and of those samples analysed 83.3% (n=10/12) were assessed as satisfactory.

EHO's submitted a total of 25 celery samples as part of the survey and of those samples analysed 92.0% (n=23/25) were assessed as being satisfactory. One celery juice sample was assessed as being marginal, as *E coli* was detected at levels between of 3-100 cfu/ml (46MPN/ml) and one sample was assessed as being potentially hazardous as the sample was detected with levels of *L. monocytogenes* greater than 100cfu/ml (25000cfu/ml).

90% (n=9/10) of cantaloupe samples were assessed as being satisfactory. The sample that was assessed as not being satisfactory had levels of *E coli* greater than 100cfu/ml (110MPN/g) and was deemed as unsatisfactory. 29 samples of watermelon were analysed and 96.6% (n=28/29) were assessed as being satisfactory. The sample that was assessed as being marginal was detected with levels of *E coli* between 3 - 100cfu/ml (3.9MPN/ml).

Finally, 62 mixed juices were analysed and only one sample was assessed as being not satisfactory. This sample had levels of *E coli* between 3 - 100 cfu/ml (4.3MPN/ml) and was assessed as marginal. Notably the juice sample only contained celery and wheatgrass as ingredients.

4.2. Questionnaire Results

Data was collected from 111 food premises on juice processes, sample storage and sample preparation using a set questionnaire (appendix A). In general, when questioned most proprietors/food handlers understood what was required to produce and handle freshly squeezed juices safely. Even when poor practices were identified the microbiological results of the samples taken from these premises did not appear to reflect these practices. The information collected from the one sample that was assessed as being potentially hazardous was prepared and processed in a reasonable manner when compared to other premises assessed in the survey. Two other samples analysed from the same premise were assessed as being satisfactory.

4.2.1. Cleaning and Sanitising Practices

Overall only 2.3% (n=8/291) of the samples analysed were deemed unsatisfactory and therefore, it is difficult to identify a relationship between handling practices and microbiological quality. 77.5% (n=86/111) of the premises had a cleaning and sanitising process for juicers documented in the premises food safety program.

Cleaning and sanitising frequency for juicer
The cleaning and sanitising frequency of juicers was reflected by premise type. Juice bars generally cleaned and sanitised juicers on a more frequent basis when compared to other premise types. Fruit juice bars, when questioned, cleaned the juicers at a frequency greater than once a day [(76%) n=38/50)]

with the majority of the juice bars cleaning the juicers between 2-3 times per day or after each use. In mixed handling premises the cleaning frequency decreased when compared to juice bars. For example, Cafés only 30% (n=3/10) cleaned the juicers more than once per day. The cleaning frequency of juicers may reflect the number of juices being sold from the premises rather than the actual necessity to clean the juicer.

While cleaning frequency differed by premise type there was no significant difference between premise types when questioned on how often they dismantled and sanitised the juicer. In total, 86.5% (n=96/111) of the premises questioned dismantled and sanitised the juicer at least once per day or more than once per day. The remaining 15 premises either did not state a frequency or only dismantled and sanitised the juicer 2 or 3 times a week.

Cleaning frequency for utensils
The frequency for cleaning utensils across all premise types related to the frequency of use and the majority of premises cleaned utensils after each use [(46.8%) n=52/111)] or more than once per day [(25.2%)n=28/111)]. Some premises (15) stated that they only cleaned their utensils once per day. When premises were asked how often they sanitised utensils including chopping boards 46%(n=51/111) of premises did so only once per day. One premises only sanitised the utensils twice per week and one premises only sanitised the utensils once a month. Two samples were submitted and analysed from this premise and were both assessed as being satisfactory.

Understanding of cleaning and sanitising
All premises were asked to describe the cleaning and sanitising procedure for juicers and utensils. All premises (n=111) responded to the question with varying degree of detail. 111 premises 36.9% (n=41/111) used sanitisers when cleaning and sanitising utensils. Most of the premises that sanitised used Chlorine, tri-sodium phosphate, quaternary ammonium compounds and household brand sanitisers. A small number of premises [9%(n=10/111)] used dishwashers as part of the cleaning and sanitising procedure. The remaining premises cleaned with water and detergent but did not sanitise.

The cleaning and sanitising procedure of the dismountable parts of the juicer mirrored the procedures described by the premises for the cleaning and sanitising of utensils.

4.2.2. Preparation

When questioned on sample preparation prior to juicing the majority of premises appeared to prepare the fruit or vegetable prior to juicing in a safe manner. Premises were asked if they washed the fruit or vegetable prior to juicing 53.0% (n=149/281) reported they washed the produce before preparation and juicing. The majority of these premises rinsed the produce in running water or rinsed and scrubbed the produce in water. Sanitiser was used on the fruit prior to juicing for only three samples (two watermelon and one orange).

Some of the fruits or vegetables [32.7% (n=92/281)] used in the juice samples were reported as not being washed prior to preparation or juicing. Of these samples, 52 were produced from fruits that require some form of preparation and the removal of the rind, skin or peel before consumption for example, watermelon and cantaloupe. Although the practice of not washing the fruit and vegetable is not desirable, the microbiological results did not reflect the absence of washing. The sample that was assessed as potentially hazardous (celery) was washed under running water.

Proprietors were asked how they prepared the fruits or vegetables that were used in the juice samples. Preparation of the fruit or vegetable depended on the fruit and vegetable type. For example, most premises peeled the orange by hand and then cut the orange with knives before being juiced. Some of the premises placed oranges whole into the juicing machine and the orange juice sample that was assessed as being marginal was cut using a machine. The sample that was assessed as potentially hazardous (celery juice) was prepared and cut manually. However, 23 other celery juice samples were prepared in the same manner and were assessed as satisfactory.

4.2.3. Storage

Storage of prepared fruit and vegetables was generally good across all premises. The majority of premises prepared the fruit or vegetable for immediate use or prepared the fruit or vegetable in bulk for the same day use. 58.7% (n=165/281) of the samples were produced from fruits or vegetables that were prepared for immediate use or prepared in bulk for the same day use. The sample that was assessed as potentially hazardous was prepared and stored in this manner. Only 7.1% (n=20/281) of the premises stored bulk prepared fruit or vegetables in for more than 2 days.

5. Discussion

Reports[1,2,3,4,11,12,18] from overseas and in Australia have shown that packaged unpasteurised juices and fruit and vegetables have been associated with microbial hazards and therefore results from this survey are encouraging. This suggests that the premises that were assessed in this sampling program in Victoria have a reasonable understanding of what is required to produce freshly squeezed juices in a safe and suitable manner.

5.1. Overseas microbiological guidelines

Overall the microbiological quality of the juice samples submitted was good as 97.3%(n=283/291) were deemed satisfactory when assessed against the ready to eat guidelines. The findings of this survey are comparable to other surveys carried out in the UK and Ireland. In the UK survey Salmonella spp. and E. coli O157 was not detected in any of the 291 samples analysed. L. monocytogenes was detected in 0.7% (n=2/291) of the samples. In the Irish survey Salmonella spp. E coli O157 and L. monocytogenes were not detected in any of the juices. It should be noted that the juices analysed in these surveys were 'packaged' unpasteurised juices and were assessed against the UK Public Health Laboratory Service (PHLS) and the Food Safety Authority of Ireland guideline (FSAI) for ready to eat foods respectively [26,23].

The PHLS and the FSAI ready to eat guidelines differ slightly when compared to Australian New Zealand guidelines and the main difference in the guidelines relates to the satisfactory level of E coli in the food. In the Australia New Zealand guidelines the satisfactory levels for E coli (<3cfu/g) are more stringent when compared to the other guidelines (<20cfu/g). If the microbiological results from this survey were assessed against the PHLS and FSAI guidelines the number of satisfactory samples would increase from 97.3% to 98.6% (n=281/291) While guidelines provide assistance to enforcement agencies in interpreting whether food premises are complying with general food safety standards they are not legally enforceable. However, some international enforcement agencies are setting microbiological standards for packaged unpasteurised juices. The Canadian Food Inspection Agency (CFIA) has set enforceable microbiological standards for unpasteurised packaged Apple juice. The microbiological standard set by CFIA is less stringent and has acceptable limits for E coli of 100cfu/g and unacceptable levels of 1000cfu/g.

5.2. Food handling practices

In 2003, the Eastern Region Food Surveillance Group (ERFSG), Victoria undertook a survey to determine the microbiological status of freshly squeezed juices and assess the risk of such products to public health. All samples (n=29) submitted were assessed to be satisfactory against the Food Standards Australia New Zealand guidelines. The number of samples submitted as part of the ERFSG survey was low and made interpretation difficult and unreliable. However, a number of potential food handling problems were identified from information gathered. The problems identified in the ERFSG survey were similar to the ones identified in this survey. For example, not washing fruit and vegetables prior to use, not using sanitisers in the cleaning process for utensils and chopping boards[21].

Although poor food handling practices were identified in both the ERFSG and this survey and issues are raised regarding food safety knowledge, it is difficult to make any conclusions from survey results. A number of studies have shown that knowledge of food handling in general is not optimal and food handlers have difficultly in understanding some food safety procedures. For example, a survey in 2002 reported only 77% of food handlers understood that detergent does not kill microorganisms and in a

repeat survey in 2004 reported that only 66% of the food handlers understood that detergent does not kill microorganisms[23].

The results from the survey questionnaire showed a number of premises did not wash the fruit or vegetables prior to juicing. Although it is not necessary to wash fruit and vegetables with sanisitier, businesses should wash them thoroughly with potable water before juicing. If heavily contaminated the fruit and vegetables should be subjected to a double wash. Washing should occur on all fruits and vegetables even if the rind, skin or peel is to be removed before juicing. The removal process of the rind, skin or peel could result in cross contamination of the edible portion[24].

The results from the survey questionnaire indicated some proprietors did not clean and sanisitise equipment and utensils on a regular basis or did not understand how to do it correctly. Operators should understand effective cleaning and sanisitising procedures as equipment can contaminate juice during processing[3,4].

Temperature control of the prepared fruit and vegetables is important as growth of pathogenic organisms can occur on cut surfaces. The survival and growth of pathogenic organisms is not only dependant on temperature but also on pH and the type of organic acid present in the fruit and vegetables. Although it has been shown pathogens can survive in high acid fruits, such as lemon and oranges it is unlikely that the pathogens numbers will increase in these environments. However, growth of pathogenic organisms has been shown to occur in medium to low acid produce such as melons or celery[2].

The information gathered from this juice survey is useful and will assist Local EHO's in identifying potential problem areas. The information collated was difficult to analyse and to assess with any degree of confidence. Food handlers did not appear to have a full understanding of food safety.

5.3. Quality of raw materials

Given that this survey identified that food handers did not have a full understanding of food safety and some poor food handling practices were identified suggests that the quality of the raw fruit or vegetable used in the juice samples has a significant factor in the microbiological status of the final product.

While *E coli* is an indicator of faecal contamination and low levels were detected in a number of samples analysed in this survey. The detection of *E coli* in these foods is not unexpected as the raw materials or produce may be exposed to environmental contamination during maturation and harvesting. For example faecal organisms can enter fruits and vegetables through damaged surfaces, such as punctures, wounds, cuts and splits.

Although not assessed in this survey the quality of the raw materials used should be of a good quality and premises should sort and discard any fruits or vegetables that are badly damaged or bruised[11]. The removal of badly damaged or bruised fruits or vegetable will decrease the risk of microbial transfer from the raw materials to equipment and the final product.

Apart from the detection of *E. Coli* in some of the juice samples Listeria spp. were also detected. *Listeria* spp. including *L. monocytogenes* is widely distributed in soil and on plant vegetation, where it can persist for long periods; hence, raw produce is a potential vehicle for human illness. Studies have shown that bean sprouts and leafy vegetables are often contaminated with *L. monocytogenes* and one juice sample

in this survey that was contaminated with *L. monocytogenes* was celery. It has been reported that some vegetables such as carrots may contain natural properties that inhibits *Listeria*[24].

The microbiological results from this survey and scientific studies suggest further investigation is required to assess the risk of consuming juices that have a pH greater than 4.5. Celery, wheatgrass and cantaloupe juices were identified as possible juice types that have a higher risk in this survey. The number of samples submitted against these juices types in this survey was low and no conclusions can be made about the safety of these juice types.

6. Conclusion

The microbiological results from this survey and reviews of scientific information suggests the risk from the consumption of freshly squeezed juices is low. However, it is clear from both epidemiological and laboratory investigations that pathogenic organisms may be present in fruit juices including those with a low pH. Although foodborne illness associated with the consumption of these products is rarely reported, businesses that produce freshly squeezed juices should be aware that preventative measures through food safety control strategies is important.

7. Recommendations

a) Further investigation is required to assess the risk of consuming juices that have a relatively high pH. Celery, Wheatgrass and Cantaloupe juices were identified as higher risk juices in this survey.

b) Further research is required to fully understand the risks, if any associated with mixed businesses producing freshly squeezed juices. The microbiological results from this survey indicated that the number of satisfactory samples dropped slightly in businesses that have a number of food preparations or when juice products were not the prime product for sale.

c) A repeat of this survey should be considered if there is data indicating emerging risks of food borne illness identified from the consumption of freshly squeezed juices.

d) Local Councils should continue to assess these premises during routine inspections and compliance checks and evaluate key food-handling practices including:
    - Washing all fruit and vegetables especially leafy vegetables (celery) thoroughly prior to juicing regardless of whether they are to be peeled or skinned as the surface may contain pathogens such as *Listeria* and *Salmonell*a. Cross contamination can occur in the process of peeling the fruit and vegetable so it is also advisable to wash peeled or skinned fruit and vegetables.
    - Cleaning and sanitising utensils including chopping boards as often as possible throughout the day.
    - Ensuring the cleaning and sanitising schedule identifies the dismantling of the juicing equipment.
    - Encouraging proprietors to keep prepared fruit and vegetables under temperature control as growth of pathogenic organisms can occur on cut surfaces.
    - Encourage proprietors to remove badly damaged or bruised fruits or vegetables.

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10. Appendix A. Survey Questionnaire

Victorian Food Sampling Committee
Freshly squeezed juice survey Questionnaire

Coversheet- Question 1 to 8 (only needs to be completed once per premises)

Municipality	
Name of EHO	
Premises Registration Number or Address of Premises	
Number of samples taken from this premises	
Date sample/s taken	
Time sample/s taken	
Date sample/s submitted to laboratory	
Time sample/s submitted to laboratory	
Name of laboratory	

Premises specific information:

1. What type of premises is this?

Greengrocer ..... ☐
Juice bar ..... ☐
Restaurant ..... ☐
Health Food Store ..... ☐
Take away ..... ☐
Sandwich bar ..... ☐

Other (please specify).....

2. What types of juice drinks are freshly squeezed on site at this premises?

Fruit juices ..... ☐
Vegetable juices..... ☐
Juices with other ingredients (eg milk, yoghurt) ..... ☐ (do not sample these)

Washing and sanitising procedures for Equipment

3. Is the cleaning and sanitising process for juicers covered in the premises Food Safety Program?

Yes..... ☐
No.....☐

4. How often are juicers cleaned and sanitised?

	Cleaned	*Sanitised*
After each use.....	☐	☐
Between different juice types.....	☐	☐
Once per day.....	☐	☐
2-3 times per day.....	☐	☐
>3 times per day..... ..	☐	☐
Not at all.....	☐	☐

Other (please specify)

5. How often are the juicers dismantled for cleaning and sanitising purposes?

	Cleaned	*Sanitised*
After each use……..	☐	☐
Between different juice types……..	☐	☐
Once per day……	☐	☐
2-3 times per day……..	☐	☐
>3 times per day…… ..	☐	☐
Not at all……	☐	☐

If not dismantled please briefly describe any alternative cleaning/sanitising procedure (eg juicier flushed with cleaning /sanitising solution)

……

……

6.Please tick the processes that best describes the <u>usual</u> cleaning and sanitising procedure for dismountable parts of the juicer: (you may tick more than one for example water and scrub surface plus soak in water with sanitiser added)

Cleaned with water and detergent in container (eg sink)…… ☐
Cleaned with running water …… ☐
Soak in a container of water and detergent…… ☐
Cleaned with water and scrub surface…… ☐
Through the dishwasher…… ☐
Cleaned in container of water with sanitiser added…….. ☐
Cleaned then soak in container of water with sanitiser added ..... ☐
Name of sanitiser used and active ingredient eg chlorine, quats .....
Concentration of sanitiser .....
How long is soaking process (minutes) .....

(If another method not mentioned above please describe)

……..

7. How often are utensils/chopping boards used in fruit/vegetables preparation cleaned and sanitised?

	Cleaned	***Sanitised***
After each use……..	☐	☐
Between different juice types……..	☐	☐
Once per day……	☐	☐
2-3 times per day……..	☐	☐
>3 times per day…… ..	☐	☐
Not at all……	☐	☐

Other (please specify)

8. Please tick the processes that best describes the cleaning and sanitising procedure for utensils/chopping boards: (you may tick more than one for example rinse and scrub surface plus soak in water with sanitiser added)

Cleaned with water and detergent in container (eg sink)…… ☐
Cleaned with running water …… ☐
Soak in a container of water and detergent…… ☐
Cleaned with water and scrub surface…… ☐
Through the dishwasher…… ☐
Cleaned in container of water with sanitiser added…….. ☐
Cleaned then soak in container of water with sanitiser added ..... ☐
Name of sanitiser used and active ingredient eg chlorine, quats .....
Concentration of sanitiser .....
How long is soaking process (minutes) .....

(If another method not mentioned above please describe)

……..

SAMPLE SPECIFIC INFORMATION- Questions 9 to 15. <u>These answers must relate to the sample taken on the day of sampling</u>
Please enter the Sample No. under the juice type heading and complete the following questions <u>in that column</u> for <u>each sample</u> obtained. For a mixed juice sample please use the last column and list the ingredients as indicated on the bottom of the next page.

Freshly Squeezed 100% Juice		**Apple** 100% Juice	**Orange** 100% Juice	**Watermelon** 100% Juice	**Cantaloupe** 100% Juice	**Carrot** 100% Juice	**Celery** 100% Juice	**Wheatgrass** 100% Juice	**Mixed (Max of 3 components)**		
Sample No.											
Temp. of end product @ time of sampling											
9. Were any ingredients frozen concentrates?		Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	**1** Y / N	**2** Y / N	**3** Y / N
10. Is ice added?		Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
11. Was the fruit or vegetable used in this drink washed prior to juicing? (if no go to Q 13)		Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
12. Please circle the process that was used to was the fruit or vegetable used in this drink. (You may circle yes to more than one.)	**a)** Rinse with water in container (eg sink or bucket)	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	b) Rinse with running water	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	c) Soak in a container of water	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	d) Rinse with water and scrub surface	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	e) Rinse in container of water with **sanitiser** added	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	f) Soak in container of water with **sanitiser** added	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	g) If yes to e) or f) Name of sanitiser used and active ingredient eg chlorine, quats										
	h) If yes to e) or f) Concentration of sanitiser										
	i) If yes to f) How long is soaking process (mins)										
	j) Fruit/vegetable washed prior to receipt at premises	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N

	k) Other washing procedure not listed above (please describe)										
13. Please circle how the fruit or vegetable used in the drink was prepared prior to juicing?	**a)** Peeled by hand	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	b) Cut by hand with knives	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	c) Cut using a machine	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	d) Placed whole into juicing machine (no peeling/cutting)	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	e) Fruit/vegetable cut/peeled prior to receipt at the premises	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	f) Other preparation procedure										
14. How is the prepared fruit/vegetable stored?	**a)** Prepared for immediate use.	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	b) In bulk and stored for that same day's use	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	c) In bulk and stored for same day and next day's use	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
	d) In bulk and stored for greater than 2 days use	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
15. What temperature is the prepared ingredient stored at?											

Please list mix juice ingredients: 1…… 2…… 3……

Comments:

11. Appendix B. Guidelines for the microbiological examination of ready-to- eat foods

Food Standards Australia New Zealand
Guidelines for the microbiological examination of ready-to- eat foods
December 2001

Introduction

Samples collected for surveillance and monitoring purposes are often multi-component products for which there are no microbiological standards or guidelines. Interpreting the significance of the types and levels of microorganisms reported when these foods are tested may therefore be difficult. The purpose of this document is to provide assistance in the interpretation of microbiological analyses of foods where no other microbiological criteria exist.

These guidelines identify four categories of microbiological quality for ready-to-eat foods ranging from satisfactory to potentially hazardous. This reflects both the high level of microbiological quality that is achievable for ready-to-eat foods in Australia and New Zealand and indicates the level of contamination that is considered to present a significant risk to public health. Follow-up actions appropriate to each category of microbiological quality are also recommended.

The guidelines for the microbiological examination of ready-to-eat foods apply to foods sampled at the point of sale or distribution * to consumers.

Note: * Ready to eat food for distribution to consumers would include those provided by airlines, hospitals and other institutions.

Ready-to-eat foods

Ready-to-eat food is food that is ordinarily consumed in the same state as that in which it is sold or distributed and does not include nuts in the shell and whole, raw fruits and vegetables that are intended for hulling, peeling or washing by the consumer.

Sampling

These guidelines provide quantitative levels of microbiological quality but do not provide sampling plans for the acceptance/rejection of sample lots.

Food samples may be submitted for laboratory analysis for a number of reasons and may be limited in size and number. While these guidelines will allow an assessment of the microbiological quality of a single sample of ready-to-eat food to be made, the results may not be representative of the lot from which it is derived, unless the sample has been individually prepared. Further samples may be required if an assessment as to the microbiological status of the lot is needed.

The statistical validity of a microbiological examination increases with the number of field samples analysed. For regulatory purposes, a minimum of 5 sample units from a lot is generally specified for examination. The size of the samples taken should also be adequate to enable appropriate microbiological analyses to be undertaken. A minimum sample size of 100g or ml is commonly required.

The ICMSF [1] publication *Microorganisms in Foods 2, Sampling for Microbiological Analysis: Principles and Specific Applications*(1986) provides detailed information on using appropriate sampling plans.

Note: [1] ICMSF International Commission on Microbiological Specifications for Foods

lot

A lot is defined as a quantity of food or food units produced and handled under uniform conditions. This may be restricted to a food item produced from a particular production line or piece of equipment within a certain time period (not exceeding 24 hours).

Food examination

The microbiological testing of ready-to-eat foods should be appropriate to the type of food sample being examined and to the processing it has received. Not all the organisms listed in Table 1 are equally applicable to all food groups, nor should all the organisms listed be tested for routinely. Interpretation of results should also be based on knowledge of the product components and the production process. The significance of the microbiological tests that may be conducted is discussed below.

Standard Plate Count

The standard plate count (SPC), also referred to as the aerobic plate count or the total viable count, is one of the most common tests applied to indicate the microbiological quality of food. The significance of SPCs, however, varies markedly according to the type of food product and the processing it has received. When SPC testing is applied on a regular basis it can be a useful means of observing trends by comparing SPC results over time.
Three levels of SPC are listed in Table 1 based on food type and the processing/handling the food has undergone.
Level 1 - applies to ready-to-eat foods in which all components of the food have been cooked in the manufacturing process/preparation of the final food product and, as such, microbial counts should be low.
Level 2 - applies to ready-to-eat foods which contain some components that have been cooked and then further handled (stored, sliced or mixed) prior to preparation of the final food or where no cooking process has been used.
Level 3 - SPCs not applicable. This applies to foods such as fresh fruits and vegetables (including salad vegetables), fermented foods and foods incorporating these (such as sandwiches and filled rolls). It would be expected that these foods would have an inherent high plate count because of the normal microbial flora present.
Note: An examination of the microbiological quality of a food should not be based on SPCs alone. The significance of high (unsatisfactory) SPCs cannot truly be made without identifying the microorganisms that predominate or without other microbiological testing.

Indicators

Enterobacteriaceae

The family Enterobacteriaceae includes many bacteria that are found in the human or animal intestinal tract, including human pathogens such as Salmonella and Shigella. Enterobacteriaceae are useful indicators of hygiene and of post-processing contamination of heat processed foods. Their presence in high numbers($>10^4$ per gram) in ready-to-eat foods indicates that an unacceptable level of contamination has occurred or there has been underprocessing (e.g. inadequate cooking)
Testing for Enterobacteriaceae is not applicable to fresh fruits and vegetables or foods containing these.

Escherichia coli

The presence of E. coli in ready-to-eat foods is undesirable because it indicates poor hygienic conditions which have lead to contamination or inadequate heat treatment. Ideally E. coli should not be detected and as such a level of <3 per gram (the limit of the Most Probable Number test) has been given as the satisfactory criteria for this organism. Levels exceeding 100 per gram are unacceptable and indicate a level of contamination which may have introduced pathogens or that pathogens, if present in the food prior to processing, may have survived.

Pathogens

Coagulase-positive staphylococci

Contamination of ready-to-eat foods with coagulase-positive staphylococci is largely as a result of human contact. Contamination should be minimised through good food handling practices and growth of the organism prevented through adequate temperature controls. Unsatisfactory levels of coagulase-positive staphylococci indicate that time/temperature abuse of a food is likely to have occurred following improper handling during food preparation. A test for enterotoxin, SET, may be appropriate where levels of coagulase-positive staphylococci exceed 10^3 cfu per gram or where poor handling practices are suspected but it is likely that viable organisms may no longer be present in

significant numbers. Levels of greater than or equal to 10^4 cfu are considered as potentially hazardous as foods with this level of contamination may result in food borne illness if consumed.

Clostridium perfringens

Unsatisfactory levels of C. perfringens generally occur as a result of temperature abuse where cooked foods are held at warm temperatures (<60 ºC, particularly room temperature) for extended periods of time or cooled (to 5 ºC or below) too slowly**. Foods associated with foodborne illness caused by C. perfringens include joints of meat (especially large and rolled joints) and meat and vegetable dishes such as stews and pies. The detection of high levels (>10^3 cfu per gram) of C. perfringens should result in an investigation of the food handling controls used by the food business. Levels of greater than or equal to 10^4 cfu per gram are considered as potentially hazardous as consumption of foods with this level of contamination may result in food borne illness.

Note: ** Food Safety Standard 3.2.2 of the Australia New Zealand Food Standards Code specifies food handling controls which include temperature control requirements for food receipt, storage, processing and display.

Bacillus cereus and other Bacillus spp

An unsatisfactory level of B. cereus in cooked foods generally occurs as a result of inadequate temperature control. As for C. perfringens, cooked foods should be held at or above 60ºC or at or below 5ºC to prevent growth, or held outside this temperature range for a limited time. Foods associated with B. cereus food poisoning include cooked rice dishes, other cereal based foods such as pasta/noodles, dairy based deserts and meat or vegetable dishes incorporating spices. The detection of high levels (>10^3 cfu per gram) of B. cereus should result in an investigation of the food handling controls used by the food business. Levels of greater than or equal to 10^4 cfu per gram are considered potentially hazardous as consumption foods with this level of contamination may result in food borne illness. Other Bacillus species, such as B. subtilis and B. licheniformis, have also been associated with food borne illness and may also be tested for.

Vibrio parahaemolyticus

Testing for V. parahaemolyticus is relevant to seafoods only. High levels of V. parahaemolyticus(>10^2 per gram) in cooked seafoods indicates that the food has been inadequately cooked or cross-contaminated after cooking with subsequent time/temperature abuse and should result in an investigation of the food handling controls used by the food business. Higher levels (up to 10^2 per gram) of V. parahaemolyticus in raw seafoods may be expected because of natural contamination from the aquatic environment, however levels from 10^3 to 10^4 per gram in raw seafoods would indicate inadequate temperature controls since harvesting and should be considered as unsatisfactory. The potentially hazardous level of V. parahaemolyticus relates to Kanagawa-positive strains. Levels of V. parahaemolyticus of greater than or equal to 10^4 cfu per gram are considered potentially hazardous as consumption of the food may result in food borne illness (relates to Kanagawa-positive strains).

Campylobacter

Campylobacter should not be present in ready-to-eat foods as consumption of food containing this pathogen may result in food borne illness. The detection of Campylobacter indicates poor food handling controls, particularly cross contamination (especially where raw poultry is handled) or inadequate cooking (e.g. raw or undercooked meat and poultry). The use of raw milk or of contaminated water may be alternative sources of Campylobacter that should be considered.

Salmonella

Ready-to-eat foods should be free of Salmonella as consumption of food containing this pathogen may result in food borne illness. The presence of this organism indicates poor food preparation and handling practices such as inadequate cooking or cross contamination. Consideration may also be given to investigating the health status of food handlers on the premises who may have been suffering from salmonellosis or asymptomatic carriers of the organism.

Listeria monocytogenes

Listeria monocytogenes is widespread in the environment and can be isolated from a wide variety of foods. Its detection in ready-to-eat foods which have not undergone a listericidal treatment, therefore, does not immediately indicate a problem with food practices within the food

establishment. Higher levels of L. monocytogenes (10^2 cfu per gram), however, do indicate a failure with food handling controls and based on current epidemiological evidence are considered a public health risk. Foods in which all components have been cooked in the final food preparation, or have received some other listericidal treatment, should be Listeria free. The detection of L. monocytogenesin such foods indicates the food was inadequately cooked or the food was contaminated post preparation. Additionally, the detection of L. monocytogenes in foods which have been prepared specifically for 'at risk' population groups such as the elderly, immunocompromised and infants should be considered as potentially hazardous.

Categories of microbiological quality

Four categories of microbiological quality have been assigned based on standard plate counts, levels of indicator organisms and the number or presence of pathogens. These are satisfactory, marginal, unsatisfactory and potentially hazardous.

Satisfactory [S] -results indicate good microbiological quality.

No action required.

Marginal [M] -results are borderline in that they are within limits of acceptable microbiological quality but may indicate possible hygiene problems in the preparation of the food.

Action: Re-sampling may be appropriate. Premises that regularly yield borderline results should have their food handling controls investigated.

Unsatisfactory [US] -results are outside of acceptable microbiological limits and are indicative of poor hygiene or food handling practices.

Action: Further sampling, including the sampling of other foods from the food premise may be required and an investigation undertaken to determine whether food handling controls and hygiene practices are adequate.

Potentially Hazardous [PH] -the levels in this range may cause food borne illness and immediate remedial action should be initiated.

Action: Consideration should be given to the withdrawal of any of the food still available for sale or distribution and, if applicable, recall action may be indicated. An investigation of food production or handling practices should be instigated to determine the source/cause of the problem so that remedial actions can commence.

Table 1. Guideline levels for determining the microbiological quality of ready-to-eat foods

Satisfactory = **S**; Marginal = **M**; Unsatisfactory = **US**; Potentially Hazardous =**PH**

Microbiological Quality (CFU per gram)

Test	S	M	US	P H
Standard Plate Count	.	.	.	.
Level 1	< 10^4	< 10^5	Greater than or equal to 10^5	.
Level 2	< 10^6	< 10^7	Greater than or equal to 10^7	.
Level 3	N/A	N/A	N/A	.
Indicators	.	.	.	.
*Enterobacteriaceae**	< 10^2	10^2-10^4	Greater than or equal to 10^4	.
Escherichia coli	< 3	3 - 100	Greater than or equal to 100	**
Pathogens	.	.	.	.
Coagulase +ve staphylococci	<10^2	10^2-10^3	10^3-10^4	Greater than or equal to 10^4SET +ve
Clostridium perfringens	<10^2	10^2-10^3	10^3-10^4	Greater than or equal to 10^4
*Bacillus cereus*and other pathogenic *Bacillus*spp	<10^2	10^2-10^3	10^3-10^4	Greater than or equal to 10^4
Vibrio parahaemolyticus#	<3	<3 -10^2	10^2 -10^4	Greater than or equal to 10^4
Campylobacter spp	not detected in 25g	-	-	detected
Salmonella spp	not detected in 25g	-	-	detected
Listeria monocytogenes	not detected in 25g	detected but <10^{2} ++	-	Greater than or equal to 10^{2} ##

**Enterobacteriaceae* testing is not applicable to fresh fruits and vegetables or foods containing these.
**Pathogenic strains of *E. coli* should be absent.
#V. parahaemolyticus should not be present in seafoods that have been cooked. For ready-to-eat seafoods that are raw, a higher satisfactory level may be applied (<10^2 cfu/g)

The potentially hazardous level of *V. parahaemolyticus* relates to Kanagawa-positive strains.

++ Foods with a long shelf life stored under refrigeration should have no*L. monocytogenes* detected in 25g.
The detection of *L. monocytogenes* in ready-to-eat foods prepared specifically for 'at risk' population groups (the elderly, immunocompromised and infants) should also be considered as potentially hazardous.

N/A - SPC testing not applicable. This applies to foods such as fresh fruits and vegetables (including salad vegetables), fermented foods and foods incorporating these (such as sandwiches and filled rolls)

12. Appendix C. Sample results

Date	Sample description	*Coagulase positive Staphylococci/ml	Salmonella/25ml	Listeria/25ml	E coli/ml	pH	Comments
14-Apr-04	Cantaloupe juice	ND	ND	Present	<0.3	6.33	LM not detected
30-Apr-04	Orange juice	ND	ND	Present	<0.3	4.43	LM not detected
14-Apr-04	Orange Juice	ND	ND	Present	<0.3	4.04	LM not detected
21-Apr-04	Orange Juice	ND	ND	Present	<0.3	4.23	LM not detected
14-Apr-04	Celery Juice	ND	ND	Present	<0.3	5.02	LM not detected
29-Apr-04	Celery Juice	ND	ND	Present	<0.3	5.76	Lm Detected at >25000 cuff/ml sample report as unsafe
14-May-04	Orange	ND	ND	Present	<0.3	3.91	LM not detected
14-May-04	Apple Juice	ND	ND	Present	<0.3	3.21	LM not detected
12-May-04	Apple Juice	ND	ND	Present	<0.3	3.23	LM not detected
03-May-04	Mixed Juice - Watermelon, Cantaloupe, Honeydew	ND	ND	ND	<0.3	4.72	
29-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.55	
29-Apr-04	Cantaloupe juice	ND	ND	ND	0.4	4.96	
29-Apr-04	Watermelon	ND	ND	ND	<0.3	5.14	
29-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.73	
29-Apr-04	Celery Juice	ND	ND	ND	<0.3	5.64	
23-Mar-04	Mixed Juice - Apple, Cantaloupe, Watermelon	ND	ND	ND	<0.3	4.3	
03-May-04	Celery Juice	ND	ND	ND	<0.3	4.99	
29-Apr-04	Mixed Juice - Carrot, Wheatgrass	ND	ND	ND	<0.3	6.14	
03-May-04	Apple juice	ND	ND	ND	2.1	4.02	
03-May-04	Watermelon	ND	ND	ND	0.9	4.3	
03-May-04	Carrot Juice	ND	ND	ND	0.9	5.36	
03-May-04	Carrot Juice	ND	ND	ND	<0.3	6.1	
03-May-04	Mixed Juice - Watermelon, Apple, Pineapple	ND	ND	ND	<0.3	4.0	
21-Apr-04	Orange Juice	ND	ND	ND	<0.3	4.14	
03-May-04	Carrot Juice	ND	ND	ND	<0.3	4.72	
29-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.95	
23-Mar-04	Mixed Juice - Carrot, Celery	ND	ND	ND	<0.3	4.2	
29-Apr-04	Mixed juice - Celery, Carrot, Wheatgrass	ND	ND	ND	1.1	5.71	
29-Apr-04	Mixed juice - Celery, carrot, Apple	ND	ND	ND	<0.3	4.94	

* Limit of detection:100 cfu/ml

Date	Sample description	*Coagulase positive Staphylococci/ml	Salmonella/25ml	Listeria/25ml	E coli/ml	pH	Comments
29-Apr-04	Mixed Juice - Honeydew, Cantaloupe, Watermelon	ND	ND	ND	0.4	4.31	
29-Apr-04	Carrot Juice	ND	ND	ND	<0.3	6.23	
29-Apr-04	Cantaloupe juice	ND	ND	ND	<0.3	4.56	
29-Apr-04	Mixed Juice - Wheatgrass, Apple	ND	ND	ND	0.9	3.7	
29-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.71	
29-Apr-04	Mixed Juice - Orange, Pineapple	ND	ND	ND	<0.3	3.65	
29-Apr-04	Mixed Juice - Apple, Wheatgrass	ND	ND	ND	<0.3	3.75	
29-Apr-04	Orange Juice	ND	ND	ND	0.4	4.01	
29-Apr-04	Carrot Juice	ND	ND	ND	<0.3	5.61	
29-Apr-04	Apple juice	ND	ND	ND	<0.3	3.52	
29-Apr-04	Carrot Juice	ND	ND	ND	<0.3	5.49	
21-Apr-04	Apple Juice	ND	ND	ND	<0.3	4.08	
29-Apr-04	Celery Juice	ND	ND	ND	<0.3	5.82	
28-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.72	
28-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.29	
03-May-04	Mixed Juice -	ND	ND	ND	<0.3	3.8	
15-Apr-04	Apple Juice	ND	ND	ND	ND	3.5	
28-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.74	
28-Apr-04	Carrot Juice	ND	ND	ND	<0.3	4.8	
03-May-04	Celery Juice	ND	ND	ND	<0.3	4.79	
28-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.27	
28-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.88	
28-Apr-04	Carrot Juice	ND	ND	ND	2.3	5.08	
03-May-04	Mixed Juice -	ND	ND	ND	<0.3	3.44	
28-Apr-04	Mixed Juice - Apple, Orange, Celery	ND	ND	ND	<0.3	3.92	
05-May-04	Orange Juice	ND	ND	ND	0.9	4.32	
05-May-04	Carrot Juice	ND	ND	ND	<0.3	6.17	
05-May-04	Celery Juice	ND	ND	ND	<0.3	5.85	
28-Apr-04	Mixed Juice - Carrot, Celery	ND	ND	ND	<0.3	5.66	
21-Apr-04	Celery Juice	ND	ND	ND	<0.3	5.58	
23-Mar-04	Orange Juice	ND	ND	ND	<0.3	4.1	
21-Apr-04	Carrot Juice	ND	ND	ND	<0.3	3.66	

* Limit of detection:100 cfu/ml

Date	Sample description	*Coagulase positive Staphylococci/ml	Salmonella/25ml	Listeria/25ml	E coli/ml	pH	Comments
23-Mar-04	Mixed Juice - Honeydew, Pineapple, Orange	ND	ND	ND	0.9	4.6	
23-Mar-04	Mixed Juice - Apple, Watermelon, Pineapple	ND	ND	ND	<0.3	3.6	
23-Mar-04	Mixed Juice - Carrot, Celery, Beetroot	ND	ND	ND	<0.3	5.0	
21-Apr-04	Orange Juice	ND	ND	ND	<0.3	4.24	
28-Apr-04	Mixed Juice - Pineapple, Apple	ND	ND	ND	<0.3	3.55	
21-Apr-04	Apple Juice	ND	ND	ND	<0.3	4.07	
28-Apr-04	Carrot Juice	ND	ND	ND	<0.3	5.27	
21-Apr-04	Cantaloupe juice	ND	ND	ND	<0.3	5.82	
21-Apr-04	Watermelon	ND	ND	ND	<0.3	5.18	
21-Apr-04	Carrot Juice	ND	ND	ND	<0.3	6.66	
21-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.98	
28-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.64	
03-May-04	Orange Juice	ND	ND	ND	<0.3	3.92	
21-Apr-04	Carrot Juice	ND	ND	ND	<0.3	5.81	
27-Apr-04	Celery Juice	ND	ND	ND	<0.3	4.29	
29-Apr-04	Mixed Juice - Apple, Wheatgrass	ND	ND	ND	<0.3	3.77	
14-May-04	Mixed Juice - Apple, Orange	ND	ND	ND	<0.3	3.91	
14-May-04	Celery Juice	ND	ND	ND	<0.3	4.37	
27-Apr-04	Watermelon	ND	ND	ND	<0.3	4.26	
27-Apr-04	Wheatgrass	ND	ND	ND	<0.3	5.78	
27-Apr-04	Mixed Juice - Carrot, Celery	ND	ND	ND	<0.3	4.63	
14-May-04	Mixed Juice - Carrot, Beetroot, Celery	ND	ND	ND	<0.3	4.55	
27-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.3	
14-May-04	Celery Juice	ND	ND	ND	<0.3	4.4	
27-Apr-04	Cantaloupe juice	ND	ND	ND	<0.3	4.41	
27-Apr-04	Watermelon	ND	ND	ND	<0.3	5.53	
27-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.79	
20-May-04	Mixed Juice- Orange, Pineapple	ND	ND	ND	<0.3	3.39	
20-May-04	Mixed Juice- Apple, pineapple, orange	ND	ND	ND	<0.3	3.66	

* Limit of detection:100cuff/ml

Date	Sample description	*Coagulase positive Staphylococci/ml	Salmonella/25ml	Listeria/25ml	E coli/ml	pH	Comments
20-May-04	Wheatgrass	ND	ND	ND	<0.3	5.88	
20-May-04	Carrot Juice	ND	ND	ND	<0.3	6.47	
27-Apr-04	Carrot Juice	ND	ND	ND	<0.3	5.64	
20-May-04	Carrot Juice	ND	ND	ND	<0.3	4.38	
20-May-04	Carrot Juice	ND	ND	ND	<0.3	3.56	
20-May-04	Celery Juice	ND	ND	ND	<0.3	4.29	
20-May-04	Apple Juice	ND	ND	ND	<0.3	4.1	
20-May-04	Apple Juice	ND	ND	ND	<0.3	4.68	
20-May-04	Carrot Juice	ND	ND	ND	<0.3	4.3	
20-May-04	Celery Juice	ND	ND	ND	<0.3	4.24	
14-May-04	Mixed juice - Carrot, Apple	ND	ND	ND	<0.3	4.32	
20-May-04	Orange Juice	ND	ND	ND	<0.3	4.48	
20-May-04	Wheatgrass	ND	ND	ND	<0.3	5.91	
26-May-04	Watermelon	ND	ND	ND	<0.3	Not Stated	
26-May-04	Celery Juice	ND	ND	ND	<0.3	Not Stated	
26-May-04	Orange Juice	ND	ND	ND	0.9/ml	Not Stated	
14-May-04	Orange	ND	ND	ND	<0.3	3.66	
14-May-04	Apple Juice	ND	ND	ND	<0.3	3.0	
14-May-04	Watermelon	ND	ND	ND	<0.3	3.83	
14-May-04	Carrot Juice	ND	ND	ND	<0.3	4.4	
20-May-04	Apple Juice	ND	ND	ND	<0.3	3.92	
28-Apr-04	Orange	ND	ND	ND	<0.3	3.93	
20-May-04	Apple Juice	ND	ND	ND	<0.3	3.09	
20-May-04	Carrot Juice	ND	ND	ND	<0.3	5.9	
20-May-04	Mixed Juice - Wheatgrass, Celery	ND	ND	ND	<0.3	5.93	
28-Apr-04	Mixed juice - Celery, Carrot	ND	ND	ND	0.4	5.48	
28-Apr-04	Mixed juice - Watermelon, Apple	ND	ND	ND	<0.3	4.24	
28-Apr-04	Mixed juice - Watermelon, Apple	ND	ND	ND	<0.3	4.25	
20-May-04	Orange Juice	ND	ND	ND	<0.3	3.62	
28-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.36	
20-May-04	Mixed Juice - Beetroot, Celery	ND	ND	ND	<0.3	5.8	
28-Apr-04	Celery Juice	ND	ND	ND	<0.3	4.63	
28-Apr-04	Watermelon	ND	ND	ND	<0.3	4.96	
28-Apr-04	Orange	ND	ND	ND	<0.3	3.85	

* Limit of detection:100 cfu/ml

Date	Sample description	*Coagulase positive Staphylococci/ml	Salmonella/25ml	Listeria/25ml	E coli/ml	pH	Comments
28-Apr-04	Celery Juice	ND	ND	ND	<0.3	5.69	
27-Apr-04	Carrot Juice	ND	ND	ND	<0.3	5.44	
27-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.58	
23-Mar-04	Mixed Juice - Wheatgrass, Carrot	ND	ND	ND	<0.3	6.3	
28-Apr-04	Mixed Juice - Celery, Carrot	ND	ND	ND	<0.3	5.17	
20-May-04	Orange Juice	ND	ND	ND	<0.3	3.56	
29-Apr-04	Mixed Juice - Apple, Carrot	ND	ND	ND	<0.3	6.16	
20-May-04	Orange Juice	ND	ND	ND	<0.3	3.91	
20-May-04	Orange Juice	ND	ND	ND	<0.3	3.59	
20-May-04	Watermelon	ND	ND	ND	<0.3	4.54	
20-May-04	Carrot Juice	ND	ND	ND	<0.3	6.0	
20-May-04	Watermelon	ND	ND	ND	<0.3	5.37	
20-May-04	Orange Juice	ND	ND	ND	<0.3	3.74	
20-May-04	Mixed Juice - Carrot, Ginger	ND	ND	ND	<0.3	6.04	
20-May-04	Cantaloupe juice	ND	ND	ND	<0.3	6.55	
20-May-04	Mixed Juice - Carrot, Ginger	ND	ND	ND	<0.3	5.99	
20-May-04	Apple Juice	ND	ND	ND	<0.3	3.24	
20-May-04	Carrot Juice	ND	ND	ND	<0.3	6.29	
20-May-04	Mixed juice - Orange, Beetroot	ND	ND	ND	<0.3	3.7	
20-May-04	Mixed Juice - Ginger, Carrot, Celery	ND	ND	ND	<0.3	3.22	
20-May-04	Wheatgrass	ND	ND	ND	<0.3	5.11	
20-May-04	Watermelon	ND	ND	ND	<0.3	5.8	
20-May-04	Carrot Juice	ND	ND	ND	<0.3	4.82	
20-May-04	Apple Juice	ND	ND	ND	<0.3	3.4	
03-May-04	Wheatgrass	ND	ND	ND	9.3	5.86	
28-Apr-04	Cantaloupe Juice	ND	ND	ND	<0.3	5.63	
28-Apr-04	Carrot Juice	ND	ND	ND	<0.3	6.45	
28-Apr-04	Orange	ND	ND	ND	<0.3	3.91	
28-Apr-04	Celery Juice	ND	ND	ND	<0.3	5.88	
29-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.95	
29-Apr-04	Carrot Juice	ND	ND	ND	<0.3	5.22	
23-Mar-04	Mixed Juice - strawberry, pineapple	ND	ND	ND	<0.3	3.7	
29-Apr-04	Carrot Juice	ND	ND	ND	<0.3	6.4	

* Limit of detection:100 cfu/ml

Date	Sample description	*Coagulase positive Staphylococci/ml	Salmonella/25ml	Listeria/25ml	E coli/ml	pH	Comments
20-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.37	
03-May-04	Orange	ND	ND	ND	<0.3	3.82	
03-May-04	Wheatgrass	ND	ND	ND	<0.3	5.52	
03-May-04	Orange	ND	ND	ND	<0.3	3.86	
03-May-04	Watermelon	ND	ND	ND	<0.3	4.66	
03-May-04	Orange	ND	ND	ND	<0.3	4.01	
03-May-04	Orange	ND	ND	ND	<0.3	3.96	
29-Apr-04	Orange Juice	ND	ND	ND	<0.3	4.02	
29-Apr-04	Carrot Juice	ND	ND	ND	<0.3	6.23	
19-Apr-04	Wheatgrass	ND	ND	ND	<0.3	5.89	
19-Apr-04	Watermelon	ND	ND	ND	<0.3	5.4	
20-Apr-04	Carrot Juice	ND	ND	ND	<0.3	6.3	
20-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.41	
20-Apr-04	Carrot Juice	ND	ND	ND	<0.3	6.18	
20-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.91	
28-Apr-04	Celery Juice	ND	ND	ND	<0.3	5.75	
29-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.73	
28-Apr-04	Watermelon	ND	ND	ND	<0.3	5.24	
29-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.31	
29-Apr-04	Carrot Juice	ND	ND	ND	<0.3	5.21	
20-Apr-04	Carrot Juice	ND	ND	ND	<0.3	5.54	
20-Apr-04	Apple Juice	ND	ND	ND	<0.3	4.01	
20-Apr-04	Carrot Juice	ND	ND	ND	<0.3	6.64	
20-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.87	
03-May-04	Carrot Juice	ND	ND	ND	<0.3	6.2	
20-Apr-04	Celery Juice	ND	ND	ND	<0.3	5.33	
27-Apr-04	Watermelon	ND	ND	ND	<0.3	4.22	
03-May-04	Orange	ND	ND	ND	<0.3	4.09	
07-Apr-04	Watermelon	ND	ND	ND	0.4	5.35	
07-Apr-04	Mixed Juice - Pineapple, Lemon	ND	ND	ND	0.4	3.36	
06-May-04	Watermelon	ND	ND	ND	<0.3	4.25	
06-May-04	Carrot Juice	ND	ND	ND	<0.3	4.81	
27-Apr-04	Mixed Juice - Orange, Pineapple, Watermelon	ND	ND	ND	<0.3	3.46	
07-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.5	
27-Apr-04	Orange	ND	ND	ND	<0.3	3.86	
07-Apr-04	Mixed juice - Celery, Apple	ND	ND	ND	<0.3	3.69	
27-Apr-04	Carrot Juice	ND	ND	ND	<0.3	4.5	
05-Apr-04	Watermelon	ND	ND	ND	<0.3	5.49	
05-Apr-04	Wheatgrass	ND	ND	ND	0.9	5.95	

* Limit of detection:100 cfu/ml

Date	Sample description	*Coagulase positive Staphylococci/ml	Salmonella/25ml	Listeria/25ml	E coli/ml	pH	Comments
05-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.34	
05-Apr-04	Mixed Juice - Orange, pineapples, blueberries	ND	ND	ND	ND	3.6	
05-Apr-04	Wheatgrass	ND	ND	ND	110	5.58	
05-Apr-04	Watermelon	ND	ND	ND	<0.3	4.37	
27-Apr-04	Apple	ND	ND	ND	<0.3	3.14	
03-May-04	Mixed Juice - Orange, Carrot	ND	ND	ND	<0.3	4.18	
19-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.51	
03-May-04	Orange	ND	ND	ND	<0.3	3.92	
03-May-04	Orange	ND	ND	ND	<0.3	4.1	
03-May-04	Orange	ND	ND	ND	<0.3	4.27	
03-May-04	Celery Juice	ND	ND	ND	<0.3	4.94	
03-May-04	Mixed Juice - Apple, Wheatgrass	ND	ND	ND	<0.3	3.61	
07-Apr-04	Celery Juice	ND	ND	ND	<0.3	5.53	
03-May-04	Mixed Juice - Celery & Wheatgrass	ND	ND	ND	4.3	4.28	
03-May-04	Watermelon	ND	ND	ND	3.9	4.65	
07-Apr-04	Apple Juice	ND	ND	ND	<0.3	4.04	
07-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.93	
07-Apr-04	Celery Juice	ND	ND	ND	ND	6.25	
07-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.53	
07-Apr-04	Orange Juice	ND	ND	ND	<0.3	4.1	
07-Apr-04	Carrot Juice	ND	ND	ND	<0.3	6.11	
07-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.4	
03-May-04	Mixed Juice - Orange, Pineapples	ND	ND	ND	<0.3	3.81	
25-May-04	Cantaloupe juice	ND	ND	ND	110	4.06	
14-Apr-04	Orange juice	ND	ND	ND	<0.3	4.32	
20-May-04	Watermelon	ND	ND	ND	<0.3	Not Stated	
20-May-04	Wheatgrass	ND	ND	ND	<0.3	Not Stated	
25-May-04	Orange Juice	ND	ND	ND	<0.3	4.4	
25-May-04	Watermelon	ND	ND	ND	<0.3	4.61	
25-May-04	Apple juice	ND	ND	ND	<0.3	3.9	
20-May-04	Wheatgrass	ND	ND	ND	<0.3	Not Stated	

* Limit of detection:100 cfu/ml

Date	Sample description	*Coagulase positive Staphylococci/ml	Salmonella/25ml	Listeria/25ml	E coli/ml	pH	Comments
25-May-04	Apple Juice	ND	ND	ND	<0.3	3.7	
20-May-04	Apple Juice	ND	ND	ND	<0.3	Not Stated	
25-May-04	Celery Juice	ND	ND	ND	<0.3	Not Stated	
25-May-04	Apple Juice	ND	ND	ND	<0.3	Not Stated	
25-May-04	Mixed Juice-Orange, mango	ND	ND	ND	<0.3	3.94	
25-May-04	Apple Juice	ND	ND	ND	<0.3	3.71	
25-May-04	Carrot Juice	ND	ND	ND	<0.3	4.33	
14-Apr-04	Carrot Juice	ND	ND	ND	<0.3	6.31	
19-Apr-04	Carrot Juice	ND	ND	ND	<0.3	4.71	
25-May-04	Carrot Juice	ND	ND	ND	<0.3	4.54	
23-Mar-04	Mixed Juice - Carrot, Ginger	ND	ND	ND	0.7	5.6	
23-Mar-04	Apple Juice	ND	ND	ND	0.3	3.8	
23-Mar-04	Mixed Juice - Carrot, Celery, Beetroot	ND	ND	ND	0.3	5.6	
05-Apr-04	Orange	ND	ND	ND	<0.3	3.75	
23-Mar-04	Mixed Juice - Grapefruit, Apple	ND	ND	ND	<0.3	3.3	
23-Mar-04	Mixed Juice - Watermelon, Cantaloupe, Honeydew	ND	ND	ND	0.3	6.1	
23-Mar-04	Mixed Juice - Carrot, Celery	ND	ND	ND	0.3	4.7	
20-May-04	Mixed Juice - Orange, Pineapple, Strawberry	ND	ND	ND	<0.3	Not Stated	
23-Mar-04	Orange Juice	ND	ND	ND	<0.3	4.3	
14-Apr-04	Wheatgrass	ND	ND	ND	<0.3	6.13	
23-Mar-04	Watermelon	ND	ND	ND	0.3	4.5	
23-Mar-04	Orange Juice	ND	ND	ND	<0.3	4.1	
23-Mar-04	Mixed Juice - Beetroot, Carrot, Ginger	ND	ND	ND	2.3	5.3	
23-Mar-04	Mixed Juice - Carrot, Celery	ND	ND	ND	1.5	4.5	
12-May-04	Apple Juice	ND	ND	ND	<0.3	3.89	
20-May-04	Orange Juice	ND	ND	ND	<0.3	Not Stated	

* Limit of detection:100 cfu/ml

Date	Sample description	*Coagulase positive Staphylococci/ml	Salmonella/25ml	Listeria/25ml	E coli/ml	pH	Comments
20-May-04	Mixed Juice - Carrot, Celery	ND	ND	ND	<0.3	Not Stated	
23-Mar-04	Watermelon	ND	ND	ND	<0.3	4.4	
29-May-04	Carrot Juice	Not tested	ND	ND	<3	5.87	
14-Apr-04	Apple Juice	ND	ND	ND	<0.3	4.01	
26-Apr-04	Orange Juice	Not tested	ND	ND	<3	3.94	
26-Apr-04	Carrot Juice	Not tested	ND	ND	<3	5.84	
26-Apr-04	Apple Juice	Not tested	ND	ND	<3	3.24	
26-Apr-04	Orange	Not tested	ND	ND	<3	3.94	
29-Apr-04	Carrot Juice	ND	ND	ND	<3	4.46	
21-Apr-04	Apple Juice	Not tested	ND	ND	<3	3.15	
30-Apr-04	Orange Juice	ND	ND	ND	15	3.88	
15-Apr-04	Cantelope	ND	ND	ND	<3	6.31	
30-Apr-04	Cantaloupe juice	ND	ND	ND	<0.3	4.67	
30-Apr-04	Orange Juice	ND	ND	ND	<0.3	4.32	
30-Apr-04	Carrot Juice	ND	ND	ND	<0.3	5.18	
30-Apr-04	Mixed Juice - Carrot & Celery	ND	ND	ND	<0.3	4.81	
30-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.44	
19-Apr-04	Carrot Juice	ND	ND	ND	<0.3	5.23	
23-Mar-04	Mixed Juice - Beetroot, Carrot,	ND	ND	ND	<0.3	5.7	
30-Apr-04	Watermelon	Not tested	ND	ND	<3	5.2	
15-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.79	
14-Apr-04	Watermelon	ND	ND	ND	<0.3	5.2	
14-Apr-04	Carrot Juice	ND	ND	ND	<0.3	5.55	
14-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.42	
14-Apr-04	Watermelon	ND	ND	ND	<0.3	4.93	
14-Apr-04	Celery Juice	ND	ND	ND	46	5.49	Marginal - Indicative of poor hygiene practices
14-Apr-04	Apple Juice	ND	ND	ND	<0.3	3.54	
21-Apr-04	Watermelon	Not tested	ND	ND	<3	5.62	
14-Apr-04	Carrot Juice	ND	ND	ND	<0.3	6.23	
19-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.83	
15-Apr-04	Mixed Juice - Orange, Avocado	ND	ND	ND	<0.3	6.45	
13-Apr-04	Mixed Juice - Pineapple, Orange and Mint	ND	ND	ND	<3	3.69	
13-Apr-04	Mixed Juice - Orange, Mango, Wheatgrass	ND	ND	ND	<3	4.14	
14-Apr-04	Carrot Juice	ND	ND	ND	<3	6.47	

* Limit of detection:100 cfu/ml

Date	Sample description	*Coagulase positive Staphylococci/ml	Salmonella/25ml	Listeria/25ml	E coli/ml	pH	Comments
14-Apr-04	Celery Juice	ND	ND	ND	<3	6.18	
15-Apr-04	Orange Juice	ND	ND	ND	<3	3.91	
15-Apr-04	Watermelon	ND	ND	ND	<3	5.35	
14-Apr-04	Orange Juice	ND	ND	ND	<0.3	3.92	

*Limit of detection:100 cfu/ml