Generic HACCP Application

Production of Fruit Wine, Cider, Mead

Amendment 0

May 2008

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Website

A copy of this document can be found at: http://www.nzfsa.govt.nz/wine/index.htm

Review of Document

This Generic HACCP Application will be reviewed, as necessary, by the New Zealand Food Safety Authority. Suggestions for alterations, deletions or additions to this document, should be sent, together with reasons for the change, any relevant data and contact details of the person making the suggestion, to:

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1 Introduction

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1.1 Purpose of this Document

This 'Generic HACCP Application' has been developed by the New Zealand Food Safety Authority (NZFSA), in consultation with industry representatives, to provide guidance on the application of Hazard Analysis and Critical Control Point (HACCP) principles to the production of fruit wine and mead. Winemakers are required to apply these principles when developing their Wine Standards Management Plans (WSMP).

1.2 Scope of the HACCP Application

This document covers the main operations in fruit wine, cider and mead making, which are:

a. the crushing, pressing, or preparation of the raw material;

b. fermentation;

c. storage, blending and/or mixing of wine;

d. bottling or packaging; and

e. labelling.

Some winemakers are involved in all of these stages. Other businesses have a more limited scope, such as those that only do the fermentation of juice, or the bottling operation. In recognition of these possibilities, the process flow diagrams and hazard analysis have been split into the three main operations: preparation of juice/honey, fermentation, and bottling/packaging. Winemakers can incorporate the HACCP application that is relevant to their product and process into their WSMP.

The hazard identification and analysis are based on information from industry and from published scientific literature.

1.3 Good Winemaking Practice

The application of HACCP in this document is based on the expectation that good winemaking practice is effectively being implemented by the winemaker and that the requirements of the Wine (Specifications) Notice are being met (i.e. the winemaker is complying with the Wine Standards Management Plan Code of Practice for Fruit Wine, Cider and Mead).

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Table 1: Scope

Products	Fruit wine (including cider and fortified wine) Mead
Process	From receipt of raw materials to dispatch of bulk wine or packaged fruit wine and mead.

Table 2: Intended Consumer and Product Requirements

Products	**Fruit Wine, Mead**
Intended consumer	General public – Adults (not intended for children and pregnant women)
Intended use of product	Direct consumption Culinary use
Regulatory Standards that must be met	Composition of fruit wine and mead as specified in Standard 2.7.3 of the Food Standards Code Permitted additives and level of use as specified in Schedule 1 of Standard 1.3.1 of the Food Standards Code Permitted processing aids and level of use as specified in Schedule 1 of Standard 1.3.3 of the Food Standards Code Labelling as specified in Standard 1.2.3 and 2.7.1 of the Food Standards Code.

3 Process Description

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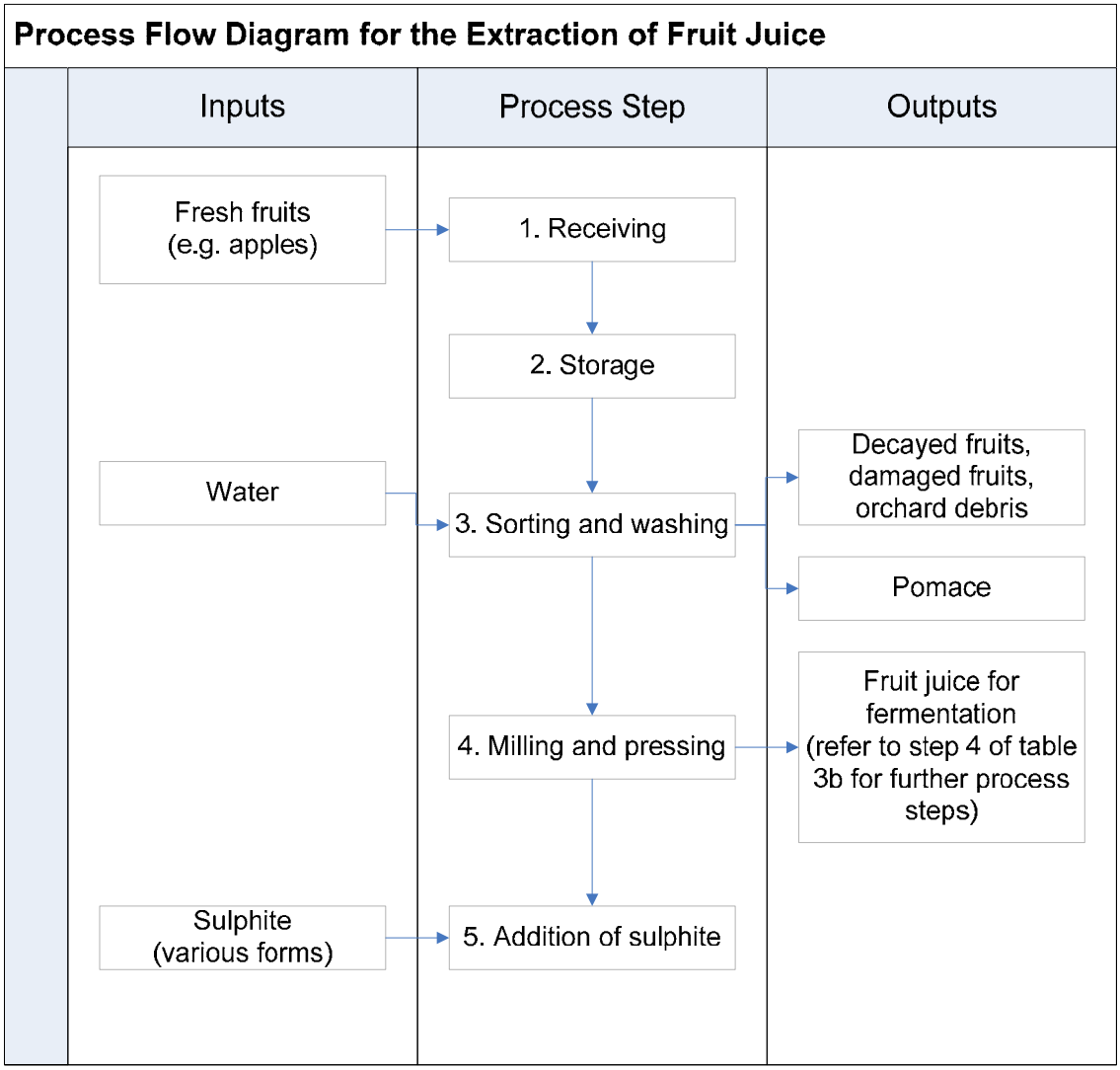
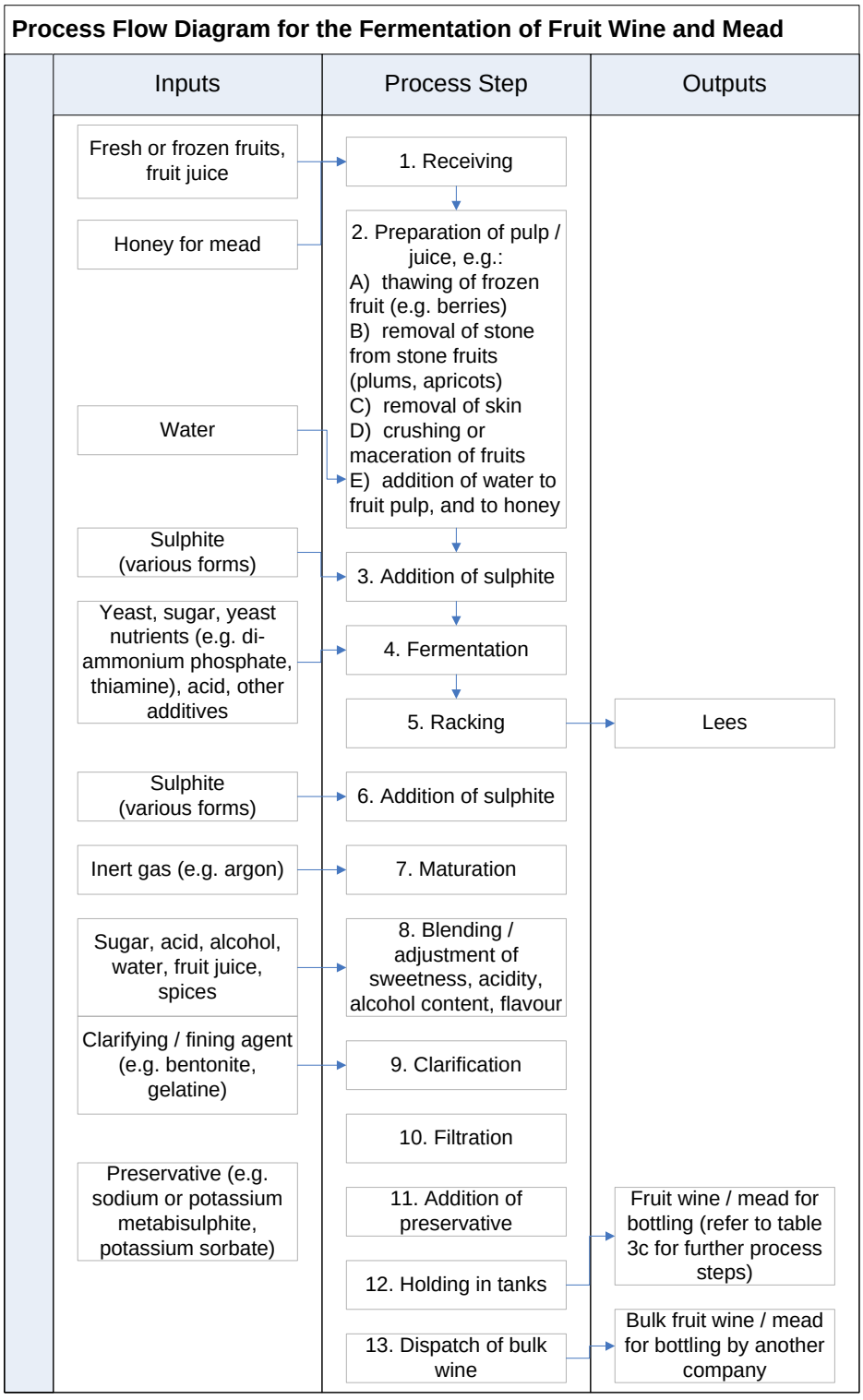
The process flow diagrams in this section show the common steps involved in fruit wine and mead making. Some of the steps are optional, and the sequence of the steps followed by an operator may differ from that shown. For example, the addition of sulphite, or the blending and adjustment of the wine can be done at various stages in the process.

Table 3a: Process Flow Diagram for the Extraction of Fruit Juice *



* A business that is involved in the extraction of fruit juice, but is not involved in any other process of fruit wine making, is covered by the Food Act and is not required to have a WSMP.

Table 3b: Process Flow Diagram for the Fermentation of Fruit Wine and Mead*



* The preparation of the raw material for fermentation will differ depending on the type of material used. For example, apples are crushed and pressed to extract juice; stone fruits such as plums are de-stoned and then crushed or macerated; soft fruits are crushed to a pulp; and frozen fruit are thawed before fermentation.

Table 3c: Process Flow Diagram for Bottling and Packing of Fruit Wine and Mead

1. New bottles are normally rinsed before use to remove physical contaminants such as dust and cardboard fibres (if packed in cartons). Reused bottles should be inspected, cleaned and sterilised before use for bottling of fruit wine and mead.

2. Some operators label their wine only when they are ready for dispatch or sale.

4 Hazard Analysis and CCP Determination

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Table 4: Identification of Hazards from Inputs

Inputs	Description/Specification	Biological Hazard (B)	Chemical Hazard (C)	Physical Hazard (P)
Fresh or frozen fruits	Sourced from a supplier that complies with good agricultural practice, including the management of agrichemicals. [1] No dropped fruits.	Enteric pathogens (e.g. Salmonella spp., E. coli spp., Cryptosporidium spp.) [2] Patulin in apples 3	Residues of agricultural chemicals (e.g. pesticides, fungicides) [4]	None
Fruit juice (e.g. apple juice)	Sourced from a supplier that complies with the requirements of the Food Act.	Enteric pathogens (e.g. Salmonella spp., E. coli spp., Cryptosporidium spp), [2] Patulin in apple juice [3]	None	None
Bulk honey	Sourced from a supplier with a registered RMP or FSP, and complies with the requirements of the Animal Products Act	None [5]	None	None

Inputs	Description/Specification	Biological Hazard (B)	Chemical Hazard (C)	Physical Hazard (P)
Clean water	Complies with the requirements defined in clause 4(1) of the Wine Specifications	None	None	None
Sugar	Food grade	None	None	None
Yeast	Suitable for food use	None	None	None
Additives (e.g. preservatives, acid, fining agents)	Food grade. Permitted for use in fruit wine, and used within limits specified in Standard 1.3.1 of the Food Standards Code	None	Sulphite [6] Allergens from fining agents with animal protein derivatives [7]	None
Processing aids (e.g. enzymes, gases)	Permitted for food use as specified in Standard 1.3.3 of the Food Standards Code	None	None	None
Spices	Food grade	Bacterial pathogens (e.g. Salmonella spp, Bacillus spp., Clostridium spp.)	None	None
New bottles	Sterilised	None	None	None
Used bottles	Company specification	Bacterial pathogens	Chemical residues (e.g. if the bottle had been reused to contain chemicals)	Foreign objects (e.g. glass, metal)
Plastic wine bags or containers, corks, caps	Suitable for food use	None	None	None
Labels, metal foil, plastic cover, cases	Company specification	None	None	None

1. Operators who receive fresh fruit must make reasonable enquiries to check that they are suitable for making into wine (Wine Spec clause 8(2)). The application of agrichemicals to food crops in New Zealand must be in accordance with their label authorisation.

2. Salmonella spp., E. coli 0157, and Cryptosporidium spp. have been implicated in outbreaks in the United States involving the consumption of unpasteurised apple juice (Johnston et.al., 2006). The presence of these enteric pathogens on fruit and in fruit juice has been attributed to some form of faecal contamination from animals grazing in orchards (Keller and Miller, 2006).

   Some orchard operators in New Zealand allow animals to graze in their orchards, thus there is potential for faecal contamination of apples that drop on the ground. Exclusion of dropped apples will minimise the occurrence of these hazards on the fruit and in the extracted fruit juice.

3. Patulin is a mycotoxin that is produced primarily by certain species of Penicillium, Aspergillus, and Byssoclamys moulds that may grow on a variety of foods including fruit. Patulin has been found to occur in apples and pears with brown rot, and in apple juice (US FDA, 2000). Contamination of apple juice has been attributed to contamination with mould on apples with surface damage. Although there are no known published reports on the occurrence of patulin in apple juice and apple products produced in New Zealand, the potential for patulin contamination in apples and apple juice have been considered in this hazard analysis.. Controls for patulin are covered in the hazard analysis in Tables 5a and 5b.

4. Fresh fruit may contain residues of agricultural chemicals, but fruits that are sourced from suppliers that comply with good agricultural practice, including the application of agrichemicals in accordance with their label authorisation, are likely to meet the New Zealand (Maximum Residue Limits of Agricultural Compounds) Food Standards 2005 (No.2), as amended. Thus, chemical residues were not considered any further in the hazard analysis in Tables 5a and 5b.

5. Bacterial spores (e.g. Bacillus spp, Clostridium spp) are likely to occur in honey, but they are not capable of growing in honey due to its inherent characteristics.

6. Sulphite can induce asthma in susceptible individuals.

7. Residues of fining agents with animal protein derivatives can cause allergic reactions in susceptible individuals.

Table 5a: Hazard Analysis and CCP Determination for the Extraction of Fruit Juice

Process Step	**Inputs**	**Hazard reasonably likely to occur on or in the product at this step**	**Justification**	**Q1. Is there a control measure(s) for the hazard at this step?** If yes, identify the control measure[1] and then answer Q2.	**Q2. Is this step a CCP [2]?**
1. Receiving	Fresh fruit	B – Enteric pathogens B – Patulin in apples	Refer to Table 4	No	
2. Storage	Fresh fruit	B – Enteric pathogens B – Patulin in apples	Hazards carried from previous step	Yes – storage in cool conditions will minimise the growth of moulds and the production of patulin	No
3. Sorting and washing	Fresh fruit	B – Enteric pathogens B – Patulin in apples	Hazards carried from previous step	Yes – removal of decayed and damaged fruit will reduce patulin contamination; and washing will reduce micro contamination [3]	No
	Clean water	None			
4. Milling & pressing	Washed fruit	B – Enteric pathogens B – Patulin in apples	Hazards carried from previous step	None	
5. Addition of sulphite	Fruit juice	B – Enteric pathogens B – Patulin in apple juice	Hazards carried from previous step	None	

Process Step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure[1] and then answer Q2.	Q2. Is this step a CCP [2]?
	Sodium or potassium metabisulphite	C – Sulphite	Refer to Table 4	Yes – correct weighing and addition of sulphite	No

1. The procedures for the control measures are required be documented in the WSMP.

2. A CCP is a step at which an identified hazard can be eliminated or reduced to an acceptable level. Control at the CCP must be linked to the achievement of an established food safety outcome (i.e. product or process criteria). A CCP must have a defined critical limit which is measurable and capable of being monitored on a real time basis so that immediate corrective action can be undertaken.

3. Contamination with patulin in apple juice is significantly reduced by trimming or removal of decayed fruits (US FDA, 2000; Keller, 2006). Sorting and culling of rotten and damaged fruits also result in a reduction of the overall microbial load in apple juice (Keller, 2006). Studies also indicate that GMP and sanitation operating procedures (including sorting and culling) alone are incapable of ensuring safety of fresh apple juice (Keller and Miller, 2006).

Table 5b: Hazard Analysis and CCP Determination for the Fermentation of Fruit, Juice and Honey

Process Step	**Inputs**	**Hazard reasonably likely to occur on or in the product at this step**	**Justification**	**Q1. Is there a control measure(s) for the hazard at this step?** If yes, identify the control measure and then answer Q2.	**Q2. Is this step a CCP?**
1. Receiving	Fresh/frozen fruit, fruit juice	B – Enteric pathogens B – Patulin in apple juice	Refer to Table 4.	None	
2. Preparation of pulp / juice	Fresh/frozen fruit	B – Enteric pathogens B – Patulin in apple juice	Hazards carried from previous step	None	
	Honey	None	Refer to Table 4		
	Clean water	None			
3. Addition of sulphite	Fruit pulp, fruit juice, diluted honey	B – Enteric pathogens in fruit pulp/juice B – Patulin in apple juice	Hazards carried from previous step	None	
	Sodium or potassium metabisulphite	C- Sulphite	Refer to Table 4	Yes – correct weighing and addition of sulphite	No
4. Fermentation	Fruit pulp, fruit juice, diluted honey	B – Enteric pathogens B – Patulin in apple juice	Hazards carried from previous step	Yes – fermentation will eliminate vegetative pathogens[1] and patulin[2]	No

Process Step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2.	Q2. Is this step a CCP?
	Yeast, sugar, yeast nutrients	None			
5. Racking	Fermented fruit wine/mead	None			
6. Addition of sulphite	Fermented fruit wine/mead	None			
	Sodium or potassium metabisulphite	C- Sulphite	Refer to Table 4	Yes – correct weighing and addition of sulphite	No
7. Maturation	Fermented fruit wine/mead	None			
	Sugar	None			
8. Blending / adjustment	Fermented fruit wine/mead	None			
	Sugar, acid, alcohol,water, fruit juice	None			
9. Clarification	Fermented fruit wine/mead	None			
	Fining agent	C- Allergens	Refer to Table 4	No[3]	

Process Step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2.	Q2. Is this step a CCP?
10. Filtration	Fermented fruit wine / mead	None			
11. Addition of preservatives	Fermented fruit wine / mead	None			
	Preservative (e.g. sulphite, sorbate)	C- sulphite		Yes – correct weighing and addition of preservative	No
12. Holding in tanks	Fermented fruit wine / mead	None			
13. Dispatch of bulk wine	Fermented fruit wine / mead	None			

1. Although the high-acid-tolerant strains of E. coli associated with the foodborne outbreaks in the US can survive for long periods in apple juice, they are extremely sensitive to alcohol and die within a few hours in fermenting or fermented apple juice (Senancheck and Golden, 1996). There have been no reports of illness due to enteropathogenic microorganisms associated with wine (ICMSF, 2005).

2. Patulin is destroyed by fermentation (Stinson et al., 1978) and thus is not found in alcoholic fruit beverages (US FDA, 2000).

3. The risk associated with the presence of potential allergens from residues of fining agents with animal protein derivatives can be managed by providing a warning label on the product.

Table 5c: Hazard Analysis and CCP Determination for the Bottling and Packaging of Fruit Wine

Process Step	**Inputs**	**Hazard reasonably likely to occur on or in the product at this step**	**Justification**	**Q1. Is there a control measure(s) for the hazard at this step?** If yes, identify the control measure and then answer Q2.	**Q2. Is this step a CCP?**
1. Receiving	Fruit wine / mead	None			
2. Final adjustment	Fruit wine / mead	None			
	Sulphite	C- Sulphite	Refer to Table 4	Yes – correct weighing and addition of sulphite; testing of final level in wine[1]	No
3. Filtration	Fruit wine / mead	None			
4. Filling	Fruit wine / mead	None			
	Bottles (i.e. rinsed new bottles; cleaned and sanitised reused bottles)	P – Glass fragments	Incorrect filler operation can result in chipping	Yes- correct equipment set-up, equipment maintenance, routine observation during filling, filtration of any affected wine	No
5. Chilling (for sparkling wines)	Fruit wine /mead	None			
6. Carbonation	Fruit wine / mead	None			
	Carbon dioxide	None			
7. Corking / capping	Fruit wine or mead in bottles	None			

Process Step	Inputs	Hazard reasonably likely to occur on or in the product at this step	Justification	Q1. Is there a control measure(s) for the hazard at this step? If yes, identify the control measure and then answer Q2.	Q2. Is this step a CCP?
	Cork or plastic caps	None			
8. Labelling, foiling or capsulating	Bottled fruit wine / mead	None			
	Labels, metal foil, plastic cover	None			
9. Packing	Bottled fruit wine / mead	None			
	Cartons, cases	None			
10. Storage	Bottled or packaged fruit wine / mead	None			
11. Dispatch	Bottled or packaged fruit wine / mead	None			

1. The risk to human health from residual sulphite in fruit wine and mead is managed by including label statement in accordance with Standard 1.2.3 of the Food Standards Code (labelling requirement).

5 Outcome of CCP Determination

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No CCP was identified for the production of fruit wine and mead. The control of hazards at key steps is expected to be adequately addressed by good hygiene and operating practices (i.e. complying with the Fruit Wine, Cider and Mead Wine Standards Management Plan Code of Practice).

6 References

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ICMSF [International Commission on Microbiological Specifications for Foods] (2005) Chapter 17: Fermented beverages. In Microorganisms in Food 6: Microbial Ecology of Food Commodities. 2nd ed. Kluwer Academic/Plenum Publishers, New York.

Johnston, L.M., Moe, C.L., Moll, D. and Jaykus, L-A. (2006) Chapter 2: The epidemiology of produce-associated outbreaks of foodborne disease. In Microbial Hazard Identification in Fresh Fruit and Vegetables. Ed. James, J. John Wiley and Sons, Inc., New Jersey.

Keller, S.E. (2006) Chapter 16: Effect of quality sorting and culling on the microbiological quality of fresh produce. In Microbiology of Fruits and Vegetables. Ed. Sapers, G.M., Gorny, J.R. and Yousef, A.E. Taylor and Francis Group, Florida.

Keller, S.E. and Miller, A.J. (2006) Chapter 9: Microbiological safety of fresh citrus and apple juices. In Microbiology of Fruits and Vegetables. Ed. Sapers, G.M., Gorny, J.R. and Yousef, A.E. Taylor and Francis Group, Florida.

Senancheck, J. and Golden, D.A. (1996) Survival of E. coli 1057:H7 during fermentation of apple cider. J. Food Prot. 59(12): 1256-1259.

Stinson, E.E., Osman, S.F., Huhtanen, C.N., and Bills, D.D. (1978) Disappearance of patulin during alcoholic fermentation of apple juice. Appl. Environ. Microbiol. 36(4): 620-622.

US FDA. (2000) Patulin in apple juice, apple juice concentrates and apple juice products. U.S. Food and Drug Administration, Washington D.C.