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**Differentiation between organic and
conventionally produced milk in pasture based
farming systems.**

A thesis presented in partial fulfilment of the
requirements for the degree of

Doctor of Philosophy

in

Animal Science

at Massey University, Palmerston North,

New Zealand

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2017

Abstract

Consumer perception of organic cow's milk is associated with the assumption that organic milk differs from conventionally produced milk. The value associated with this difference, justifies the premium retail price. It includes the perception that organic dairy farming is kinder on the environment, animals and people; that organic milk products are produced without the use of antibiotics, added hormones, synthetic chemicals and genetic modification and may have potential benefits for human health. Controlled studies investigating the chemical differences between organic and conventionally produced milk have so far fallen short of a conclusion as to whether or not these exist. Reasons for this are many folds, caused principally by the complexity of the research problem. A main complication is that farming practices and their impacts differ depending on country, region, year and season between and within organic and conventional systems. Factors influencing milk composition (e.g. diet, breed, and stage of lactation) have been studied individually, while interactions between multiple factors have been largely ignored. Studies fail to consider that factors other than the farming system (organic versus conventional) could have caused or contributed to, the reported differences in milk composition. These omissions make it impossible to determine whether there is a system related difference between organic and conventional milk, or not. The present study investigated the chemical differences between organic and conventionally produced milk in a pasture based farming system. Milk samples have been collected on two farm sets each comprised of one organic and one conventional farm. All farms applied year-round pasture grazing. Milk samples were collected from individual animals on Farm Set 1 and throughout the milking season on both farm sets. Milk samples have been analysed for fatty acid, free oligosaccharides, major casein and whey proteins, and milk fat volatiles, as well for a limited set of milk metabolites using a non-targeted NMR method. Considering the known influence factors on milk composition and the differences observed between the farms on the farm sets in our study, we postulated that fatty acids were influenced by breed and fertilizer application. Oligosaccharides differed between farming systems, with causes presently unknown. The farm set was the dominant influence factor on protein composition, while none of the compounds identified using NMR show any trend. Thus, the major conclusions from this study were that the factors influencing milk composition are not exclusive to either farming system, and pasture feeding conventional cows will most probably remove differences previously reported in other organic and conventionally produced milk studies.

List of Publications

Schwendel, B. H., P. C. H. Morel, T. J. Wester, M. H. Tavendale, C. Deadman, B. Fong, N. M. Shadbolt, A. Thatcher, and D. E. Otter. 2015. Fatty acid profile differs between organic and conventionally produced cow milk independent of season or milking time. *J. Dairy Sci.* 98:1411-1425. <http://dx.doi.org/10.3168/jds.2014-8322>.

Schwendel, B. H., T. J. Wester, P. C. H. Morel, M. H. Tavendale, C. Deadman, N. M. Shadbolt, and D. E. Otter. 2014. Invited review: Organic and conventionally produced milk-An evaluation of influence factors on milk composition. *J. Dairy Sci.* <http://dx.doi.org/10.3168/jds.2014-8389>.

Schwendel, B. H., Wester, T. J., Morel, P. C. H., Fong, B., Tavendale, M. H., Deadman, C., Shadbolt, N. M., & Otter, D. E. (2017). Pasture feeding conventional cows removes differences between organic and conventionally produced milk. *Food Chemistry*, 229, 805-813.

List of Presentations

Schwendel, B. H., Morel, P. C. H., Wester, T. J., Tavendale, M. H., Deadman, C., Fong, B., Shadbolt, N. M., Thatcher, A., & D. E. Otter (2012). Differentiation of organic from conventionally produced milk. Paper presented at the Australasian Dairy Science Symposium 2012. Proceedings of the 5th Australasian Dairy Science Symposium, Melbourne, Australia, 13-15 November 2012, Tallygaroopna. Conference paper retrieved from <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=caba6&AN=201332842>
77

Schwendel, B. H., Morel, P. C. H., Wester, T. J., Tavendale, M. H., Deadman, C., Fong, B., Shadbolt, N. M., Thatcher, A., & D. E. Otter. (2013). Fatty acid profile differs between organic and conventionally produced milk independently of sampling time. [ADSA Production Division Oral Competition, PhD Division, 2013 Annual Meeting, American Dairy Science Association; American Society of Animal Science]. *Journal of Dairy Science*, 96(E-Suppl. 1), 134. <http://www.jtmtg.org/JAM/2013/abstracts/2013-JAM-Abstracts.pdf>.

Acknowledgements

For, With, and Because of:

Tim, Patrick, Bert, Mike, Craig, Nicola, and Don

Special thanks to Aaron for looking after the baby, to my family and friends for their patience, and to everyone who helped me to keep up my spirits.

This work was funded by grants from Fonterra Co-operative Group Limited, Ministry of Science and Innovation and AGMART.

Table of Contents

Abstract	I
List of Publications	II
List of Presentations.....	II
Acknowledgements	III
Table of Contents.....	IV
List of Figures	IX
List of Tables	X
Chapter 1.....	11
1.1. Ideology and Background.....	11
1.2. Questions and Execution	13
1.2.1 Are there differences in milk FA composition between organic and conventional milk when organic and conventionally farmed cows both consume a diet based on pasture?.....	14
1.2.2 Are previous findings observed throughout lactation and when another farm set is included?.....	16
1.2.3 Do other milk compounds vary between organic and conventionally produced milk?	17
1.2.4 Are there differences in milk metabolite composition using a non-targeted analytical method?	20
1.3. Conclusion.....	20
REFERENCES	20
Chapter 2.....	24
Review: Organic and conventionally produced milk — An evaluation of factors influencing milk composition.....	24
ABSTRACT.....	24
2.1 INTRODUCTION	25
2.2 FACTORS THAT INFLUENCE MILK COMPOSITION.....	30
2.3 CONVENTIONAL VERSUS ORGANIC MILK – MAIN COMPONENTS	44

2.3.1	Milk yield.....	44
2.3.2	Milk fat content.....	44
2.3.3	Milk fat – Individual fatty acids.....	45
2.3.4	Milk protein content.....	50
2.3.5	Milk lactose content.....	51
2.3.6	Summary of Main Components.....	52
2.4	CONVENTIONAL VERSUS ORGANIC MILK – FATTY ACIDS.....	52
2.4.1	Milk from retail and dairy plants.....	52
2.4.2	Milk from research units and dairy farms.....	60
2.5	CONVENTIONAL VERSUS ORGANIC MILK – MINOR COMPONENTS.....	62
2.5.1	Vitamins and antioxidants.....	62
2.5.2	Minerals.....	63
2.5.3	Hormones.....	66
2.6	CONVENTIONAL VERSUS ORGANIC MILK – OTHER.....	66
2.6.1	Udder Health and Somatic Cell Count.....	66
2.6.2	Flavour and Taste.....	67
2.6.3	Identification.....	68
2.7	CONCLUSION.....	69
	REFERENCES.....	69
	Chapter 3.....	91
	Fatty acid profile differs between organic and conventionally produced cow’s milk independently of season or milking time.....	91
	ABSTRACT.....	91
3.1	INTRODUCTION.....	92
3.2	MATERIAL AND METHODS.....	93
3.2.1	Farm and Herd Data.....	93
3.2.2	Sampling and Sample Treatment.....	94
3.2.3	Fatty Acid Analyses.....	96
3.2.4	Statistical Analyses.....	99
3.3	RESULTS AND DISCUSSION.....	99

3.3.1	System effect	99
3.3.2	Time of the day effect	109
3.3.3	Interactions	111
3.4	CONCLUSIONS.....	117
	REFERENCES	117
Chapter 4.....		126
Pasture feeding conventional cows removes differences between organic and conventionally produced milk		126
ABSTRACT.....		126
4.1	INTRODUCTION	127
4.2	MATERIAL AND METHODS	128
4.2.1	Farm and animal data	128
4.2.2	Sample collection	129
4.2.3	Oligosaccharide analysis.....	129
4.2.4	Fatty acids.....	132
4.2.5	Protein analysis.....	132
4.2.6	Milk fat volatile compounds analysis	132
4.2.7	Statistical analysis.....	133
4.3	RESULTS.....	133
4.3.1	Oligosaccharide	133
4.3.2	Fatty acid	137
4.3.3	Protein.....	137
4.3.4	Milk fat volatile compounds	144
4.4	DISCUSSION	144
4.4.1	Oligosaccharides.....	144
4.4.2	Fatty acids.....	151
4.4.3	Protein.....	154
4.4.4	Milk fat volatile compounds	155
4.5	CONCLUSION	156
	REFERENCES	157

Chapter 5	163
Non-targeted approach does not reveal differences between organic and conventionally produced milk.	163
ABSTRACT	163
5.1 INTRODUCTION.....	163
5.2 MATERIAL AND METHODS.....	164
5.2.1 Farm Data and Sampling.....	164
5.2.2 Sample preparation and NMR analysis.....	165
5.2.3 Data processing.....	165
5.3 RESULT AND DISCUSSION	166
5.3.1 Individual milk sample set.....	166
5.3.2 Bulk milk sample sets.....	173
5.4 CONCLUSION	176
REFERENCES.....	176
Chapter 6	179
Discussion	179
6.1 Fatty acid composition	179
6.2 Other milk components	182
6.2.1 Oligosaccharide Composition	182
6.2.2 Protein Composition.....	183
6.2.3 Milk fat volatile composition	183
6.3 Non-targeted method.....	184
Chapter 7	186
Conclusion.....	186
Chapter 8	188
Future Outlook	188
8.1 Investigate effect of nitrogen fertilizer application on milk FA composition.....	188
8.2 Investigate long-term effect of of cider vinegar garlic drench and secondary plant metabolites on rumen derived FA.....	188
8.3 Investigation of free OS in colostrum from organic and conventional cows	189

8.4	Investigation of organic and conventionally produced milk using high resolution MS for non-targeted metabolomics	189
8.5	Investigation of the effect of organic and conventional farming on animal welfare and environmental impact.....	190
	REFERENCES	190

List of Figures

Figure 3.1 Botanical composition of organic (ORG) and conventional (CONV) pasture in spring (Nov) and autumn (May)	97
Figure 3.2 Principal component analysis of eight milk sets collected, separated by season and sampling time of the day. Organic milk is represented by (○) and conventional milk by (●).	114
Figure 3.3 Interactions of α -linolenic acid (ALA), vaccenic acid (VA), and conjugated linoleic acid (CLA) concentration on sampling time for each system. Organic milk is represented by (—○—) and conventional milk by (- -●- -).....	116
Figure 4.1 Concentration of selected fatty acids (FA) (○ C12:0; ● C14:0; ▲ ALA, C18:3 c9c12c15; + CLA, C18:2 c9t11) throughout the sampling period in organic and conventional milk from Farm Sets 1 and 2.....	135
Figure 4.2 Supplementary Data. Principal component analysis of all major milk proteins in milk from (○) organic and (●) conventional Farm Set 1, and (△) organic and (▲) conventional Farm Set 2.....	143
Figure 4.3. Concentration (in g per 100 g milk protein) of κ -Casein and β -Lactoglobulin B throughout the milking season from Farm Set 1 and 2 for organic (●) and conventionally (○) produced milk	145
Figure 4.4 Heat maps of volatile compounds in milk fat measured throughout milking season. Farm set 1 (left) and Farm set 2 (right).	146
Figure 4.5 Principal component analysis of odd and branched chain fatty acid (OBCFA) and poly unsaturated fatty acids (PUFA; vaccenic acid, α -linolenic acid, linoleic acid, conjugated linoleic acid) in milk from (○) organic and (●) conventional Farm Set 1, and (△) organic and (▲)conventional Farm Set 2.....	153

List of Tables

Table 2.1 Country specific regulations for organic dairy farming	28
Table 2.2 Summary of Factors influencing milk yield, fat, protein, and lactose concentration	31
Table 2.3 Effect of breed and season on individual milk fatty acids.....	34
Table 2.4 Effect of different forages on individual milk fatty acids.	41
Table 2.5 Differences in milk composition between organic and conventional produced milk	47
Table 2.6 Ratio of ω -6/ ω -3 FA and PUFA/SFA in organic and conventional retail milk	54
Table 2.7 Fatty acid composition of organic and conventional retail milk	56
Table 2.8 Concentration of selected FA in organic and conventional retail milk from different countries .	59
Table 3.1 Farm and animal characteristics averaged over lactation.....	95
Table 3.2 Measured chemical composition of organic and conventional pasture	98
Table 3.3 Effect of system, season, and time of milking on fatty acids (FA).	100
Table 3.4 Proportion of correctly grouped data assigned by Discriminant Function Analysis.	113
Table 4.1 Farm and animal factors of conventional and organic dairy farms from Farm Sets 1 and 2.	130
Table 4.2 <i>Supplementary data</i> . Feed supplementation throughout the milking period	131
Table 4.3 Oligosaccharide in bulk milk samples from conventional (Con) and organic (Org) farms ¹	136
Table 4.4 Fatty acids in bulk milk samples from conventional (Con) and organic (Org) farms.	138
Table 4.5 Casein and whey proteins in bulk milk samples.....	142
Table 4.6 Supplementary Data. Volatile compounds observed by this study in bulk milk	147
Table 5.1 Assignment of ¹ H and ¹³ C NMR signals of compounds identified	168
Table 5.2 Effect of system, season and time of milking on milk metabolites.....	171
Table 5.3 Milk metabolites in bulk milk samples from conventional (Con) and organic (Org) farms.	174