

# **The logistics of milk collection: an exploratory case study between New Zealand and Brazil**

**Luis Carlos Queiroz Pimenta**

**A thesis submitted in partial fulfilment of requirements for a degree  
of Master in Logistics and Supply Chain Management.**

**Massey University  
Palmerston North Campus  
New Zealand**

## **Abstract**

Logistics has become one of the most important activities for all companies where has been treated as strategic function to gain competitive advantage over a companies` competitors.

Agribusiness as any other business is also using logistics tools in their supply chain to reduce their chain cost and more important to improve their business efficiency as a whole. Transportation is one of the logistics activities that most influences price of product which in some cases can represent 25% of the final price.

Milk collection for a dairy business plays an important part in the overall performance of the company. A poor milk collection system jeopardise the entire chain as it is the first stage of the manufacturing process.

The main purpose of this work is to identify and describe the possible differences and similarities between a Brazilian and New Zealand Dairy Company regarding their logistics of milk collection.

Even though the two companies are in the same business segment they are inserted in different environments/markets therefore need to deal with different issues regarding milk collection such as companies` structure, milk production`s cycle, and routing and scheduling applications. However, both understand the importance of the logistics activities and apply tools in their chain to improve their efficiency.

Due to its size and market share the New Zealand Company has a better collection system in place than the Brazilian Company. Both have implemented some changes in the last few years that brought some improvements for their milk collection.

## **Acknowledgment**

I would like to thank so many people who have helped me during this time. People who have listened to all my complaints, suffered with my bad moods and even then still supporting me all the way through.

Firstly my parents, Geraldo e Ivonete, and my sister Cristina, I miss you guys so much but this it is something I wanted to do. I do appreciate all the help and support given to me even though I was not there, close to you all. I am what I am because of you. I would not have stayed here so long if you hadn't given me the strength to do so. My cousins, aunts, uncles and friends in Brazil you guys are still part of my life. Rodrigo, I still can't believe you came over here (it was priceless).

Francisco, Spu and Dani, thanks for the second chance, and Flavia, Mathius and Bruno, you all made my life in Palmy and NZ so much easier and even have made me forget about Brazil sometimes. I am sure I wouldn't have stayed here if you were not around.

Ivan Simpson for the friendship, advice all the editing and the free English classes. I know it must have been really boring to read all those poorly written assignments and to understand what I was saying and put it in readable English. You probably know more about Logistics than myself now ☺.

Alan Win for giving me the chance to do the Masterate, and Professor Norman Marr for all the supervision and advice.

The Batt Street and associates for all the good times, parties, barbeques and for accepting me in the group.

And last but not least, all the people who helped me in so many ways to get this work done.

Thank you all

Luis

## Table of Contents

Abstract.....	ii
Acknowledgment.....	iii
List of Tables.....	vii
List of Figures.....	viii
Chapter 1 Introduction.....	1
1.1 Introduction.....	1
1.2 Background.....	1
1.2.1 Increasing Importance of Logistics and its Influence in Dairy.....	1
1.2.2 History of Milk Industry.....	5
1.3 Objectives.....	8
1.3.1 Problem Statement.....	8
1.3.2 Objectives.....	9
1.3.3 Hypothesis.....	10
Chapter 2 Literature Review.....	11
2.1 Introduction.....	11
2.2 Agribusiness.....	11
2.3 Logistics.....	13
2.4 The Role of Logistics in the Supply Chain.....	17
2.5 Logistics of Transport.....	21
2.6 Transportation Modes.....	27
2.6.1 Rail.....	28
2.6.2 Road.....	30
2.6.3 Water.....	31
2.6.4 Pipelines.....	33
2.6.5 Air.....	33
2.6.6 Intermodal.....	34
2.6.7 Comparison Between Modes.....	35
2.7 Designs for Transportation Network.....	37
2.7.1 Direct Shipment Network.....	38
2.7.2 Direct Shipment with Milk Runs.....	38
2.7.3 All Shipments via Central Distribution Centre (DC).....	39
2.7.4 Shipping via DC using Milk Runs.....	39
2.7.5 Tailored Network.....	40
2.7.6 Differences between Transportation Networks.....	40
2.8 Utilization of Information Technology.....	41
2.9 Transportation Routing and Scheduling.....	43
2.9.1 Use of Simulation within Supply Chain.....	44
2.10 Outsourcing in Transport.....	46
2.10.1 The Third Party Logistic (3PL) Usage.....	48
2.10.2 3PL Selection Criteria.....	49
2.10.3 The Future of Logistics Outsourcing.....	50
2.11 Summary.....	51
Chapter 3 Logistics of Perishable Products.....	52
3.1 Introduction.....	52
3.2 Introduction to Transportation of Perishable Products.....	52
3.3 Fruit, Vegetables and Flowers Transportation.....	55
3.4 Ready Mix Concrete (RMC) Transportation.....	57

3.5 Milk Transportation.....	59
3.5.1 Ways of Transporting Milk .....	60
3.5.2 Milk Reception .....	63
3.5.3 Milk Collection.....	64
Chapter 4 Milk Industry .....	67
4.1 Introduction.....	67
4.2 World .....	67
4.3 Brazil.....	70
4.3.1 Dairy Industry in Brazil .....	71
4.4 New Zealand .....	73
4.4.1 New Zealand Dairy Industry .....	73
Chapter 5 Methodology .....	76
5.1 Introduction.....	76
5.2 Introduction of the Methodology.....	76
5.3 Research Methods .....	77
5.4 Research Approach Method .....	79
5.5 Summary.....	81
5.6 Schematic Representation.....	83
Chapter 6 Analysis and Discussion.....	84
6.1 Introduction.....	84
6.2 Objectives .....	84
6.3 New Zealand Company .....	84
6.3.1 Company Background.....	84
6.3.2 Company Structure .....	85
6.3.3 Milk Production .....	86
6.3.4 Collection.....	87
6.3.5 Implementation of New Technologies.....	91
6.3.6 Milk Quality.....	92
6.4 Brazilian Company .....	94
6.4.1 Company Background.....	94
6.4.2 Company Structure .....	95
6.4.3 Milk Production .....	95
6.4.4 Collection.....	97
6.4.5 Implementation of New Technologies.....	102
6.4.6 Milk Quality.....	102
6.5 Comparison .....	104
Chapter 7 Conclusion .....	107
7.1 Introduction.....	107
7.2 Objectives .....	107
7.2.1 Objective 1 - Define Agribusiness .....	107
7.2.2 Objective 2 - Study the Use of Logistics and its Application in Agribusiness.....	108
7.2.3 Objective 3 - Determine Which Problems are Faced by the Logistics of Milk Collection .....	108
7.2.4 Objective 4 - Identify the Differences Between the Milk Collection Processes.....	110
7.2.5 Hypothesis.....	110
7.3 Limitations.....	112
7.4 Future Research .....	112
References .....	113

Appendix.....	121
Letter .....	121
Questionnaire .....	122

## List of Tables

Table 2.1 - Commercial Freight Activity in US, 2002 _____	27
Table 2.2 - Average freight ton-mile transportation price by mode _____	35
Table 2.3 - Cost structure for each mode _____	36
Table 2.4 - Relative rankings of transportation mode by cost and operating performance characteristics (a) _____	37
Table 2.5 - Size of Order/Load _____	37
Table 2.6 - Pros and cons of different transportation network _____	40
Table 3.1 - Maximum temperature during transport _____	54
Table 4.1 - World's Milk Production _____	68
Table 4.2 - Top 20 Dairy Countries in the World _____	70
Table 4.3 - Agribusiness Products in Brazil _____	71
Table 4.4 - Milk Processor List intake in 1,000 tons _____	72
Table 4.5 - Milk Processor List in 1,000 tons _____	74

## List of Figures

Figure 1.1 - Flow of material resources in the dairy production sector _____	2
Figure 2.1 - Mode choice: selection process _____	21
Figure 2.2 - Relationship among transportation parties _____	26
Figure 3.1- Estimate of worldwide perishable flows 2005 in Tons _____	55
Figure 3.2 - Data flow in milk management system _____	66
Figure 4.1 - Graph of Global Sales of Dairy Products per Region (forecast) in US _	69
Figure 5.1 - Schematic representation of the research _____	83