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**Case studies on the adoption of dairy goat milking systems in  
New Zealand**

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A Dissertation  
submitted in partial fulfilment  
of the requirements for the Degree of  
Bachelor of Agricultural Science

at  
Lincoln University  
by  
Eva Mary Brakenrig

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Abstract of a Dissertation submitted in partial fulfilment of the  
requirements for the Degree of Agricultural Science.

Case studies on the adoption of dairy goat milking systems in New Zealand

by

Eva Mary Brakenrig

The dairy goat milking sector in New Zealand is a developing industry. It is predominantly clustered in the Waikato and consists of both indoor and outdoor systems. This dissertation investigates the key drivers, planning, limitations and benefits surrounding the adoption of goat milking systems for six established case studies in New Zealand. All six case studies are located in the Waikato and supply the Dairy Goat Co-operative (DGC). Five of the case studies are indoor systems and one is an outdoor system.

Key drivers behind the dairy goat system adoption were influenced by individual circumstances and constraints of their initial systems. They included the financial returns involved, including a consistent payout; also farm ownership opportunities, lifestyle changes and being forced out of their original systems due to a lack of profitability. The case studies utilised established farms as a source of information during the planning and establishment phases. The case studies were identified as early adopters.

The main benefit surrounding the adoption was the financial returns, they exceeded expectations and added stability to their income. The main limitation was highlighted to be the cap on shares, which limited growth but was beneficial to the consistency of their payout. The case studies were positive about the future of the dairy goat industry. Each case study stated they will continue to be a part of the industry with plans for growth when opportunities arise to improve their systems.

**Keywords:** dairy goat system, innovation, indoor farming, cluster theory, key drivers, co-operative

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# Table of Contents

<b>Abstract</b> .....	<b>ii</b>
<b>Acknowledgements</b> .....	<b>iii</b>
<b>Table of Contents</b> .....	<b>iv</b>
<b>List of Tables</b> .....	<b>vii</b>
<b>List of Figures</b> .....	<b>viii</b>
<b>Chapter 1 Introduction</b> .....	<b>1</b>
1.1 Overview.....	1
1.2 Research problem and relevance of research .....	2
1.3 Research aim .....	2
1.4 Key objectives.....	2
1.5 Research approach .....	2
1.6 Dissertation outline .....	3
<b>Chapter 2 Literature review</b> .....	<b>4</b>
2.1 Introduction.....	4
2.2 Innovation adoption theory.....	4
2.2.1 Individual innovativeness theory.....	5
2.2.2 Theoretical frameworks.....	6
2.3 Cluster theory .....	7
2.4 Co-operative theory corporate governance .....	9
2.5 Caprine Arthritis Encephalitis .....	10
2.6 Conclusions and area of research .....	11
<b>Chapter 3 Methods</b> .....	<b>13</b>
3.1 Introduction.....	13
3.2 Research Questions .....	13
3.3 Type of research .....	13
3.4 Case study method .....	13
3.5 Researcher position .....	14
3.6 Sample selection.....	14
3.7 Health and safety.....	15
3.8 Farmer consent.....	15
3.9 Data collection.....	15
3.10 Data processing and analysis .....	16
3.11 Research method limitations.....	16
<b>Chapter 4 Case study profiles</b> .....	<b>17</b>
4.1 Introduction.....	17
4.2 Farm A .....	17

4.2.1	Farm overview .....	17
4.2.2	Key drivers .....	17
4.2.3	Planning and establishment .....	18
4.2.4	Benefits .....	19
4.2.5	Limitations .....	20
4.2.6	Future plans.....	21
4.3	Farm B.....	22
4.3.1	Farm overview.....	22
4.3.2	Key drivers .....	22
4.3.3	Planning and establishment .....	22
4.3.4	Benefits .....	23
4.3.5	Limitations.....	24
4.3.6	Future plans.....	25
4.4	Farm C.....	25
4.4.1	Farm overview.....	25
4.4.2	Key drivers .....	26
4.4.3	Planning and establishment .....	26
4.4.4	Benefits .....	27
4.4.5	Limitations.....	28
4.4.6	Future Plans.....	29
4.5	Farm D .....	29
4.5.1	Farm overview.....	29
4.5.2	Key drivers .....	29
4.5.3	Planning and establishment .....	30
4.5.4	Benefits .....	31
4.5.5	Limitations.....	32
4.5.6	Future plans.....	33
4.6	Farm E.....	33
4.6.1	Farm overview.....	33
4.6.2	Key drivers .....	33
4.6.3	Planning and establishment .....	34
4.6.4	Benefits .....	35
4.6.5	Limitations.....	35
4.6.6	Future plans.....	37
<b>Chapter 5 Cross case analysis and discussion .....</b>		<b>38</b>
5.1	Summary of case studies .....	38
5.1.1	Farm systems.....	38
5.1.2	Comparison of case studies.....	38
5.2	Key drivers of dairy goat system adoption .....	39
5.3	Planning and establishment.....	40
5.4	Benefits and limitations.....	40
5.4.1	Benefits.....	41
5.4.2	Limitations .....	41
5.4.3	Summary.....	43
5.5	Adoption framework .....	44
5.5.1	Innovativeness of case studies .....	44
5.6	Future plans for the case studies.....	44
<b>Chapter 6 Summary and conclusions .....</b>		<b>46</b>
6.1	Major findings of this study .....	46

6.1.1	Farm systems.....	46
6.1.2	Key drivers of dairy goat system adoption.....	46
6.1.3	Planning and establishment.....	46
6.1.4	Benefits and limitations.....	47
6.1.5	Adoption theory.....	47
6.1.6	Future plans of the case studies.....	47
6.2	Limitations of research.....	47
6.3	Future research.....	48
<b>Appendix A Case study participant information letter .....</b>		<b>49</b>
<b>Appendix B Interview guide for case studies.....</b>		<b>50</b>
<b>References .....</b>		<b>53</b>

## List of Tables

Table 5.1 Comparison of case studies .....	39
Table 5.2 Summary of benefits and limitations highlighted by the case studies analysed .....	43



## List of Figures

Figure 2.1 Adopter categories (Rogers, 2003, p.281).....	5
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# Chapter 1

## Introduction

### 1.1 Overview

The dairy goat industry is still developing in New Zealand. The agricultural industry in New Zealand is changing with the development and adoption of technologies moving the industry forward. Commercial dairy goat farming began in New Zealand in the 1970's and early 1980's (Orr, 2010). Since then the adoption of dairy goat systems has predominantly been clustered in the Waikato region with some farms supplying the Dairy Goat Co-operative (DGC) from Taranaki and Whangarei, as they were part of the original system. This allows these farms to exploit technologies, information, resources and supply available in the area. The dairy goat systems in New Zealand are predominantly indoor systems but there are outdoor systems operating successfully. There is limited research into dairy goat systems in developed countries. Farmers are relying on established systems as their source of information and support.

The DGC has secured markets overseas in a niche market supplying powdered goat milk infant formula. Goat milk has unique features that make it an alternative to cow milk products, it is widely used by those with digestive problems or a sensitivity to cows' milk. The protein in goat milk are digested more efficiently than those found in cow milk. Goat milk behaves more like human breast milk in the digestive tract of a human, allowing the digestive enzymes more efficient access to aid with digestion. Goat milk has also been seen to have a higher amount of calcium, phosphorus and potassium than cows milk (Silanikove *et al.* 2010).

Due to the impact Caprine Arthritis Encephalitis has on the production of some of the case study goat herds, some discussion has been devoted to this topic. Caprine Arthritis Encephalitis (CAE) is a virus that affects goats globally. There is little known about the spread and therefore best containment practices. Its negative impacts on production are causing financial losses in the New Zealand dairy goat industry. The DGC is aiming to have all supplying farms CAE free by 2022. To attain the CAE free title, the farm must have less than 1% of their herd CAE positive for a minimum of three years. Positive CAE goats will need to be culled prior to 2022, which will cause large losses for some suppliers. The virus decreases milk production and combined with the loss of stock due to culling, it is a large limiting factor in the New Zealand dairy goat industry.

This dissertation analyses six established dairy goat system in the Waikato supplying the Dairy Goat Co-Operative. They were studied in order to identify the key drivers, planning and establishment,

limitations and benefits surrounding the adoption of their dairy goat system. An insight into the future plans for each case study was shown.

## **1.2 Research problem and relevance of research**

As land prices continue to rise, it is becoming increasingly difficult to buy large and productive farms. The adoption of a dairy goat system gives the opportunity of land ownership and a stable financial return on a relatively small piece of land.

The DGC has a closed market and is currently not accepting new suppliers. They supply the Chinese market with consumer ready powdered infant formula, as it is a suitable substitute for those who have an allergy to cows milk or have digestive problems. In order to support the successful adoption of dairy goat systems in New Zealand, there is a need for secured markets to cater for the increase in production.

## **1.3 Research aim**

The aim of this research is to identify the key drivers behind the adoption of dairy goat systems in New Zealand. It seeks to understand the planning and principles behind the dairy goat system adoption. A range of farm systems have been included in order to extend the scope of the case studies and allow contrasts and comparisons between all case studies.

## **1.4 Key objectives**

The Key objectives surrounding this research are:

- Identify the original systems in place before the dairy goat system adoption
- Identify the key drivers of a dairy goat system adoption for each of the five case studies
- Identify important planning and development phases of the dairy goat system adoption
- Compare and contrast the case studies. Overall systems, motivations, outcomes and future plans
- Identify positive and negative outcomes of dairy goat system adoption

## **1.5 Research approach**

Five case studies were undertaken on dairy goat milking farms in the Waikato that had been adopted from a previous farming system. A case study approach was selected to be the best method of data

collection as it allowed relevant qualitative and quantitative data to be recorded in an in-depth manner. Each case study was selected on the basis that the dairy goat system had completed the conversion process and was now an established dairy goat farm. A knowledge of the industry and ability to provide the relevant information needed. The data was collected through semi-structured interviews, using the snow balling method to cover a wide topic of data specific to that case study. The data was then compared and contrasted with the aim of identifying the key drivers and outcomes of the adoption of dairy goat systems in the Dairy Goat Cooperative catchment

## **1.6 Dissertation outline**

The dissertation is arranged into six chapters. This layout allows the information to be laid out in a way that clearly states background, method and context. The case studies are compared and conclusions are made.

### **Chapter 1 Introduction**

Introduction of the topic and an overview of the research.

### **Chapter 2 Literature Review**

A review of literature relating to the adoption theory and cluster theory. Aids in identifying the place for this research in relation to current literature.

### **Chapter 3 Methods**

Outlines the method of research used, the data collection and the reasoning behind it.

### **Chapter 4 Case study profiles**

Outlines each case study and summarises the interviews and outcomes.

### **Chapter 5 Case study comparison, analysis and discussion**

Compares and contrasts the five case studies investigated.

### **Chapter 6 Conclusions**

Summarises key findings and limitations of the study. Identifies future research.

## **Chapter 2**

### **Literature review**

#### **2.1 Introduction**

This literature review covers literature that is relevant to the adoption of dairy goat systems in New Zealand. As the dairy goat industry is an emerging industry in New Zealand, scientific literature is lacking. This review is limited to theories surrounding the adoption and innovation in a broad sense. In addition the specific goat disease Caprine Arthritis Encephalitis is discussed. The Caprine Arthritis Encephalitis (CAE) virus is prevalent in the dairy goat industry and affects the production of affected goats. It is a global problem that is having a limiting effect on the New Zealand dairy goat industry. There is little known about the spread and therefore containment of the virus. The DGC is aiming to have all supplying farms CAE free by 2022.

Adoption refers to an innovation that is integrated into a new system. It can be characterised by its rate of adoption and diffusion. Diffusion refers to what extent this innovation penetrates the market. (Sunding and Zilberman, 2001). The adoption of Dairy Goat systems in New Zealand has been slow. It has clustered in the Waikato predominantly, congregating around common resources such as the dairy goat co-operative processing plant as well as the knowledge of fellow innovators. Commercial dairy goat farming began in New Zealand in the 1970's to early 1980's (Orr, 2010) and was considered an 'emerging industry' (Singireddy *et al.*, 1997). The objective of this review is to analyse relevant literature on the factors affecting adoption, diffusion, cluster theory and include a short review of the CAE virus that is currently affecting the dairy goat industry.

#### **2.2 Innovation adoption theory**

The development of agriculture is driven by technological innovations. It has led to an increase in both production and quality of products. Historically many technological advances in the agricultural industry have been met with some resistance during the adoption period (Rauniyar & Parker, 1998). The following section provides an overview of the innovation adoption theory and theoretical frameworks surrounding the research.

### 2.2.1 Individual innovativeness theory

The adoption of technologies in agriculture has been varied. By implication, an innovation involves something new. Innovation can be defined as a planned change in a firm's activities with the purpose of improving performance, it will involve new ways to perform tasks, new products and new procedures (Sunding & Zilberman, 1999, p. 1). Adopters can be categorised by their willingness to experiment with innovative technologies and the rate of adoption relative to other adopters (Rogers, 1983, p.22). Rogers states that the population of adopters can be categorised into five groups. These include innovators, early adopters, early majority, late majority and laggards (see figure 1). He states that innovativeness is a relative dimension that one has either more or less of it relative to others in a social system.

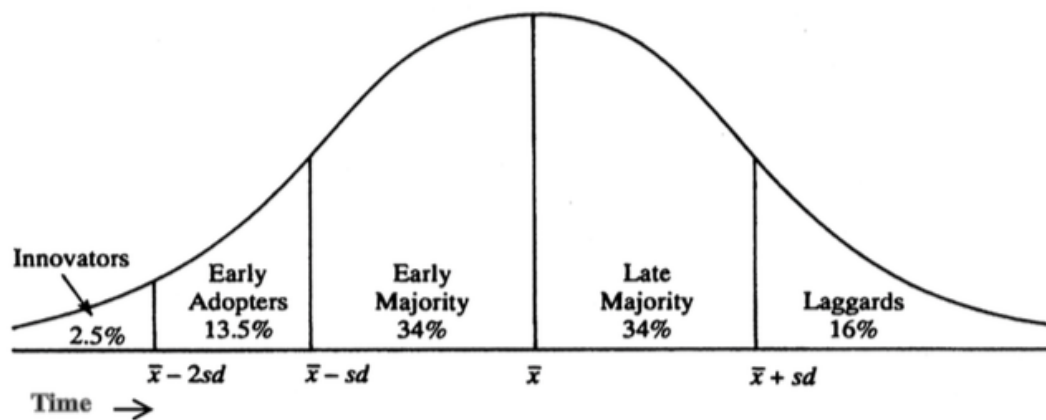


Figure 2.1 Adopter categories (Rogers, 2003, p.281)

Based upon Rogers, Figure 2.1 the dominant attributes of each category are:

Innovators - venturesome, very eager to try new ideas causing them to lead the innovation. They usually lead out of the local circle due to their near obsession with innovation. Communication can span long distances to other innovators. They must have financial resources to absorb the possible losses involved in unprofitable innovations, the ability to understand and apply sometimes complex knowledge and be able to cope with the uncertainty that surrounds innovation. They often launch the new idea from outside the system boundaries and start the diffusion of the innovation.

Early adopters - respectable, more integrated in the local social system than innovators and have the greatest degree of opinion and leadership. Potential adopters look up to these early adopters for advice. They speed the rate of diffusion as other adopters look to them for guidance, serving as role models to later adopters. The main role of the early adopter is to decrease uncertainty surrounding the innovation through adoption and evaluation.

Early majority - deliberate, just ahead of the average member of society with a deliberate willingness in adopting ideas. They rarely hold leadership roles but have frequent interactions with their peers. They provide connectivity through the diffusion process. Often they will deliberate for a period of time before adopting the innovation thus causing their innovation-decision period to be longer than the prior adopters.

Late majority - sceptical. This category adopts later than the average member of the social system. It may be due to economic necessity or a response to the increase in network pressures. They approach the innovation with a sceptical and cautious approach. The innovation will have already been proven to be successful and they respond to pressure by their peers.

Laggards - traditional. These are the last to adopt an innovation. They possess no leadership in the process and slow the diffusion process. Their decisions are often based on what has been made in the past and often interact with other traditionalists. They have a resistance to innovation often caused by limited resources. Their overly cautious approach often means there has to be utter certainty that the innovation will not fail. (Rogers, 1983, pp. 248-250)

Nutley *et al* (2002) also uses the bell shaped curve to show that the individual innovativeness theory is based on who and when the innovation is adopted.

Rogers notes that relatively earlier adopters are no different in age from late adopters but tend to have a formal education, more likely to be literate, are seen to have a higher social status and have larger sized resources whether it be farms, client base, company etc. indicating a generally higher socioeconomic status. (Rogers, 1983, p. 251). The earlier adopters are more cosmopolitan and have contact with change agents causing them to catalyse the diffusion process. They tend to be more active information seekers which leads them to seek innovation. (Rogers, 1983. Pp. 258-259). These studies suggest that innovation adoption is a complex process. It is influenced by many factors and decisions.

### **2.2.2 Theoretical frameworks**

The work of Rogers (1983) is supported by Botha *et al* (2005) review of theoretical frameworks. They suggest that a range of factors influence the innovation adoption decision-making process. The adoption process begins when a person moves from the state of 'pre contemplation' which is then either followed by rejection or the adoption decision making process will continue. Traditionally it was assumed that as innovations were deemed successful, all farmers would adopt them. The measure of success was based on the level of innovation. As the diffusion process increased and information was communicated through farmers, the adoption rate would increase. This active form of information communication was labelled the 'extension theory'. In summary it was the process of

changing voluntary behaviour via communication pathways. The extension theory does not revolve around analysing the adoption of innovations but about the behaviour change surrounding it. The bounded rationality theory states that perfect information is not possible, it looks at the decision making process as a whole rather than each stage. Each individual will have specific requirements for a successful adoption therefore there is no such thing as perfect information surrounding their decision making process. It points out that individuals are bound to their resources whether it be time, money or knowledge. Individuals goals are important in the decision making process. The diffusion theory brings together the underpinning disciplines such as anthropology, education, geography and sociology (Botha *et al*, 2005). Diffusion has theories within itself, which include: the innovation itself, the communication channels used to spread information about the innovation time and the nature of the society into which it is introduced. (Rogers, 1995). Diffusion theory also adds personal factors by incorporating mental processes into the decision making process. Highlighting behaviour, beliefs and perceptions are an important aspect to consider. Murphy (2014) sees the decision making process as a large part of innovation adoption. How an individual is able to interact and understand their environment which includes their interaction with others plays a large role. Their information seeking characteristics, socio-demographics and the characteristics of the innovation all impacted the decision making process.

It is known that the adoption of innovation is a not a spontaneous process and takes time. The theoretical frameworks complement each other to allow the analysis of the adoption process.

Although innovation adoption theory has been widely studied, there have been inconsistencies noted. Wolfe (1994) suggested that due to the complex and context specific nature of the innovation adoption it created difficulties in understanding it. He stated that the literature can offer little guidance due to these complexities *“innovation (adoption) cannot be understood without careful attention to the personal, organizational, technological and environmental contexts within which it takes place”* Wolf, 1994, p.406)

### **2.3 Cluster theory**

The cluster theory is based on geographic concentrations of interconnected entities in a particular field (Porters, 1998). Clusters often extend downstream to channels and customers and laterally to manufacturers of complementary products. Industries related by skills, technologies and or common inputs also congregate. These clusters often include institutions such as universities, standard settings agencies, trade associations and training providers. These assets in the area can help in developing the growing cluster. Clusters are a feature in virtually every economy. They generate co-operation as well as competition especially in areas that are economically advanced. The scope of a cluster can vary from a single city to neighbouring countries but must include end product, service



companies, financial institutions and firms in related industries. They often include collective private sector bodies that support the members of the cluster. (Porter, 2000). Drawing boundaries is not a simple process, as there are complex linkages and complementarities to the system. The 'spill overs' are important to productivity and innovation. The boundaries will continue to evolve as new firms evolve, there will be periods of growth and decline. With growth comes new linkages and the cluster grows. Porter states that most participants in the cluster do not compete directly with each other. They share common needs and opportunities as well as obstacles and constraints. There is opportunity for co-ordination and mutual improvement without the need of threat. The cluster can often offer a web of constructive dialogue efficient in improving conditions. Now that companies can source capital goods, information and technology globally thanks to the development of technology, it would be thought that the role that location plays would diminish. Yet today's economic map is still dominated by clusters.

Porters (1998) highlights why clusters are important aspects of competition. Modern competition depends on productivity rather than access to inputs and productivity depends on how companies compete. A company can be highly productive in any industry as long as they offer unique products and services. These industries are becoming more and more technologically advanced and knowledge intensive. Location is a strong influence on the sophistication with which a company competes as well as the quality of the local business environment. Companies rely on efficient transportation infrastructure and educated employees. They have to adhere to legal requirements and corporate structures, which help regulate the business environment. This specific business environment is often location specific, again creating the cluster. Porter (1998) goes on to say that clusters affect competition in three broad ways: increasing productivity of companies in the area and driving the direction and pace of the innovation in the area, which then underpins the future productivity and growth and lastly stimulates the formation of new businesses therefore growing the cluster. This creates a benefit to the members of the cluster. Being part of a cluster allows the sourcing of inputs, information and technology as well as the interaction with the related entities. These lead to improved productivity and efficiency of those involved in the cluster. There tends to be a better access to educated employees as well as suppliers in the supply chain. A cluster creates a source of specialised supplier base with lower transaction costs. This minimises the need for inventory, importing costs, transportation costs and storage costs. The location can reduce delays in the system and improve efficiency for the businesses. As reputation is important, a good local reputation can lower the risk of suppliers reneging commitments as loyal relationships are made. Although some inputs may be better sourced from a distance, suppliers that are trying to penetrate a cluster have been known to price more aggressively, knowing the efficiencies and marketing potentials if they can tap into the resources.

Porter (1998) explained how clusters play a vital role in innovation. The characteristics stated above that have an impact on productivity can have a larger impact on innovation. As buyers are part of the 'spillover' of a cluster, it allows the companies to have a larger view on the market than their isolated competitors, allowing them to develop and meet growing consumer needs. The communication within a cluster allows the companies to learn early about evolving technology and successful innovations as well as failed innovations. Face to face contact and frequent visits are timely and efficient. As well as making innovation more visible a cluster also provide the flexibility to act on innovation. A company can source and implement these innovations rapidly to better their business. They are closely involved in the innovation process. It is not a surprise that new businesses surface within developed clusters as it lowers risk and creates market opportunities. It allows the new business to draw on an established source of inputs and gaps in the supply chain system are quickly identified. This is shown with the advancement of agricultural technologies and products continuous growth. New clusters may arise from an innovative company when this company starts in the cluster and may then grow another component, for example the Dairy Goat Co-operative in Hamilton. The supplying farms are developed to surround the processing factory and forming a specialised cluster. 65% of the New Zealand dairy goat industry is clustered in the Waikato (Orr, 2010).

## **2.4 Co-operative theory corporate governance**

Corporate governance is the practices and processes by which a company is directed and controlled, dealing with the ways in which investors assure themselves of getting a return on their investment. It involves balancing both the interests of the company as well as the interests of the shareholders. The stakeholders may include management, customers, government or shareholders (Shleifer, 1997).

Historically companies were owned and managed by the same people such as a sole trade structure. For economies to grow and to fund expansion, it became necessary to find investors to fund this growth. Large farming businesses require sound corporate governance and are well aware of its importance. The Dairy Goat Co-operative has a co-operative corporate governance theory in place.

The most general definition states that patrons own, control and benefit from their use of the co-operative. The patrons benefit by transacting with the co-operative. (NZCA, 2000).

Old (2009) highlighted the importance of good governance structures in order for a business to be successful. Although the New Zealand dairy industry seems to be dominated by co-operatives, there seems to be little understanding and research of co-operative governance structures. Currently there is no encompassing theory surrounding co-operative governance which is interesting given its importance in the industry. As much of the world's economic activity relies on the guidance given by

these governing boards, the activities of these boards have a wide impact (Leblanc & Gillies, 2005).

They have legal responsibilities and all critical decisions made within business come down to these governing boards. Co-operatives are very common in developed economies and are estimated to be responsible for one third of the world's agricultural food supply (Pattison, 2000). Co-operatives are unique from other organizations as the user control allows members to ensure that the business outcomes align with what their goals are for the co-operative (Dunn et al., 2002, p. 34). The Dairy Goat Co-operative is no exception to this. Dunn et al., (2002) sees that the that most important aspect of a co-operatives success is having a governing board that can have effective control over the co-operative while ensuring things are done in a way that promotes the best interests of the members. Co-operatives can benefit the members by limiting exposure to the market and therefore limit exploitation by middlemen involved. Old (2009) states that the role of co-operative boards are aligned with many aspects covered in corporate governance literature but also goes beyond this. The special nature that lies within the user-controlled principles has an effect on the composition and roles of the co-operative board, such as the board being elected from and by the members of the co-operative to ensure that the members' interests are expressed. They are put in place to represent the members so it makes sense that they are sourced from there as they have an understanding of needs and resources.

The International Co-operative Alliance (ICA) has adopted seven co-operative principles; voluntary and open membership; democratic member control; member economic participation; autonomy and independence; education, training and information; co-operation among co-operatives and concerns for community (ICA, 2007). These encompass the majority of co-operatives operating globally. The ICA states "co-operatives are based on the value of self help, self responsibility, democracy, equality, equity and solidarity. In the tradition of their founders, co-operative members believe in the ethical values of honesty, openness, social responsibility and caring for others" (ICA, 2007, p. 1) A further look into literature shows that there are three underpinning principles to co-operatives: user owned, user controlled and user benefitted (Barton, 1989) These underpinning principles have a large effect on the organization, objectives, culture and governance of the co-operative. So while theories such as agency theory shed light on corporate governance structure within a co-operative, there is no encompassing theory to explain the roles.

## **2.5 Caprine Arthritis Encephalitis**

Caprine Arthritis Encephalitis (CAE) is a contagious viral disease found in goats. It is a large problem in the New Zealand dairy goat industry and the DGC are aiming to have all of their supplying farms CAE free by 2022. There is little understanding surrounding the transmission and best way of controlling it. Adams (1983) observed the transmission through multiple contact points, the most efficient

transport of the disease from doe to kid was through the consumption of milk and colostrum from an infected goat. There was transmission through other secretions but these were seen to be less efficient. In the study when uninfected does were milked with infected does, there was a high percentage of infection in less than 10 months. The disease is found in goats worldwide and interest in the disease and eradication efforts have increased recently. The disease affects small ruminant production and causes economic losses due to the culling of animals and the decrease in milk production and quality. Hasegawa *et al* (2016) studied the vertical transmission and found the virus was present in different parts of the female reproductive tract including the uterus but it is unclear whether vertical transmission is present. The symptoms include weakness in the rear legs of young goats causing muscle atrophy and swollen joints, particularly the knees, in adult goats. The infection stimulates an inflammatory response, which affects the brain, lungs, joints and mammary gland. It replicates slowly and it may be several years before the goat develops clinical signs (Leitner *et al.*, 2008). Greenwood *et al* (1995) found that it was associated with reduced lactation length, milk fat, protein yield, increased the chance of contracting other diseases and also reduced the growth rate prior to weaning of kids significantly. It can be contracted at birth or throughout the goat's life through exposure to the virus. Further information is required in order to implement more comprehensive preventative programs for the CAE disease. Reina *et al* (2008) described the prevention strategies but highlighted that it is difficult with such little knowledge surrounding it. As prevention is limited, early detection, strict culling, separation of positive CAE and negative CAE and snatching kids at birth were highlighted to be the most efficient strategies. A farm must have less than 1% CAE positive goats on farm for more than 3 years to be classified as CAE under the DGC catchment.

## **2.6 Conclusions and area of research**

There has been a wide range of study into innovation adoption. Although there are some inconsistent theories the research shows there are complementary trends. There is a need for more research into the animal welfare practices surrounding housed animals. Overseas protocols have been deemed very successful and would be beneficial in New Zealand indoor systems. There is also little known about dairy goats in developed countries as the majority of literature is for developing economies and small scale systems.

There is little known about corporate governance structures in a co-operative despite co-operatives having a large part in the agricultural industry. Although many theories such as agency theory show similarities, co-operatives have different needs and therefore different roles of the governing board. There is room for research in this area. Overall the information available surrounding drivers of

adoption was broad and based on models with existing infrastructure. More information on the key drivers and the establishment of new systems in New Zealand is required.

The most efficient transmission of CAE in goats is through the ingestion of infected colostrum. There are few preventative strategies in place, early detection, strict culling, complete separation of the positive CAE and negative CAE goats and removal from the doe at birth are the main tools implemented on farm. The DGC aims to have all supplying farms CAE free by 2022.

## **Chapter 3**

### **Methods**

#### **3.1 Introduction**

The aim of the study was to provide an analysis of the adoption of dairy goat milking systems in New Zealand. To achieve this, a case study approach was used. Five dairy goat milking systems in New Zealand were interviewed using a semi structured interview process. Qualitative data was collected.

This section outlines the method, which was undertaken to collect the data.

#### **3.2 Research Questions**

- 1) What was the original system?
- 2) What was the reasoning behind the dairy goat milking adoption?
- 3) What were the key aspects of planning and establishing the dairy goat system adoption?
- 4) What were the key benefits and limitations surrounding the adoption?

#### **3.3 Type of research**

A qualitative research approach was deemed the most appropriate for these case studies. A method of inquiry through semi-structured interviews allowed contrast and comparisons to be made. A qualitative research approach seeks difference and divergence as well as identifying common elements. It has a greater ability to interpret in-depth data collected than if solely quantitative research was to be used (Davidson & Tolich, 2003, p. 127).

For this study, rather than identifying hypotheses to test, open-ended research questions were used. This allowed a range of data to be collected specific to each case study farm.

#### **3.4 Case study method**

A case study approach was identified as the most suitable method for the collection of data. It allowed the collection of comprehensive qualitative data in response to the research questions put forward. A case study does not follow a stereotypic form (Yin, 2003). A case study approach allows an in-depth examination of a social phenomenon, which in this case is a farming population.

Yin (2003) defined a case study as the following

- 1) "Investigates a contemporary phenomenon within its real-life context especially when the boundaries between phenomenon and context are not clearly evident."
- 2) "Copes with the technically distinctive situation in which there will be many more variables of interest than data points: and as one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion; and as another result, benefits from the prior development of theoretical propositions to guide data collection and analysis." (pp. 13-14)

Case studies were done on each of the five dairy goat farms selected. Having multiple case studies allowed the collection of data to be varied and contrasts and comparisons made. There were unique aspects to each system. Comparing and contrasting the systems allowed conclusions to be drawn surrounding the driving forces behind the adoption of dairy goat systems in New Zealand. Benefits and limitations involved with the adoption were highlighted. Multiple case studies allowed a pastoral grazing based dairy goat system to be included. This led to comparing and contrasting system drivers on both pastoral grazing based and indoor systems, expanding the study.

The case studies allowed a collection of information on the system as a whole both prior the adoption as well as following it. The face-to-face case study meant that farmer goals and personal attributes could be identified, which was beneficial to identifying the key drivers as well as future plans for the system.

### **3.5 Researcher position**

Currently studying at Lincoln University doing a Bachelor of Agricultural Science with Honours. This will be completed in November 2017. The researcher has undertaken a wide range of undergraduate papers as well as work experience throughout the Waikato. Having also worked on three dairy goat systems in the Waikato provided an advantage when understanding the running of a dairy goat system and enabled specific research questions to be asked.

### **3.6 Sample selection**

Sample selection was based on a judgemental sampling. Selection was centred on the knowledge, understanding and ability to relay this information. It is a non-probability sampling method (Babbie, 2013, p. 190). As there are a limited number of farmers who have adopted goat milking systems in New Zealand, it was important that those selected had a good understanding of the industry and

were able to provide a good insight toward the purpose of the study while maintaining diversity between the case studies. Farmers must have been involved in the adoption process and to have completed at least one season of production.

Time constraints contributed to the number of case studies being selected. Farmer co-operation was key to the success of this research as well as a passion and enthusiasm for what they were achieving. Initial contact was made through knowledge of farmers gained while working in the dairy goat industry and referrals from sources not involved in the study. The inclusion of referrals by outsourced contacts minimized the researcher bias.

### **3.7 Health and safety**

Health and safety risks were minimized. Interviews were carried out on farm with general farm hazards being managed in a practical way with common sense. Travel was done in a personal car and ample time was left for travelling to and from the interview.

### **3.8 Farmer consent**

Each participant was made aware what was involved in the study and the nature of the research before giving consent. Initial contact was made through a personal phone call explaining the background of the study and the aim of the research. This was followed up by an email formally presenting the study information, researcher details and supervisor details (Appendix A). The farmer then indicated whether or not they would participate. An interview time and location was set and a secondary phone call closer to the interview date to confirm details and ask if they had any further questions was made. The participants were assigned a letter to identify them in the study, which allowed confidentiality in the research.

Under Lincoln University regulations it is stated that “activities ordinarily exempted from review include research projects involving interviews with and/or observations of public figures or professional persons in the areas of their duties or competence, provided that this is in accordance with the provisions of the Privacy Act”. Clause 6.2.3(2). As this research falls under this, an application for human ethics consent was not required.

### **3.9 Data collection**

Each case study was visited once and the data was collected through a semi structured interview process. Further questions were asked through phone or email to minimise disruption to the farmer. During the visit, a face-to-face interview was done. This allowed accurate and in-depth qualitative and quantitative information to be collected. Questions were formed prior to the interviews and



were open-ended allowing a snowball effect to occur. The questions were non-leading to minimise a bias. Each interview was done on the farmer's property. The interview time and date was set to suit each individual and was predominantly done with the farmer alone or with a partner present.

The majority of the data collected was qualitative, allowing an understanding of the process and motivation behind the adoption. This was supported by quantitative data relating to physical aspects of the system. The aim of this data collection was to use it to understand the system rather than use it for statistical analysis. The information was collected by a digital recording on a laptop as well as a voice recorder. This allowed information to be re-examined. In some cases the farm visit included a farm tour, which helped understand the system as a whole.

### **3.10 Data processing and analysis**

At the conclusion of each interview, key points of the interview were transferred to a Microsoft Word Document on a personal laptop. This process created a summary of each case study allowing a comparison and contrast to be made. Due to the minimal numerical data, this was also able to be transferred in to a Microsoft Word Document. The information was sorted into fields and formed a review of that system.

### **3.11 Research method limitations**

Due to the nature of this research, the collection and analysis was needed of in-depth data. Case studies require an understanding and insight of the data. Considering the short time frame limited the number of case studies. This may have reduced the level of representation as it meant a small number of the dairy goat farms were targeted. Therefore this research is not likely to have covered all key drivers and processes involved in the adoption of a dairy goat system. It concentrated on the Dairy Goat Co-operative catchment in the Waikato. The conclusions drawn are specific to the selected farmers and generalisations to the broader populations have been avoided.

# Chapter 4

## Case study profiles

### 4.1 Introduction

This chapter provides an overview of the five case study farms. It is a summary of the interviews with the farmers including a brief description of the farm system, personal experiences and views on the adoption process. All farms are located in the Waikato region. Each farm has been allocated a letter ranging from A to E which is used throughout this report to provide anonymity.

### 4.2 Farm A

#### 4.2.1 Farm overview

Farm A is located in the Waikato. It was originally a Standardbred breeding and training facility in conjunction with beef grazers and rearing calves through to two year olds. The system is 46ha and was converted to a dairy goat system 25 years ago. The dairy goat system was outdoors for three seasons then was changed to the indoor system it is today due to animal health issues. There are 400 milking does at peak milked through a 32 a-side herringbone shed. The housing consists of one barn for the milking does and one barn for kid rearing. The system operates a cut and carry feed system fed through the does' barn on a conveyor belt and fed to the kids in the raceways between bays. Two run off blocks have been purchased since converting; 15ha purchased in 1995 and 11ha in 2009, allowing more mowing capacity and for bucks to be off the property. Farmer A had no experience with dairy goat farming prior to this conversion, their experience with farming surrounded the original outdoor system.

In addition to the cut and carry feed, does are fed pellets in the shed during each milking. They like to keep the system simple and not interfere too much with what works.

#### 4.2.2 Key drivers

**Lifestyle Change:** Farm A grew tired of the Standardbred training lifestyle and wanted a change. They took over the family Standardbred training and did not want to do it long term. They found the income inconsistent and their interests were different from that of the racing industry. Without wanting to give it up completely, they wanted to make it a smaller part of their lifestyle and income dependency. The drystock were not bringing in sufficient income at the time either.

**Self Sufficiency:** Farm A has two children, who were young at the time of the conversion, and they liked the thought of being somewhat self-sufficient in terms of milk produce. Going into the cow dairy industry wasn't plausible for their system due to land size constraints for their system so when introduced to the idea of a dairy goat system they ran with it.

**Return on investment:** When the opportunity arose to enter the dairy goat industry they liked the idea. The land owned at the time was suitable for conversion without too much change. This meant that the current infrastructure could be converted and without too much initial capital investment. The return on their investment was a large aspect of converting, with the high milk payout being a selling point. Traditionally when starting from scratch adopting a dairy goat system has high start-up costs, but they were able to limit this by using second hand equipment and converting existing infrastructure. They did not want to be "buying" their milk, through expensive production, if they are spending \$1 they want \$2 in return.

#### **4.2.3 Planning and establishment**

Farm A's interest in dairy goats didn't begin until the opportunity to buy some goats was presented. As they were looking for a change of lifestyle and income it was a plausible option. The initial plan was to buy a small number of goats to be self sufficient and eliminate the need for buying milk but this opportunity arose and they took it. However, there were 220 kids available, sourced from Taranaki, and 30 cull goats from Te Awamutu in order to teach the kids to load into the milking shed. In the second season 30 more goats were purchased from Waikato to improve the genetics in the herd.

At the time there was little information available. The Dairy Goat Co-operative was in its early stages, there were no shares available to buy and it was a very small operation with one office in Hamilton. Farm A got in contact with them to start the process. New entrants had to be interviewed and then accepted to be a supplier of the DGC by meeting criteria such as location to ensure milk could be easily collected. Once accepted Farm A had to pay \$10,000 to the DGC to start up which was going into research and expansion. This was taken as \$2,000 for the next five years of supplying them to ease financial burden. This was the equivalent of buying shares at this point. Now the DGC has a strong relationship with BNZ bank and realises the value of a share and allows farmers to borrow against them. Although the dairy goat industry in New Zealand is still developing, there are New Zealand based innovations being implemented globally.

Most information came from trial and error and discussion with established goat systems. Having the support of other goat farmers was vital both in respect to animal husbandry and setting up the dairy goat system. Local farmers were happy to discuss options for the milking shed and share their knowledge. The banks were ill informed and often unsupportive of the venture. This has changed greatly. The DGC supplied as much information as possible but in its early stages this was very limited. Fielddays run by the DGC allowed the sharing of information.

As they had not run sheep on the property they were advised by the DGC that the goats would thrive outdoors for up to five seasons due to the lack of potential internal parasites. However, after their third season the effects of parasites was evident. They tried natural drenching alternatives but had little success. This led them to early drying off the herd before February each year in order to drench and prepare them for breeding. So they made the decision to move indoors.

The unused dairy cow shed on farm was converted to a initially a 14 a-side herringbone, which has since expanded to a 32 a-side herringbone dairy goat shed, which was slowly improved as cash flow allowed it. They expanded the shed as they increased their numbers. The original doe shed was bought second hand and erected on farm. The kidding shed was built later as cash flow allowed it. Over the first year the farm was re-fenced and a central race put in to make getting the goats to each milking easier. Three years later the housing barns were put in place in preparation to move inside.

When asked what they would have done differently if they were to do it again, they highlighted the need for good genetics. Their goats were predominantly of poor genetics and genetic gain was very slow as well as low production for the first few seasons. They would go indoor straight away instead of being outdoors for three seasons to maximise their production and keep on top of animal health. They also said that if they had the knowledge they had now they would go big from the beginning, both in terms of number of does and sheds knowing that their future returns would allow this. This is one thing they have noticed that has changed. When they converted their system it was common to do things slowly as the cash flow allowed whereas now it is more common to borrow large amounts of money to begin with. There is a large amount of capital needed for the initial set up of infrastructure.

#### **4.2.4 Benefits**

**Self Sufficiency:** They have achieved their goal of eliminating the need for buying milk. Although a small benefit in the scheme of things, it was one of their goals from the beginning.

**Labour:** The size of their current system allows Farm A to run the system predominantly in the family. They do the day-to-day running of the farm themselves with help from their children. They employ one milker who milks twice a day during the season.

**Future opportunities:** They got into the industry while it was in the early stages of diffusion. They saw the potential in it and wanted to continue to expand their system after their adoption. As the industry continued to develop, it allowed them to purchase two run off blocks and expand their milking numbers from 220 to 400 milking does. The high returns allowed them to borrow money from the banks knowing they would be able to pay it back.

**Lifestyle:** The system they are running is flexible. They bring minimum amount of labour in so their costs in that respect are low. They dry off late February- early March and go on their annual holiday. This is really important for their enjoyment and well-being.

**Consistent payout:** They give a lot of credit to the DGC for providing a consistent market and a consistent milk payout price. They have a good relationship with their suppliers. They like the loyalty of the DGC. Instead of accepting new farms into the catchment and selling shares when they want to raise the milk supply the company go to their current suppliers and offer the shares. This is a large selling point for Farm A supplying the DGC. It means the market is not flooded and they feel like they are being rewarded and are a valued part of the co-operative.

#### 4.2.5 Limitations

**Capped shares:** The current cap on shares by the DGC means that their production is also capped. The DGC will only take that amount of milk and any excess produced is not paid for. There can be no more shares purchased until the market increases. It is unknown when this will be.

**Public Perception:** As they were early adopters, peers thought negatively about the system change. Going against the grain, they were met with opposing views and sceptical opinions by more traditional farms. There was a lack of knowledge that restricted them in terms of bank relationships and product knowledge. Agronomists are beginning to learn about the industry and offer more advice as the industry progresses.

**Animal health:** An outdoor systems was hard to maintain during the three seasons outdoors, Farm A put a lot of time into drenching. At the time there was a withholding period of up to 35 days for drenches, which impacted their production.

**Breeding:** They highlighted that the genetics in their herd really limited them to begin with. Their production took longer to increase than what they expected due to the poor breeding lines they had on farm.

**Feeding:** It has taken time to capture what works on the system. The goats are relatively fussy eaters and initially it took over three mows to realise the goats were not eating due to too much dirt being picked up. Due to this farm A keeps the cultivated pasture and horse grazing very separate. There is no cross contamination. After effluent has been spread it will take 1-2 toppings for the grass to become palatable to the goats.

**Property constraints:** Initially the size of the property limited them. As the whole farm is not used for the cultivated pasture, the amount of grass they can grow on their property limits the number of goats they can milk. They view their location as a limitation as it is hard to purchase land in the area. It is expensive and highly sought after. However, they were able to purchase the two run off blocks which allowed them to expand from their original 220 goats to the 400 they milk today.

**Lack of communication:** After purchasing their second run off block and aiming to again increase their number of milking does and production, they went to a DGC AGM and were then told that they were not increasing their take of milk from then on, putting a cap on it due to the market not expanding. This meant that Farm A had purchased land but was not able to increase production. This created financial hardship for nearly three years.

#### **4.2.6 Future plans**

If land were to become available they would look into purchasing it but are not actively looking. They are capped on production so there is currently no need for expansion. They believe it will be a few years before the cap is lifted and the DGC will open up their catchment for new farms to enter but they believe that there will still be opportunities for limited growth for their current suppliers. They are happy with their current system and their current lifestyle. Their future plans will depend on their children and their interest in the farm. They have an interest in the industry and want to continue with their involvement. They see public perception as a large barrier for the goat industry in New Zealand, as New Zealand's reserved approach to farming and their traditional attitude may slow the rate of adoption. They do see the possibility of new processors into the industry, but as the DGC have secured markets they don't see this as a threat to them.

## 4.3 Farm B

### 4.3.1 Farm overview

Farm B is located in the Waikato. The farm was a dairy farm bought 11 years ago in 2006 with the intention to convert to a dairy goat system. The 76ha block was converted as soon as it was purchased and a six ha adjacent block is leased. The current system consists of two sheds, a 40 a-side herringbone rapid exit and 46 a-side rapid exit herringbone, milking 1400 does at peak. There are three housing barns for the milking does and one kid-rearing shed. Farm B owned and ran a 1,200ha sheep and beef property in South Waikato before purchasing this property but had no prior experience in the dairy goat industry.

### 4.3.2 Key drivers

**Return on Equity:** The sheep and beef industry was struggling and income was inconsistent. When they explored alternative options the dairy goat industry was a promising opportunity. The financial returns were very appealing and return on equity was a key driver. They saw a future in the industry and wanted to try.

**Future Opportunities:** They felt that the dairy goat industry was a good industry to enter. It had opportunities for growth in the future, which appealed to Farm B.

**Location fit:** Farm B liked the location of the farm, as there were good schools in the area for the children. The original dairy farm was bought with the intention to convert to a dairy goat system and was in an area that could supply the DGC easily.

### 4.3.3 Planning and establishment

The goats and shares in the Dairy Goat Co-operative were purchased before the property was finalised, the property was taken over on June 1<sup>st</sup> 2006 and construction on the sheds commenced immediately. There were pressures to begin with as the new farm was also purchased before their previous sheep and beef property was sold. They were looking for a property for a while, waiting for a property suitable to convert to a dairy goat system. They originally purchased 400 goats and increased from there. They purchased outdoor goats originally but over the next four years bought out four farms and amalgamated their goats into one herd.

Their largest source of information was other farmers. They were so helpful and allowed them to come on farm to view their systems. There are discussion groups in place to share information. A key thing is that they aren't competing against each other, they are shareholders to the same company with the goal to supply a quality product to the DGC.

When exploring options surrounding the types of milking shed to put in place, they thought a rotary was too expensive. They looked around at surrounding sheds and talked to farmers about what worked. There was a herringbone cow shed on, so it was decided to convert that to a rapid exit dairy goat shed.

Their original goal was to milk 900 goats and reach 100 kg/ms/ goat. They are now milking 1400 goats and consistently reaching 125 kg/ms/ goat so have exceeded their own expectations.

As they have expanded and built more housing sheds, they have refined their designs and are very happy with their recent build. The feeding platform is higher which decreases the time the goats spend on their knees. They are wanting to change all their housing barns to this design.

When asked what they would do differently if they were to do it again they would start big. With their knowledge they would build all of their sheds with their final design they have come to now. They would put lights in the shed which has help them regulate the hours of light all year round. This was really beneficial when they were continuously milking

#### **4.3.4 Benefits**

**Return on equity:** The financial gain has exceeded their expectations. They adopted a dairy goat system because the sheep and beef industry was going backwards but it has worked out better financially than originally expected and it gives you more choices.

**Lifestyle:** With their scale and number of staff, they have created a system that allows them to have time off farm after kidding. They have weekends off which has been important while the children have been growing up. They also enjoy the animals, which makes their job fun.

**Market transparency:** Farm B appreciates the transparency of the DGC. They took an overseas trip to see where the products were going and learn more about the Chinese market. The relationships formed between the suppliers and the DGC are a large benefit for the industry. There is good



communication within the company and between suppliers. Farm B likes that if they have an issue they can approach the company and voice their concerns.

**Consistent payout:** Since one of the main reasons for their change in system was the downturn of sheep and beef, the consistent payout is a large selling point. The relationship between suppliers and the DGC forms loyalty.

#### 4.3.5 Limitations

**Labour:** It is hard to find staff who have experience with goat farming. Farm B utilises overseas labour but changing immigration laws are making it increasingly difficult to hire skilled labour. It is important for Farm B to retain their staff, which is becoming more difficult with these new laws coming into play. They currently have five staff on hand.

**Capped market:** Farm B wants to expand. They are a large supplier with the drive to supply more so are waiting for the market to grow.

**Resource consent:** The indoor system consists of large barns. Getting resource consent especially in such a tight timeframe was difficult. The regulations are becoming stricter so it is getting harder to get these resource consents.

**Breeding:** As they bought in goats of four farms and amalgamated them into one herd it brought with it a lot of disease. CAE, Johnes and cheesy gland were a big issue. Genetic gain was slow and production suffered.

**Lack of research:** There is not a lot of industry-based research. CAE is a widespread disease in the goat industry which all farmers are working towards eliminating although there is a lack of understanding surrounding the disease. There are best practice protocols surrounding CAE that try to contain it and this combined with blood testing and culling appear to be effective. They keep their CAE herd completely separated to minimise any contamination.

**Cost:** Farm B highlights that there are substantial start-up costs involved which could be a barrier to the adoption of dairy goat systems. The investment in infrastructure is a big aspect to consider.

### **4.3.6 Future plans**

They are very keen to expand. The only thing stopping them is the cap on the market. They are excited by the industry and want to continue to grow with it. They currently have 168,000 kg/ms shares on their current system and want to increase this to 200,000 kg/ms shares. They are in the process of purchasing a neighbouring farm and will convert this to a dairy goat system also with the aim to have shares for 150,000 kg/ms on that farm. They are working towards being CAE free but this is not a primary goal, they are doing this by blood testing and culling. They are currently at around 30% CAE. The kids used to be 12% CAE but they have lowered this down to 2%.

Their desire for growth stems from succession. There are four children in the family and they want to leave a successful business to the family. They love their farming but their current growth is not necessarily for them but more for securing a future after succession occurs.

## **4.4 Farm C**

### **4.4.1 Farm overview**

Farm C is located in the Waikato, it was originally two dairy farms, 40ha and 60ha, and have been in the family for generations. There was one old cow shed on the 40ha block. The plan was to always have one farm supporting the goat system and one farm stays as a dairy cow system as Farm C enjoys being involved with dairy cows. The current system has 800 milking does and 230 cows on the combined 100 ha. The dairy system is a conventional pasture based system. The goats eat less dry matter than the cows and the two systems complement each other with the cows being fed what is not eaten by the goats. The goat system is a silage-based system, which leads to less water in the feed and has been seen to create less wastage. The grass is cut and bailed by contractors. The remaining silage is scraped out and fed out to the cows on a feed pad. 2017 is the fifth season of the two systems running together and they have been running the goats on the silage based system since mid-December 2016. Since the conversion Farm C has built a four bay housing barn, three are for the milking does and one is dedicated to kid rearing. They built a 40 a-side rapid exit goat milking shed. There is a manager each on the cow farm and the goat farm to oversee the day-to-day running. There is one feed out load of silage in the morning and that sustains them for a day. Farm C had no experience with dairy goats prior to this adoption although they had extensive experience with dairy cow systems and had run a contracting business on the side

#### 4.4.2 Key drivers

**Restraints on expanding original system:** Due to highly sought after land in the area and the high price of land, it is difficult to expand. When exploring the option of a dairy goat system it allowed intensification on the current land size. It was seen as an alternative option to having to purchase land elsewhere. They found that 100 ha now is a reasonable size but they wanted to future proof their farm and maximise production on farm.

**Diversify income:** Farm C highlighted diversifying income as their largest driver. They liked the consistency that surrounds supplying the DGC. As the market is secured and shares are capped to avoid flooding the market, the milk payout for dairy goat milk has less fluctuation throughout the season. They found that their reliance on Fonterra was just not consistent enough to settle for it. Personal preference meant that Farm C still wanted to continue some involvement with the cow industry so a split system was an option. By diversifying their income, their exposure to risk was lowered in regards to the fluctuating cow milk price but allows the possibility of expansion either way if circumstances allow

**Environmental restraints:** With the original system there were effluent issues arising surrounding the feedpad. Farmer C costed putting one big rotary in the middle of the two farms to service both farms. It was extremely expensive and Farm C deemed it an unviable option. This led to Farm C exploring the option of an alternative farm system.

**Return on equity:** When discussing the financial gain possible within the dairy goat industry with the bank manager as well as with established goat farmers, it was the financial gain that stands out. The high payout and its consistency when compared to the land size needed yields a high return. Overall they wanted to make the most amount of money they could on a small block of land.

#### 4.4.3 Planning and establishment

The idea came about when Farm C was contracting on a dairy goat farm, they were discussing the system and Farm C was interested to see if it was a viable option. After discussions with the bank manager farm C started the planning. The original goal was to continue to run the cows on the 100 ha and bring in all grass from off farm to feed the goats. When looking further into this Farm C decided this was a better option. They set the goal of trying the goat system for three years to build capital then return to cow farming but five seasons later the goat system is running well.

The original herd of goats was bought off the Dairy Goat Co-operative and consisted of excess kids reared by other suppliers. It was an amalgamation of six farms genetics being sold on. Bucks with good genetics were brought in to try and increase the size of the kids and speed up genetic gain.

As soon as the decision was made to convert to the split system, it progresses very quickly. They visited surrounding farms to look at styles of housing barns and milking shed styles, milking in the shed themselves to get a feel for it. The rapid exit shed that they decided on allowed less labour units during milking and was a simpler option than a rotary. The housing barn built was inspired by neighbouring farms, when viewed they decided it was a fit for their system and a reasonable price.

The DGC has information available but Farm C found the information to be very broad especially in regards to financial figures. Most of the information was sourced from established dairy goat farmers. They were very willing to help and wanted to share their knowledge. When Farm C first converted their system there were two goat farms nearby but this has grown to more than eight in the last five years. They have formed a discussion group, which meets monthly to talk about their systems. There have been good relationships formed and Farm C feels like it is a place where you can share truthful information or problems. It provides support as well as knowledge and information. Finally, they would view different farms with varying systems and create a solution that would work for them. A lot of trial and error goes into the adoption of these systems.

When asked what they would do differently if they were to do a conversion again, they said they would do things bigger and faster. They would set the farm up for a larger herd and wait for goat DGC to increase quota rather than what they have done now which is waiting for them to increase the quota before expanding.

#### **4.4.4 Benefits**

**Low wastage:** As the cows eat the excess of silage fed to the goats, it means there is limited wastage. A lot of dairy goat systems have a large mound of waste grass, which is scraped out of the barns daily but Farm C has eliminated this. It has led to less wastage with the cows as well as when the goats were being fed cut grass and grain the cows left more behind. Now that they are being fed grass that has had a period of drying there is less left behind. This has led to less composting in the paddock and less dead patches of pasture. This combined with being fed on the feed pad has allowed them to increase their cow stocking rate slightly.

**Complimentary systems:** Farm C highlighted how well the two systems work together. There is less wasted feed and less environmental impacts than if they were to be running only cows on the 100 ha, but they also mentioned that having the two stock classes on farm has kept the paddocks tidy. This is a small but important aspect to them as they run a contracting business on the side and a tidy image is important.

**Timing:** As the adoption is relatively recent, it has meant that Farm C has come into an industry where advisers and bankers have knowledge in place. There are external sources that are able to give advice in terms of products, finances and animal husbandry. This is an important information source.

**Return on equity:** The financial returns have been what Farm C has expected with the split system allowing cash flow throughout the year. The consistency in the payout makes them want to continue to be a part of the industry together with the support from the DGC. They find the DGC to be very switched on with the way they are running their business

**Environmental impacts:** Farm C have found there to be less environmental impacts and therefore less environmental restrictions surrounding the goat system. As the goats are housed, the effluent is easily controlled and the effluent washed out of the shed has little restrictions surrounding it as it is seen as less harsh than cow effluent. The soiled shed shavings are dug out twice a year and are put on the paddock before and after the maize with no restrictions.

#### **4.4.5 Limitations**

**Genetics:** The original herd was made up of six different farms genetics, which took a while to get genetic gain and improve production. When the goats were originally purchased they were not in good condition and most were underweight. It took a while to get the goats up to speed with some not coming into milk until the second season. There was little regulation of the goats in regard to condition and health at the time, which led to some goats being underweight at the time of purchase.

**Labour:** Due to the dairy goat industry being a developing industry in New Zealand, it is hard to find staff with goat knowledge. The new immigration laws are making it more difficult for Farm C to source skilled overseas labour. It is an important part of the system to have skilled staff and this is a large limitation.

**Capped market:** Currently the system is on hold in terms of expansion. Farm C have reached their cap on production so cannot increase their number of milking does but there is not enough land to increase the cow size either. Farm C is waiting for the market to increase to evaluate their next options.

#### **4.4.6 Future Plans**

Farm C has purchased a neighbouring dairy cow farm and when the shares increase they will convert that to goat farming system. They have plans to build another barn when the co-operative increase the shares, allowing the current system to produce more milk solid, increase the number of kids reared and house bucks. This will leave the current barn for the milking herd. The financial gains involved continue to interest Farm C.

They will always keep milking cows, this is not a financial decision but a personal decision. They enjoy milking cows and the lifestyle that it brings which has impacted their decision making process to date.

### **4.5 Farm D**

#### **4.5.1 Farm overview**

Farm D is located in the Waikato. The original system was part of a functioning dairy farm, which was split off with the intention to sell it off. There was no existing infrastructure on the 32ha flat block of land when it was taken over. Farm D is in an equity partnership with the dairy farmer, which the land was purchased off, with the aim to gain complete ownership in the near future. It was bought in 2014 but this is the second season of milking. Farm D has a vast farming experience, which includes working on systems with housed cow farms and has converted systems to goat farms overseas. Farm D has a formal education behind them, which they completed overseas. The current system runs 600 milking does through a 44 a-side herringbone. It is a cut-and-carry grass based system. The excess grass not eaten is scraped out and fed to the neighbouring dairy farm to reduce waste on farm. This is Farm D's second goat farm conversion. They are currently less than 1% CAE but have to maintain this for three years before being labelled CAE free.

#### **4.5.2 Key drivers**

**Good return on land:** As a young family, the idea of being able to get a small block of land and make a high return was a major factor. They were not in a financial position to be purchasing a large

farming system. The opportunity was there for the taking whereas other alternatives had larger barriers to cross.

**Goal of ownership:** A large part of this adoption was the intention to own the land. This is not yet a reality but they are continuously working towards their goal and it is still a key driver behind their work. This is their major goal.

**Lifestyle:** Farm D has young children and the on-farm lifestyle was an attractive lifestyle option, as it would allow them to spend time as a family.

**Location:** Goat farms need to be in the catchment area to supply the DGC, but beyond this Farm D highlighted that you are more likely to buy next to other goat farms instinctively. If there are no goat farms in the area you are less likely to inquire about adopting a system.

### **4.5.3 Planning and establishment**

A lot of planning went into this adoption. Farm D visited various local goat farms and read literature from the European goat industry. They wanted to make informed decisions and implement processes that had been proven to work. The DGC was there to provide it, if help needed but they drew more from established farms in the area. Their experience in intensive housed cow systems has proven to be a large benefit in this adoption as their knowledge is extremely useful. It allowed them to quickly see what would suit the system or what didn't quite work. Although they drew from other farms, the final design was an adaptation, which took several aspects from various farms to form a design suited to this system. They managed an outdoor dairy goat system three years ago and the issues surrounding animal health, specifically the worm problem, made the decision to create an indoor system easy. They liked the idea of an outdoor system but it wasn't feasible.

There was a large amount of earthworks done to make the block suitable, contouring the land to maximise drainage. The section was re-grassed during this period. They experimented with tetraploid grass types but found it wasn't suitable for the system, as it did not last. They are in a local discussion group, which they said is so important for the sharing of knowledge as well as support. Farm D highlighted that one big problem the New Zealand goat industry has, is that there is a gap in research and data. The discussion groups help bridge this gap by portraying real-time information about what is currently happening on their system. Farm D has access to literature overseas from Europe and uses this a lot in their learning.

All goats were sourced as kids and reared on farm. This meant that the beginning of the adoption was dedicated to this. They were purchased off farmers who had excess kids as well as a portion being custom reared. They have been growing the herd to establish numbers but have now changed to the next stage of selecting good does and more severe culling, where the goats are culled based more on animal health traits than production. They have always brought good bucks in based on genetics to give a good base to the herd. Kids were sourced from low risk CAE farms as an initial goal was to minimise CAE on farm in preparation for eliminating it in the future.

Farm D is based on efficiency rather than technology. This is reflected in many aspects of the farm. Farm D relies on more reliable and tested machinery rather than the latest innovation as there is less to go wrong. This is especially evident in the 44 a-side herringbone shed, which has a basic but functional design. Fixing technology is not an expense they want.

They highlighted the need for an understanding of the business. Farm D said you won't start benefiting from the business until you understand it. A part of establishment was to create a system that had a high return on equity. The cost to income ratio was always considered. It was all about the conversion of grass to milk. Feed and labour were the big expenses so it was important to have these under control. High production is important but only if the cost of producing it is low.

When asked what they would do differently if they were to do it again, there isn't much that jumps out. A lot of preparation and research went into this adoption and as it is recent there is a lot of support available. One point they made was that they would have used more concrete on the property as it is useful and tidy having more hard surfaces to utilise. They would have been more brave and looked into starting bigger. Their financial status at the time didn't allow it but looking back with that they know now, they would have liked to have planned for the future with a larger system.

#### **4.5.4 Benefits**

**Environmental impacts:** They have found the system to be a lot more controllable in terms of environmental impacts. They can control the restrictions as well as having control over inputs and outputs.

**Return on equity:** The return on equity is allowing them to pursue their goal of farm ownership. It was a key driver and is a large benefit. It makes putting the work into the system worthwhile



**Labour units:** The current system has one full time labour unit. This allows Farm D to have time off and spend time with their family.

**Capped Market:** Although the cap on production limits the opportunity for growth, Farm D is very realistic about this and sees that the pros outweigh the cons. They are able to be doing what they are doing because of this cap and it is the best thing that could happen to the suppliers.

**Marketing by DGC:** Farm D highlights that the most important part of selling an agricultural product is the marketing. Farmers are not geared to do this and the DGC has done it well. Securing overseas markets and marketing the infant formula the way they have, allows the farmers to be as successful as they are.

#### 4.5.5 Limitations

**Soil type:** It was known when the property was taken over that the soil type was not ideal for the conversion. The decision was made that this could be remedied and intensive earthworks were done to make the property mowable. The area is a river flat, so despite the preparation done there are still times where mowing isn't possible

**Building:** Timing is an important part of the adoption process. The building of the infrastructure was behind time, which in turn pushed everything back.

**Labour:** A large limitation is the difficulty in sourcing skilled labour. The goat industry is not a big industry but is growing quickly. This means there is limited experienced labour out there but there is a high demand. The staff need to have good animal sense but also have experience with machinery, it is hard to find both of these attributes. The dairy goat industry requires a wide skill set, which you are more likely to need to teach to staff. This is also a very time consuming task but worth it in the end.

**Disease:** They have been actively trying to eliminate CAE from the system since the beginning of the adoption. Early on when they were testing, they got the results back and made a decision to cull all positives. This was difficult as the farm was still establishing itself. They dropped their numbers as well as losing approximately \$700 per doe culled. It has been worthwhile in the long run but this was a limitation at the time. The gap in knowledge about CAE is hindering its control. Farm D is running off European knowledge where instant culling is enforced for positive tests.

**Barriers to entry:** Farm D highlighted that the highest barrier of entry to get into the dairy goat industry today is the start up cost. If you were to disregard the cap on the market, the cost involved in infrastructure and the purchasing of shares has made the industry harder to get into.

#### **4.5.6 Future plans**

When the quota extends Farm D will look into growth, but at present they are content with the current system. To an extent, growth would be viable but may lead to having to relocate or rebuild. It is efficient to expand the system up to a point but after that it would begin to cost money to produce the milk. They realise that they are young and growth will always be there. They believe in the industry and want to continue to be involved. As stated, a large goal is to have 100% ownership; they are currently involved in an equity partnership. Overall they want to maintain high returns and continue to run a successful system.

### **4.6 Farm E**

#### **4.6.1 Farm overview**

The original system was a dairy system purchased by the farmer, they did one season of milking a limited number of cows on the farm before it was converted to dairy goat system. They converted the original cow milking shed to the dairy goat milking shed with few alterations needed. The farm was converted 19 years ago into the outdoor dairy goat system it is today. The paddocks are predominantly unchanged with the exception of better fencing and gates. The farm is 38ha made up of 24 paddocks. They are milking 500 milking does at peak through a 40 a-side quick release herringbone, which they find is a good one man unit. The outdoors system is pasture based with grain fed outdoors. The supplement feed is fed out in feed out boxes in the paddock to try and minimise wastage. The poorly draining soil types on farm have impacted them a lot. They have one kid-rearing shed where kids are reared indoors for 2-3 months before going outdoors. Farm E's farming experience comes from milking cows prior to this adoption.

#### **4.6.2 Key drivers**

**Change of lifestyle:** When considering the adoption, their age became a large factor. They had to make the decision whether to continue to sharemilking and moving around or find an alternative option, which allowed them to stay in one place, which would also benefit their children. The dairy

goat system was appealing as it allowed them to do this although not a quieter lifestyle it was more secure.

**Farm ownership:** A goal for Farm E was to gain farm ownership. Originally they were wanting to milk cows but this was a more viable option in terms of land size and returns. They were able to purchase a small block of land and obtain high returns.

**Return on equity:** Allowed them to buy a small block of land and have high returns.

**Succession:** They wanted to have a successful business to pass on to the family. They wanted to build a profitable farming system, which would allow them to support their children and in the future be passed on to them.

**Similarity to cow farming:** They chose the outdoor system as they like the pasture based system. The goats feed themselves and they enjoy the lifestyle that comes with it. It allows them to have downtime and they find it more pleasant.

### **4.6.3 Planning and establishment**

Their experience stems from dairy cow farming. They were born on farms and milked cows for 9 years before purchasing this system. This experience has helped them when the adoption was taking place, they converted the existing cow shed, put in new fencing and gates but not too many alterations were done. The current system has not changed drastically from the original system.

At the time of the adoption, The DGC was not classed as an efficient source of information. Their main source of advice was surrounding goat farms. There are a limited number of outdoor dairy goat systems in New Zealand but information sharing between them is so beneficial. The outdoor system revolves around the ruminant diet; over the years trial and error has led to the current system. They have quickly learnt what works and the consequences of when it doesn't. The goats are very responsive to change. The pasture management has come from personal experience and again trial and error.

Farm E originally reared the kids in the original herd. The kids were sourced from local farmers with excess kids. These were of low genetics, which caused production to be low to begin with. An unexpected challenge to this was behaviour issues, the inquisitive nature of the animals can lead to a headache for the farmer.

When deciding on the style of their shed they wanted a simple unit, which could be run with limited labour. The 40 a-side quick release herringbone that they have in place allows one person to do the majority of the milking with one in the yards.

When asked what they would do differently if they were to do it again they would look at getting better goats genetically to begin with. They originally got free excess stock instead of paying up to \$50 per animal for the more superior animal. They also would get their goats from CAE free farms and work towards limiting CAE on farm from an earlier stage. They would have purchased land on a better soil type. It has been a large limitation on their adoption.

#### **4.6.4 Benefits**

**Farmers nearby:** This has been a great source of information.

**Animals feed themselves:** They have found it to be less labour intensive in terms of feeding when compared to the indoor system. The self-sufficiency of the grazing goat has been really beneficial

**Less start-up costs:** Getting into the dairy goat industry often has the barrier of large start up costs. This system has had little done to it to change it. The only large alteration was the conversion of the milking shed to suit a goat system.

**Lifestyle:** It has meant they were able to spend time with their children and take them on holiday. Their children have been have a huge part of their life and this was a big selling point for converting to an outdoor goat system.

**Labour:** The size of the system means it is run by the family. They are able to keep labour costs down which is important when trying to keep the cost to income ratio balanced.

**Financial gain:** The financial return has exceeded their expectations. The consistency in payout has been a nice change from the dairy cow industry.

#### **4.6.5 Limitations**

**Soil type:** The soil is not free draining; it has been a large limitation for the system as it gets very wet in winter. They have contoured the land in the worst places to ease some of this but it continues to

be an issue during the wet months. There are springs in the area and flat paddocks become waterlogged.

**Animal health:** They are constantly having to think about the future, they believe there will be a parasite that takes them down and forces them indoors, it is not about if but when. They need to be prepared for this.

**Genetics:** Due to the animal health issues associated with outdoor systems, they have to be more selective on their genetics to move forward with their herd. The culling system is very strict and animals suffering from parasites are not kept on and neither are their kids. As they purchased excess stock from local farms, their original genetics were poor and genetic gain was slow. It took several seasons for production to increase. There was a lot of competition for goats at the time so it was often a take what you can get process.

**Lowered production:** An outdoor system is producing less kg of milk solids when compared to the indoor systems. They still have feed costs of bringing in supplements so the overall profit tends to be less. Their highest peak production was 85 kg ms/goat in a lactation compared to Farm B which was consistently doing 120kg ms/goat.

**Lack of knowledge of others:** This was a large limitation with the adoption. The local banks had no knowledge of the industry and refused to work with goat farms. They had to leave their bank at the time as they weren't considered to be in the banks brief so they could not offer their services. Banks were not prepared to lend money as they were unaware of the returns. This has changed greatly, now DGC has a good relationship with BNZ and banks have more awareness of the industry.

**Land size:** They have reached their maximum number of goats and maximum production for their current system. They are eager to expand but the opportunity hasn't arisen and the capped market, which is only growing at 10% per year, would limit expansion. They would like increased communication from the DGC in terms of where the market is at and to know an approximate time that expansion for farmers could happen.

**Weather:** There is no control on the impact of weather. The weather has a direct correlation with the production, during wet periods the production will drop when farming outdoors.

**Innovation:** Since the majority of the information available both in New Zealand and overseas comes from innovations suited to an indoor system, Farm E has to adapt this information to suit his system. A lot of information is irrelevant or not viable for his system.

**Succession issues:** One gap in the industry that was brought up, was about the alternatives to succession. If a farmer doesn't have family coming through who want to get into farming, the alternative is to sell. There aren't many opportunities surrounding 50/50 sharemilking,, or the likes of, to allow farmers to enter the industry this way. They highlighted the future opportunities surrounding this. To purchase an established goat farm is an expensive task and this would allow a pathway into the industry.

**Public perception:** They have encountered negative views throughout their time as dairy goat farmers. Other industries have looked down their nose at them and openly said it is less of an industry. This has hindered labour units coming from other industries to be trained on a goat dairy system. Until this changes, it will continue to be a limitation to the uptake of dairy goat farming.

#### **4.6.6 Future plans**

Farm E want to grow. If land becomes available around the farm they are willing to spend money on it to secure it. They want to buy more land and expand their system. They have been trying to buy land for two years now but have had no success. The goal would to be secure a neighbouring farm and convert the dairy shed to goats which would allow them to run it as a separate goat farm. The expansion would not be for the financial gain but more because it is a sensible thing to do, when the opportunity arises it would be a waste to not utilise it. They are content with their current system and don't feel the need for any drastic changes. Succession is on the cards but the family is not taking much of an interest in the business at this time, so this is an unknown factor.

## Chapter 5

### Cross case analysis and discussion

This chapter is a comparison and contrast of the results from the five case studies. This includes the key drivers behind the adoption, planning and establishment and key limitations and benefits. The findings are analysed to identify any key differences.

#### 5.1 Summary of case studies

##### 5.1.1 Farm systems

The dairy goat systems in New Zealand are predominantly indoor systems but there are outdoor systems operating successfully such as Farm E. The farming systems covered in this research include an outdoor system (Farm E), grass based cut and carry (Farm A,B and D) , silage based cut and carry and a hybrid farm system running two systems together (Farm C). The outdoor system is based around the traditional grazing animal system with some supplementation and concentrates offered, whereas indoor systems are characterized by harvesting forage and crops then transporting them to feed the goats indoors. Indoor farms had about 66% of the total farm area dedicated to the goats with an average of 34% of the farm being dedicated to other activities such as forestry or another stock class (Solis-Ramirez *et al.*, 2011)

There is little to no literature surrounding dairy goat systems in developed countries. The overseas goat market is dominated by the goat hair and goat cheese market whereas the New Zealand market, on which this research is based, centres its production on powdered infant formula which is exported.

##### 5.1.2 Comparison of case studies

As each system was so varied, there was a variance in both the size of the platform as well as number of milking does. All farms were located in the Waikato and all were suppliers to the DGC. The most recent adoption was Farm D which is in its 3<sup>rd</sup> milking season. The earliest adopter was Farm A which is now in its 25<sup>th</sup> season. When comparing this to a study done by Solis-Ramirez *et al.*, who surveyed 13 dairy goat systems in the Waikato, the average herd size of his study was 648 with a minimum herd size of 383 and a maximum of 1075. The DGC has 73 farmer shareholders with an average herd

size of 730 goats and an average farm size of 60ha (K. Arnold, Personal communication, October 16, 2017). The average for this study is 740 although a wide variance exists (see Table 5.1).

**Table 5.1 Comparison of case studies**

<b>Farm</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
<b>Location</b>	<b>Waikato</b>	<b>Waikato</b>	<b>Waikato</b>	<b>Waikato</b>	<b>Waikato</b>
<b>Size</b>	<b>46ha</b>	<b>82ha</b>	<b>40ha</b>	<b>32ha</b>	<b>38ha</b>
<b>Number of milking does</b>	<b>400</b>	<b>1400</b>	<b>800</b>	<b>600</b>	<b>500</b>
<b>Seasons since adoption</b>	<b>25</b>	<b>11</b>	<b>5</b>	<b>3</b>	<b>19</b>
<b>Farm System type</b>	<b>Indoor</b>	<b>Indoor</b>	<b>Indoor</b>	<b>Indoor</b>	<b>Outdoor</b>

## **5.2 Key drivers of dairy goat system adoption**

The key drivers identified by each case study varied. It often depended on the previous system the farmer was running as well as personal attributes. The main key drivers that led to the adoption of the goat milking system are outlined in this section:

The largest key driver identified across the case studies was the potential financial gain involved in changing industry. The high payout as well as its consistency were points that all five case studies identified as key drivers. This combined with the smaller amount of land needed to set up a reasonably sized unit, results in successful systems having a high return on their investment. All five case studies discussed the financial benefits with established dairy goat systems as well as bank managers' in order to evaluate the viability of the adoption.

Lifestyle change was another common theme among the case studies. Farm A wanted to move away from their involvement in their original industry and Farm B found that their involvement in the sheep and beef industry was no longer profitable. Although they wanted to change their lifestyle, this still ties in to chasing the financial gains. Farm E had to consider their age and stage of life, they wanted a situation where they could get into a farming system that didn't require participants to move around, they wanted to move away from sharemilking and build a successful system for their family.

Farm A and C wanted to future proof their farm. They were doing this by diversifying their income. Farm C was no longer comfortable relying on the fluctuating dairy cow payout and inconsistent income. Farm A also wasn't earning enough to sustain the property with the Standardbred racing option. Neither farm wanted to fully move away from these industries so this was an option to incorporate a new income stream into their system. The flexibility surrounding the adoption as well as the relatively small amount of land needed were large key points behind entering the industry.



As land prices rise, it is getting increasingly hard to become a farm owner. For Farm D and E, this was a key goal when exploring the dairy goat industry. The smaller block of land needed to enter the industry made the goal of farm ownership achievable. Although Farm E is still working towards it, they stated that it would not be financially possible for their young family to have purchased larger land in another industry.

### **5.3 Planning and establishment**

Research and planning were identified as the base of planning and establishment. The sourcing of information was vital for the successful adoption of all the dairy goat systems. All five case studies identified information from established dairy goat systems as their number one source of information. Visiting existing operations before making decisions in both the planning and establishing phases was important. They would either adopt what was seen on other farms or take aspects of that system and apply it to theirs while altering it suit their specific system. Farm D has overseas experience as well as being able to speak a second language and access the limited overseas literature. Farm D's approach came across as well researched. Discussion groups, consisting of local dairy goat farmers, were an integral part of knowledge sharing and are an important part of the continued support and development of their systems today.

The DGC was of variable use to the farmers, depending on the time of adoption as it has developed over recent times. They were there to provide support for the farmers. As the industry has grown, the DGC seems to have become a larger source of information.

Murphy (2014) identified access to information as a key factor in the decision making process. There are gaps in information identified by these case studies, with a lack of relevant literature available it could be having a negative impact on the adoption of dairy goat farming in New Zealand.

All case studies stated that if they were to start over with what they now know, they would increase their scale of their operation from the beginning. The limit to this was capital at the time and in some cases the inability to borrow. This meant that although they might have wished to start larger, the capital was a limitation.

### **5.4 Benefits and limitations**

A number of benefits and limitations surrounding the adoption of dairy goat systems were identified in the case studies. This section shows a comparison and contrast between the main benefits and limitations highlighted for their system.

### 5.4.1 Benefits

**Financial returns:** As Farms' A, B, C and E were forced out of their original systems due to a lack of profitability; the main benefit highlighted by them was the consistent financial returns. Their return on investment exceeded expectations. Farms' A, C and D were able to implement the dairy goat system on the existing land and tap into the growing industry. The consistent payout has been a significant benefit of supplying the DGC. Farm C identified the inconsistent payout of the cow dairy industry as a key driver for their adoption, the consistent payout has been an important benefit in their diversification of their income.

**Land Ownership:** Farm D secured their land with the intention of converting to a dairy goat system. After research, they found that this adoption would be an efficient way to gain farm ownership. They are currently in an equity partnership and working towards 100% ownership. The financial returns and relatively small land area needed means that the possibility of land ownership increases. Farm E has found this to be a large benefit for their young family. With limited capital available it was a way into self-employment.

**Lifestyle:** Farms' A, B, D and E have enjoyed the lifestyle that adoption has brought. The labour units and farm system have also allowed flexibility. All five case studies are families and having time off is an important aspect.

**DGC:** Farm B and Farm D emphasised the importance of what the DGC is doing with the marketing being done and the secured markets which are creating the consistent payout to the suppliers. Farm B appreciates the transparency of the market. Farm B has been overseas to see where their supply is going. The continued support from the DGC has been a large benefit for these suppliers. The DGC were identified as key components during the establishment and this has continued on throughout the supply. The good relationship between supplier and processor has been beneficial.

### 5.4.2 Limitations

**Capped shares:** All case studies stated capped shares as a limitation for their growth but highlighted its importance. It is vital for them as suppliers that the DGC has secured markets. They understand that although this is a limitation it is also the best thing for them and their future.

**Public Perception:** Farms' A, B, C and D discussed negative perceptions they have encountered. Most of the negative views have come from other farming systems who often 'looked down their nose' at dairy goat farmers. The lack of knowledge and understanding of the system creates a large gap between the dairy goat farmers and the 'traditional' farm systems.

**Breeding:** All case studies identified poor breeding to be a limitation at the beginning of their adoption. The poor genetics that were brought in made genetic gain slow and limited production in the early stages. As capital was limited, goats were sourced from the excess of existing systems.

**Animal health:** Animal health management in the outdoor systems is testing. Farm A was an outdoor system for three seasons before being forced indoors due to intestinal worms affecting production. Farm E is an outdoor system but admitted that there will be a point where they will also be forced indoors. They say there will be a worm that they cannot beat and it will cause them to re-evaluate their system. The lack of information surrounding CAE has caused difficulties surrounding the control of it. The DGC's goal of being CAE free by 2020 will be detrimental to the herds of some as it will require the culling of infected goats. None of the case studies are CAE free yet.

**Limited labour:** Farms B, C, D and E highlighted the lack of goat specific skilled labour available. Farm A likes to keep the majority of the labour within the family and has a long-term staff member. This has meant they have not encountered this problem yet. Farm B relies heavily on overseas labour and has found that changing immigration laws has made it harder to bring in skilled labour. Farm D highlighted the lack of skilled labour, stating that labour units must be good with animals but also have a mechanical side due to the reliance of the system on machinery. It is time consuming to train staff and Farm D, who is currently training a staff member up, sees it as an investment. As the goat industry is developing in New Zealand all case studies have stated the lack of goat specific New Zealand labour.

**Property constraints:** The land in the Waikato is sought after and expensive. As the dairy goat industry has clustered in this region, the case studies identified feeling 'stuck' in their location, which will eventually limit their growth. The surrounding land rarely comes up for sale and in Farm A's case, there is a great demand for land, which drives the prices up. Farm E stated that they will buy any adjacent land that comes up for sale as it is a necessity for their development no matter the cost. As all five case studies want to expand, the need for more land space may become an issue.

**Start-up costs:** A large barrier of entry is the start-up costs involved in the adoption. The infrastructure needed for an indoor system is more extensive than that of a traditional farming system. Although in their view the reduced land area required still a cheaper and more profitable option than other livestock systems in their view. All five case studies highlighted that if they were to re-do their system adoption, they would start with a bigger scale and increase at a faster rate. The lack of initial capital was the main limitation surrounding this.

### 5.4.3 Summary

Table 5.2 Summary of benefits and limitations highlighted by the case studies analysed

<b>Benefits</b>	<b>Limitations</b>
<ul style="list-style-type: none"> <li>• Self sufficiency</li> <li>• Low labour units</li> <li>• Future opportunities</li> <li>• Lifestyle</li> <li>• Consistent payout</li> <li>• Return on equity</li> <li>• Market transparency</li> <li>• Low wastage</li> <li>• Timing</li> <li>• Land ownership</li> <li>• Environmental impacts</li> <li>• Cluster of resources</li> </ul>	<ul style="list-style-type: none"> <li>• Capped shares</li> <li>• Public perception</li> <li>• Animal health in outdoor systems</li> <li>• Breeding</li> <li>• Feeding</li> <li>• Property constraint</li> <li>• Limited skilled labour</li> <li>• Resource content</li> <li>• Lack of research</li> <li>• Start up costs</li> <li>• Low production of outdoor system</li> <li>• Land available</li> <li>• Lack of innovation</li> <li>• External sources lack of knowledge</li> </ul>

The case study farms all identified similar outcomes from their adoptions. They covered a wide range of both limitations and benefits. Although some were specific to their system, there were some that were consistent across all of the case studies. The common benefits included lifestyle, consistent

payout, land ownership and return on equity. The limitations included large start-up costs, public perception, slow genetic gain due to poor original herd genetics, limited access to skilled labour and lack of professional help as external sources of information lacked a knowledge and understanding of the industry.

## **5.5 Adoption framework**

### **5.5.1 Innovativeness of case studies**

When looking at Rogers (1983) five categories of adopters outlined in Chapter 2, all of the case studies can be identified as early adopters. They took guidance from the innovators but had opinions and leadership. They are an important part of the diffusion process and help speed up this process. They will be the role models for later adopters. Their opinions have allowed them to adapt ideas from other systems and implement it on their farm. Their affinity to exploring new ideas also shows a degree of venturesome attributes shown by innovators.

## **5.6 Future plans for the case studies**

All five case study farmers identified a strong future for the dairy goat industry in New Zealand. All of them believe that when the overseas market grows, the New Zealand industry will grow to support it. When the cap is lifted, all of the case studies predict an increase in herd size. If the DGC were to open up the shares to the public, they all agree there will be farmers waiting to enter the industry despite the substantial start-up costs involved. They commend the DGC for their loyalty as the current suppliers will have the opportunity to increase their production before the shares are released to the public. All five case studies stated that if adjacent land were to become available they would buy it for the purpose of converting it to a dairy goat system. The farms want to continue their involvement and are excited by the future opportunities.

Farm E noted the possibility of niche markets opening in New Zealand to service consumers with fresh goats' milk for dairy alternatives. This could include cheese, yoghurts and ice creams. All five case studies see the possibility of more processors coming forward to challenge the DGC but the current limited overseas market would be a barrier to this.

Farm E brought up the limited opportunities for 50/50 sharemilking in New Zealand. They highlighted that with the high cost of entry it is an opening for those coming in. This could be possibility for the development of the industry.

Currently, there is a lot of wastage of buck kids as there is not a secure market for them and a large number of buck kids are killed on farm. This could implicate the industry in terms of public perception if this continues.

## **Chapter 6**

### **Summary and conclusions**

This chapter briefly summarises the key findings of the research. Limitations and future research surrounding study are addressed. The following conclusions have been drawn from the five case studies in this research. They do not represent all dairy goat systems in New Zealand

#### **6.1 Major findings of this study**

##### **6.1.1 Farm systems**

This research is an analysis of five case studies of farmers who have successfully adopted a dairy goat system in New Zealand. The systems include indoor system, an outdoor system and a indoor system which is run in conjunction with another stock class. In this research the outdoor system is based around the traditional grazing animal system with some supplementation and concentrates are offered, whereas indoor systems are characterized by harvesting forage and crops then transporting them to feed the goats indoors. The majority of the case studies were indoor systems.

##### **6.1.2 Key drivers of dairy goat system adoption**

Many key drivers were identified across the five case studies. They were linked to the individual circumstances of each case study as well as the physical resources available on the original systems. The main key driver identified was the financial returns involved after the adoption. All five case studies identified the high milk payout combined with the consistency of it led to the high returns that drew them to the industry. Farm ownership, return on land size, lifestyle changes and restrictions surrounding their original systems were also identified as key drivers across the case studies. These drivers were behind the decision making process of adopting a goat milking system in New Zealand. Farm A, B, C and E were pushed from their original industry due to a lack of profitability and consistent income. The dairy goat industry was an opportunity for those with limited capital as there is a smaller land size needed.

##### **6.1.3 Planning and establishment**

Research and sourcing the right information were identified as key factors in the planning and establishment phases. All five case studies stated that they viewed established systems and talked to local farmers and incorporated what they saw into their system. Both discussion and physical visits to other systems were an integral part of the planning of their systems. The case study would either

implement what they saw or alter it to suit their specific system. The support of the DGC was also identified and gaining information from them was important.

This supports the research done by Murphy (2014) which highlights that the interconnection of farmer's information sourcing characteristics influences the decision making process.

#### **6.1.4 Benefits and limitations**

Financial returns were highlighted to be the largest benefit surrounding the adoption. This included return on investment and consistent payouts leading to the opportunity of land ownership. The lifestyle suited the family nature of the case studies. The relationship with the DGC has been a beneficial part of being a supplier and has aided in the adoption process.

Capped shares have limited the growth of the suppliers but the case studies appreciate the importance of it. Key limitations also included the public perception from other farmers, the unfavourable breeding brought onto farm at the time of establishment which slowed genetic gain and production, the lack of skilled labour available as well as becoming increasingly difficult to source foreign labour units, the constraints of the property and limited opportunities to buy surrounding land plus the start-up costs limiting their initial size of adoption, particularly for the indoor dairy goat system.

#### **6.1.5 Adoption theory**

As all of the case studies had a passion for the adoption of the goat system, they were identified as early adopters. Their prior lack of knowledge in regards to adopting a goat milking system puts them in this category.

#### **6.1.6 Future plans of the case studies**

All five case studies have positive views on the future of the dairy goat industry in New Zealand. They have plans for expansion and growth, wanting to continue their involvement in the industry. They believe that when the cap is lifted on the DGC market there will be growth to fill this and match the demands of overseas markets.

### **6.2 Limitations of research**

Limitations surrounding this research include the lack of quantitative information used. The farm production and actual financial returns involved were not a focus but would have allowed a greater comparison between case studies. There was limited access to industry averages, which again made



comparisons hard. The case studies were all under the Dairy Goat Co-operative catchment. This limits the conclusions drawn, to be made about a limited proportion of the goat industry. There are suppliers of other processors that may have different systems. As the case studies are clustered in the Waikato region of New Zealand this also limits the scope of the research. Due to the specificity of the systems, general conclusions about the wider population have been avoided.

### **6.3 Future research**

This research highlights a need for more research to be carried out on dairy goat systems in New Zealand. Further research should include further investigation into what is involved in the adoption of a dairy goat system. This could involve the collection of key financial data and performance indicators in order to determine the success of the system. This would allow the benefits identified, such as change in lifestyle and financial returns, to be quantified. Production and financial data could be collected from both indoor and outdoor systems then compared. This would allow the systems to be contrasted and inform new adopters of any production advantages of each system. There is little known about animal welfare surrounding goat farming in New Zealand. The majority of research surrounding goat production is based on developing countries and developing economies. New Zealand based research would allow the implementation of more specific best practice protocols. There is room for more research surrounding the environmental impact of a dairy goat system. Currently there is little industry knowledge surrounding the inputs of both an indoor and outdoor system. With the increasing emphasis on sustainable farming, this would be an important aspect to cover. The unknown environmental parameters could have implications on the industry growth.

## Appendix A

### Case study participant information letter

I would like to thank you for giving me your time and the opportunity to get to know you and your business and for aiding me with my research. It is a great privilege and an amazing opportunity to gain a better understanding of functional farms in the dairy goat industry. Your help with my research is extremely valuable to my studies and again I very much appreciate your support.

If you have any questions in regard to my research, please don't hesitate to get in contact with me or my supervisor at Lincoln University. Contact details are as follows:

- Guy Trafford ([guy.trafford@lincoln.ac.nz](mailto:guy.trafford@lincoln.ac.nz))

Just to remind you the goals of my studies are:

- To better understand why farmers are adopting dairy goat systems in NZ.
- To provide information on the benefits and limitations of dairy goat farming systems in NZ
- The identification of lessons-learned from those undertaking the adoption of dairy goat farming in NZ.
- To provide information that may help people in the future to adopt a dairy goat farming system NZ.

I will be looking to publish the results of my studies towards the end of this year (November 2017). I would like to make clear that all farm data collected will remain confidential, and the property of Lincoln University, and that it will not be displayed in an identifiable manner. It will only be used to help build and justify models, trends or themes.

Thank you again for your help. Your expertise and experience is invaluable to my research. If you have any further thoughts on my research project or questions in the future, please do not hesitate to get into contact with me.

Eva Brakenrig

Lincoln University Honours Student

Email: [eva.brakenrig@lincolnuni.ac.nz](mailto:eva.brakenrig@lincolnuni.ac.nz)

## **Appendix B**

### **Interview guide for case studies**

Note: questions will vary from this as relevant topics come up

**Could you please tell us about yourself and how you became interested in dairy goat farming?**

- Introduction
- Farming experience/knowledge
- Source of goat farming information
- Background research of goat farming you have done/had access to

**Could you please give us a background of this property?**

- Original farm system/use of property
- Constraints/limitations
- Existing infrastructure when property was purchased
- Existing machinery

**Why was the decision made to adopt and use a dairy goat system?**

- Goals/objectives
- Perceived benefits
- Who/what were the driving forces for the change/purchase of the system

**Could you briefly describe the current indoor goat milking system used on the property?**

- Type of shed
- Size of milking shed
- Details of goat housing
- Number of goats
- New infrastructure (shed etc.)
- Machinery on farm

**Have you made many changes since the beginning of this adoption?**

- Why did they occur?

- What would you do different?

**Are there any other unforeseen challenges that occurred?**

- Lessons learnt
- Changes to the original design
- Reasons for change

**Have you achieved what you set out to achieve by adopting a dairy goat system?**

- How or why not?
- Other benefits found

**What plans do you have for the future of your farm systems?**

- Expansion/efficiency
- Goals
- Succession

**What are the key benefits you found in establishing a dairy goat system in New Zealand?**

- Expected or unexpected

**What are the main disadvantages/limitations have you found (if any) of the adoption of dairy goat systems in New Zealand? Both farm based and market based.**

- Expected or unexpected
- Ways to mitigate

**How do you think indoor dairy goat systems in New Zealand compare to an outdoor dairy goat milking system?**

- Benefits
- Negatives
- Similarities

**What do you see as the biggest barrier to the uptake and growth of dairy goat systems throughout New Zealand?**

- Ways to mitigate (if any)

**The adoption of dairy goat farming is currently predominantly based around the Waikato. Why is this and do you see it expanding in the future to as far as the South Island?**

- Limitations
- Opportunities

**What would you do differently if you were to adopt a system from scratch now?**

- Why didn't you do this to begin with?

### **Summary**

- What are the most important things to consider during the planning and establishment phase of adopting a dairy goat system in New Zealand?
- In the future where do you think dairy goat systems and goats milk will fit within the New Zealand farming sector and the market?
- If the market were to open up do you think the number of dairy goat farms would increase?
- What would you do differently now if you were to do it all again?

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