

Use and perceptions of the Emergency Slaughter Program in British Columbia

by

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Abstract

When dealing with acutely injured or non-ambulatory dairy cows, dairy producers in British Columbia must decide whether to treat, ship, euthanize, or use the Emergency Slaughter Program (ESP). This thesis focused on the last of these options. The specific injuries and conditions that result in ESP use are unknown, although identification of these reasons could allow additional monitoring of cows when they may be vulnerable to emergency slaughter, and determine the most appropriate reasons for ESP use. Analysis of 812 ante-mortem inspection documents found that a large proportion of cows in the ESP were non-ambulatory (63%) or had sustained what were likely calving-related injuries (37%). Two distinct uses for the ESP emerged including 1) traumatic incidents (i.e. emergencies) such as a fractured femur and 2) ‘inhumane to transport’, a category that likely includes non-emergencies such as lameness where cows were not necessarily in acute distress but could not be transported humanely. Anecdotal reports suggest that the ESP may be controversial among dairy industry professionals, but to date the overall perceptions including concerns and benefits of the program are unknown. Understanding these perceptions can be used to provide recommendations for improving the ESP particularly in situations where cow welfare is compromised and individuals must make decisions in potentially uncertain and unwanted situations. Interviews and focus groups with 40 dairy industry professionals revealed positive and negative perceptions of the ESP influenced by 1) an individual’s values, 2) the perceived operational legitimacy of the ESP and 3) overarching concerns about the dairy industry. Resulting recommendations for the ESP include: 1) clarification of cow conditions that warrant the use of the ESP for non-emergency situations, 2) additional training for veterinarians on ante-mortem inspection, 3) specification of precise timing parameters for when the ESP can be used, 4) the use of proper equipment and procedures that

ensure meat quality and hygiene of carcasses, 5) added collaboration between slaughterhouses, transporters, veterinarians, producers and the dairy industry to allow the appropriate use of the ESP in other parts of British Columbia and 6) proactive culling and the use of on-farm protocols for making end-of-life decisions.

Lay Summary

This thesis analyzes the use and perceptions of the Emergency Slaughter Program (ESP) by the dairy industry in British Columbia. The ESP is an end-of-life option used primarily for injured dairy cows that cannot be transported humanely but are considered fit for human consumption. Information about the reasons for emergency slaughter was analyzed and two main categories emerged including true emergencies such as a broken leg and non-emergencies such as chronically lame cows. Interviews and focus groups held with dairy producers, veterinarians, and other dairy industry professionals revealed positive and negative perceptions of the ESP influenced by individual values, the operational legitimacy of the ESP, and dairy industry concerns. Shared recommendations for the ESP include clarification about allowable cow conditions for the ESP, veterinarian and producer training, more precise timing parameters for the ESP, added collaboration to extend the appropriate use of the ESP, and proactive culling for compromised cows.

Preface

K.E. Koralesky and D. Fraser designed the study. K.E. Koralesky collected and analyzed the data; undergraduate student C. Roberts and graduate student C. Sumner coded transcripts for inter-coder agreement. K.E. Koralesky wrote the manuscript. D. Fraser supervised and provided feedback on the manuscript. M. von Keyserlingk and H. Wittman also provided feedback on the manuscript.

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Dedication

This thesis is dedicated to everyone who participated in this study. I sincerely appreciate your openness and honesty. My goal was to authentically and truthfully represent your perceptions.

Prologue

At the end of each interview and focus group, the final question I would always ask is if the participants had anything else to add, or, if they had any questions for me. A few times participants asked, “Well, what do you think of the emergency slaughter program?” Thinking of the most appropriate answer, I said, “Well, as a researcher, my goal is to be open to your perceptions of the program, and do my best at analyzing and writing about those perceptions.”

That answer usually didn’t cut it, however.

At first, I was afraid to share my perceptions of this program. I then recognized that my non-committal answer was actually distancing myself from people in a way that contradicted how I hoped people would connect with me, trust me, and share their true perceptions of the emergency slaughter program with me. This didn’t seem fair or right.

So, I told them – after the interview or focus group was over, of course. I told them that honestly, after every conversation I had with people on this topic, I could see the points they were making. I have, throughout this thesis, been on the fence about my perception of the emergency slaughter program. I can see the positives and I can see the negatives, which also put me in a good place to conduct this research.

Fundamentally, my concern is with the welfare of the animals. I feel that we have a moral obligation to protect the welfare of the animals we use throughout and at the end of their lives. If we truly uphold this obligation, then we should make end-of-life decisions for animals with their welfare in mind, and that should guide which end-of-life option we use.

Chapter 1: Introduction

Dairy industry professionals such as producers, veterinarians and other professionals have a moral obligation to protect the welfare of dairy cows at the end of their lives (Shearer and Ramirez, 2013). Though there are a variety of end-of-life options for dairy cows, due to the sensitive nature of this topic little is known about how industry professionals make end-of-life decisions for animals. Additionally, the public has become increasingly concerned about the treatment of compromised and non-ambulatory dairy cows (Turner and Doonan, 2010) and various legislative and retail food company efforts have prohibited the sale or use of products from non-ambulatory cattle (Stull et al., 2007). There is thus an expectation that these animals are treated in a humane and compassionate way at the end of their lives by the individuals responsible for them.

This thesis will analyze one end-of-life option, the Emergency Slaughter Program (ESP) in British Columbia (BC). In contrast to other end-of-life options such as routine culling when dairy cows are transported to auction or slaughter, and on-farm euthanasia when cows are killed and composted or rendered, the ESP is used when a cow has been acutely injured or is no longer fit for transport and is thus killed on farm and transported to a slaughterhouse for sale. The reasons for ESP use as well as the perceptions that influence ESP use are unknown. Before exploring these specific questions about the ESP, end-of-life options for dairy cows will be reviewed.

1.1 Culling and transport of compromised dairy cows

The culling of dairy cows, that is, intentionally removing animals from the herd for economic or health reasons and transporting them to auction and/or slaughter, is a routine practice in the dairy industry. In Canada in 2015, major reasons for culling dairy cows were

reproductive problems (17.7%), mastitis (11.7%), and feet/leg problems and low milk production tied at 7.6% (Canadian Dairy Information Centre, 2017). The percentage of cows culled due to ‘Injury/Accident’ or ‘Injury to udder/teats’ was approximately 4.8% in 2015 (Canadian Dairy Information Centre, 2017).

In addition to major culling reasons and injuries, cows that suffer from dystocia (difficult calving) or metabolic disorders associated with calving, and those that suffer from infectious diseases can become non-ambulatory or ‘down’ cows, with poor prognosis for recovery and hence may be culled from the herd (Huxley, 2006; Stull et al., 2007). The number of non-ambulatory cows in the United States of America (USA) in 2014 has been estimated by the National Animal Health Monitoring System (NAHMS). Of the approximately 9 million dairy cows in the USA, 2.6% (234,000 cows) became non-ambulatory in 2013 (USDA, 2016).

Information on non-ambulatory cows in Canada is available primarily from one older study completed by the Canadian Food Inspection Agency (CFIA). The CFIA monitored 19 slaughter facilities and 3 auction markets in Canada and found that 90% of the non-ambulatory cows were dairy cows, and less than 1% of the non-ambulatory cows became non-ambulatory in transit, meaning that non-ambulatory cows likely became non-ambulatory on dairy farms before they were transported (Doonan et al., 2003). While this information provided only a snapshot of the number of non-ambulatory cows in Canada as only the cows arriving at the slaughterhouses and auction markets monitored during the study period were counted, it is likely that large numbers of non-ambulatory dairy cows were transported regularly, which is ‘impossible’ to do humanely (Doonan et al., 2003). Therefore in 2005, an amendment was made to the Canadian *Health of Animals Regulations Part XII Transportation of Animals section 138 Sick, Pregnant, and Unfit Animals* which now states ‘no person shall load’ and ‘no person shall transport an

animal that by reason of infirmity, illness, injury, fatigue or any other cause cannot be transported without undue suffering during the expected journey'. This federal regulation also defines 'non-ambulatory animal' as 'an animal that cannot be transported without undue suffering during the expected journey'.

Some studies have examined the outcomes of transporting culled dairy cows. Večerek et al. (2006) compared the number of dairy cows shipped to the number of dairy cows arriving dead at slaughterhouses in the Czech Republic and found that the number of dead dairy cows arriving increased with distance traveled. González et al. (2012) asked cattle (beef and dairy) transport carriers in North America to complete surveys assessing various welfare outcomes (for example, the number of dead and non-ambulatory cattle) per journey. They also found that increasing transport distances had negative welfare outcomes for dairy cattle, such as increased risk of cows becoming lame, non-ambulatory, or dying when compared to feeder and fat cattle (González et al., 2012). Thus, transport has negative welfare outcomes especially for cull dairy cows which are likely to be already compromised. Transport can also affect carcass processing, as Doonan et al. (2003) found that almost 40% of non-ambulatory dairy cows arriving at the slaughterhouse could not be processed for human consumption due to poor meat quality.

Although there are legal provisions to protect the transport of compromised cows, as well as economic incentives to deter the transport of compromised cows, research about compromised cow transport continues (González et al., 2012; Schwartzkopf-Genswein, 2015) and anecdotal reports suggest that compromised cow transport still occurs. This may happen because producers are not aware of other options (Doonan et al., 2003) or perhaps because a common understanding of 'fitness for transport' does not exist due to a range of views on what is 'acceptable' for transport (Canada Gazette, 2005). Alternatively, Thomsen and Sørensen (2008) interviewed

Danish dairy producers in 2002 and again in 2006 and found that one reason why producers had lowered their threshold for euthanasia was due to changing transportation laws, as producers recognized that a cow they could once ship legally was no longer permitted. These studies show that ultimately, transport decisions rest with dairy industry professionals such as producers, veterinarians and transporters, and it is their obligation to safeguard humane transport (Schwartzkopf-Genswein, 2015).

1.2 On-farm mortality of dairy cows

Cases where dairy cows become injured, remain recumbent and subsequently die are considered on-farm mortality cases. In these instances, producers must decide whether to treat or euthanize an animal depending on injury type and severity. On-farm mortality has been studied using a variety of methods including questionnaires, mortality data, and necropsies, mostly conducted in Denmark, Sweden and the USA.

Many studies show a high percentage of cows dying for unknown reasons. In reviewing 19 studies on dairy cow mortality, Thomsen and Houe (2006) categorized the proximate causes of death and found that a large percentage (16-46% depending on the study) was attributed to ‘unknown reasons’. Similarly, when producers were asked to provide the proximate cause of death, ‘unknown reasons’ was a common answer, including 28% in Thomsen et al. (2004), 20% in McConnel et al. (2008) and 48% of unassisted deaths and 14% of assisted deaths reported in Alvåsen et al. (2014b). Additionally, veterinarians surveyed by Fusi et al. (2017) reported that 14.7% of dairy cow deaths on Italian dairy farms were due to ‘unknown reasons’, which the authors hypothesize could be due to a lack of daily inspections, or perhaps that stockpeople are unable to recognize the early onset of certain diseases.

Accidents are a common cause of on-farm mortality, including 5-13% in Thomsen and Houe (2006), 12% in Thomsen et al. (2004) and 19% in a necropsy study of 94 dairy cows by McConnel et al. (2009). Locomotor disorders accounted for large percentages of on-farm mortality as well, including 45% in Thomsen et al. (2012a), 40% in Thomsen et al. (2004) and 40% in Alvåsen et al. (2014b). In contrast to cows dying ‘unassisted’ for ‘unknown reasons’, cows dying due to accidents, such as fractures and the luxation of hip joints, and locomotor disorders were more likely to be euthanized. For example, Thomsen et al. (2004) found that 2% of cows with locomotor disorders died unassisted, while 40% were euthanized.

One overarching risk factor found in on-farm mortality studies is that dairy cows die due to calving-related injuries, including 6-46% in Thomsen and Houe (2006), and the majority of deaths occur within 30 days of calving (Thomsen et al., 2004; Thomsen and Houe 2006; Thomsen et al., 2012a; McConnel et al., 2009; Alvåsen et al., 2014b; Fusi et al., 2017). The periparturient period (the time around giving birth) and the weeks following are associated with numerous challenges for dairy cows. First, calving-related problems like abomasal displacement and retained placenta or metabolic disorders like milk fever and ketosis often occur within the first two weeks of calving (Goff and Horst, 1996), and some on-farm mortality studies attribute mortality to metabolic disorders specifically: 8-18% (Thomsen and Houe, 2006); 22% (Fusi et al., 2017); and 40% (Reimus et al., 2017). In addition to metabolic and physiological changes occurring within an individual cow after calving, routine farm management practices require fresh cows (newly calved) to adjust to a new pen, new herd mates, potentially different pen structures, and a new diet within hours of calving (Sepúlveda-Varas et al., 2013). These data and management practices emphasize that additional monitoring and observation is necessary to ensure cow health after calving (Alvåsen et al. 2014b; Fusi et al., 2017).

Finally, some studies have attempted to identify additional risk factors for on-farm mortality but with little consensus, specifically regarding farm size. On one hand, Alvåsen et al. (2014a) sent a questionnaire to Swedish dairy farmers identified as having high or low levels of on-farm mortality and found that large herd size was associated with higher mortality, perhaps due to a decreased amount of individual attention given to cows on large farms. In their analysis of the 2002 NAHMS survey data from the USA, McConnel et al. (2008) found higher mortality levels associated with farms that had more than 355 adult cows, and additionally, found that farms with cows that had more physical derangements (higher lameness percentages) and more sick cows (higher antibiotic usage) had increased mortality rates.

On the other hand, Thomsen and Sørensen (2009) analyzed data about dairy cows euthanized on 3,025 Danish dairy farms and found that more cows were euthanized on larger farms, farms with a higher milk yield, and farms with a higher morbidity rate. They reasoned, however, that larger farms and farms that produce more milk are potentially better managed, and may have strict Standard Operating Procedures (SOPs) for performing euthanasia. Similarly, the NAHMS survey found that in 2013, 41% of large farms (500+ cows) euthanized non-ambulatory cows after 24 hours compared with only 20% of medium farms (100-499 cows) and 25% of small farms (30-99 cows) (USDA, 2016).

1.3 End-of-life options for dairy cows

When a dairy cow becomes compromised various options are available to producers, including treatment, transport, euthanasia, and emergency slaughter (ES) where available. The decision to treat depends on various factors, including injury type, prognosis, and the amount of time and resources available, as nursing an injured or non-ambulatory cow requires the provision of food, water, drug administration if necessary, encouraging the cow to stand if she is non-

ambulatory, and turning the cow every few hours to shift her weight to avoid muscular damage (Huxley, 2006). If the decision is made to transport, various regulations limit the transport of compromised cows such as the federal *Health of Animals Regulations* made under the *Health of Animals Act*.

If neither treatment nor transport are options, and producers do not wish to keep the meat for family consumption, three main options remain: to kill and then compost the animal on-farm, to arrange for a deadstock transporter to kill the cow and take the carcass for rendering, or to use on-farm ES.

Producers that compost deadstock in BC must adhere to the *Agricultural Waste Control Regulation* made under the *Environmental Management Act*. Under this regulation, carcasses may be composted on the farm of origin; however, composting sites must be located at a distance of at least 30 meters from any water source, and farms must keep their compost away from public view with a proper structure that will protect the composting material from excessive rainfall (British Columbia Ministry of Agriculture, 2015).

As an alternative to composting, producers may contact a deadstock transporter to dispose of the carcass. Deadstock transporters will kill the cow and then transport the carcass to a rendering facility where carcasses are made into oleochemicals, livestock feed and other products not used for human consumption. Deadstock transporters must have an SRM (specified risk material) permit from the CFIA to transport carcasses. SRM includes the skull, brain, eyes, spinal cord, and other parts of ruminants that may contain infectious agents that can cause bovine spongiform encephalopathy (BSE) (British Columbia Ministry of Agriculture, 2014). The SRM is separated from the carcass and transported to an incineration plant in Alberta (West Coast Reduction Ltd, 2017).

1.4 Emergency slaughter of farm animals

Another end-of-life option is on-farm ES. ES is not a new concept. An early paper by Norval (1954) stated that ‘emergency slaughter should only apply where immediate slaughter of a sick or injured animal is carried out in order to salvage the carcass’. Norval also stated that a majority of ES cases were due to ‘paraplegia’, that is, non-ambulatory cows with milk fever. Thirty years later in 1984, the Farm Animal Welfare Council (FAWC) in the United Kingdom (UK) published the ‘Report on the Welfare of Livestock (Red Meat Animals) at the Time of Slaughter’. In this report, ES was considered permissible when ‘an animal is suffering from sudden onset of a condition which causes acute pain, e.g. limb fractures, and must be slaughtered immediately’ (FAWC, 1984). The FAWC report noted that producer decisions to use ES should be made on a case-by-case basis, and that the procedure also depends on slaughterhouse availability and willingness to process the carcass. However, the FAWC emphasized that the primary concern in ES situations should be the welfare of the animal (FAWC, 1984).

ES is a regulated option in a number of countries and provinces. In the European Union, *Regulation (EC) No 853/2004* allows the ES of ungulates if certain provisions are met, including that a veterinarian performs an ante-mortem inspection, the carcass arrives at the slaughterhouse within two hours of killing, and a post-mortem inspection deems the animal fit for human consumption. ES is permitted in the UK where they have developed a guidance document titled: ‘Guidance for veterinary surgeons on the emergency slaughter of cattle’. This document includes information about the EU regulation, considerations for cattle that may be ES candidates, information about humane stunning and killing, and the paperwork required for ES. ES is not allowed in the USA effective 2004, shortly after a cow tested positive for BSE in late 2003.

In Canada, ESPs exist in Alberta, British Columbia, Manitoba, Ontario and Saskatchewan and are used mostly for cattle. In Ontario, if an animal becomes injured and the producer decides to use ES they must first contact the slaughterhouse or a veterinary inspector (contracted through the Ministry of Agriculture) to confirm that the slaughterhouse has space available to accept the carcass. The veterinary inspector then obtains authorization to perform an ES from an appointed regional veterinarian, and once complete, the veterinary inspector also completes the post-mortem inspection at the slaughterhouse. The regional veterinarian receives all ante-mortem and post-mortem information from the veterinary inspector and makes a final decision on whether the carcass may be sold for human consumption (Ontario Ministry of Agriculture, Food and Rural Affairs, 2016).

In Alberta the process is similar and used mostly for beef cattle in feedlots. A producer may contact either an appointed inspector or a veterinarian to perform the ante-mortem inspection. Veterinarians must pass a training course on ante-mortem inspection and the ES process and renew their training every three years (Government of Alberta, 2017). In Saskatchewan, where similar guidelines exist for ES, a veterinarian appointed by the Ministry of Agriculture or an inspector must perform the ante-mortem inspection on-farm (Saskatchewan Ministry of Agriculture, 2017). Finally, in Manitoba, producers must have a veterinarian, which may be a private veterinarian, perform the ante-mortem inspection. Additionally, they must contact a permitted provincial slaughterhouse to schedule a time for carcass delivery (Copeland, 2015).

In summary, the provincial programs operate in similar ways with some differences. Each province requires that carcasses arrive at the slaughterhouse within two hours of slaughter and that an ante-mortem inspection and documentation of this inspection is completed. However,

provinces differ in whether a private, appointed or trained veterinarian is required to complete the ante-mortem inspection. All transporters must have SRM-permitted vehicles to transport carcasses, and finally, carcasses must pass post-mortem inspection at the slaughterhouse to be considered fit for human consumption.

Two papers on ES are based on data collected from slaughterhouses in the Czech Republic. Večerek et al. (2003) monitored the ES of cattle (presumably beef and dairy cattle, although this is not specified) at Czech slaughterhouses from 1997-2002. They found that 35% of cows and 43% of heifers underwent ES at the slaughterhouse due to locomotor apparatus injuries. In a similar study that also monitored ES due specifically to mobility issues at a Czech slaughterhouse, Pištěková et al. (2004) found that 18% of cows that arrived at the slaughterhouse underwent ES due to limb injuries, 19% due to hind-limb paresis, and 21% due to claw inflammations.

Researchers in Ireland have published a few papers on the ES of cattle including dairy cows at slaughterhouses. Cullinane et al. (2010) examined 1,255 veterinary certificates (VCs) issued for either ‘emergency’ slaughter (accidental injuries) or ‘casualty’ slaughter (chronic conditions). VCs are issued by veterinarians and are intended to accompany the live animal to the slaughterhouse. Cullinane et al. (2010) found that the mean time between issuing a VC and slaughter was three days, and that VCs were issued due to locomotor system injuries in 77% of the cases. They concluded that because there is no specific period of validity for the VC, there could be delays in slaughtering ‘emergency’ or ‘casualty’ animals, and that veterinarians had provided VCs for animals that were unfit for transport. Thus, when the on-farm ES program was introduced in Ireland in 2009, the authors concluded that it was a positive alternative to the

issuing of VCs as it could eliminate slaughter delays and inhumane transport (Cullinane et al., 2010; 2012).

Several years later, McDermott and McKeivitt (2016) surveyed official veterinarians (OVs) (i.e. certified veterinarians who work in slaughterhouses) and private veterinary practitioners (PVPs) (i.e. veterinarians who work in food animal practice) about emergency slaughter in Ireland. They found that only 4% of slaughterhouses in select areas of Ireland accepted on-farm ES carcasses. They also identified some interesting perceptions, including for example that 89% of the OVs working in slaughterhouses believed that the acceptance of on-farm ES carcasses would negatively affect public perception of their business. Additionally, although 88% of PVPs stated that they would be very likely to recommend on-farm ES to their clients, only 54% were aware of slaughterhouses that would accept these carcasses. The authors concluded that additional stakeholder engagement and training should be completed in order to make on-farm ES more widely available in Ireland.

More recently, Fusi et al. (2017) recruited veterinarians to complete surveys of on-farm mortality on 137 Italian dairy farms. Of the 251 cows that died during the study period of approximately 16 months, 55% of the cows died assisted, and of those cows, 45% underwent ES. The main reasons for ES were accidents, metabolic/digestive disorders, and calving problems.

There are two main limitations in the existing studies about ES. First, most did not identify reasons for ES until the animal reached the slaughterhouse, and thus it is unclear whether the cows became compromised on-farm or in transit. Second, studies that have used surveys to understand some of the underlying perceptions about ES have focused on only one professional group, veterinarians, and thus the perceptions of producers and other industry professionals are still unknown.

1.5 Perceptions about end-of-life options for dairy cows

Research about end-of-life options for dairy cows has largely focused on the reasons and risk factors that lead to use of these options. The use of qualitative data collection methods, for example interviews and focus groups, to understand how dairy industry professionals perceive and make end-of-life decisions would be beneficial for a few reasons. First, end-of-life decisions are undoubtedly difficult and must be made when a cow's welfare is compromised.

Understanding the factors that influence an individual's decision-making process and perceptions of the various options for dairy cow mortality could help provide guidance and clarity when making these decisions. In addition, understanding the positive and negative perceptions of a particular program, such as the ESP, can lead to the development of shared recommendations between dairy industry professionals for the program.

Some studies have shown that dairy industry professionals perceive on-farm mortality as a welfare and industry concern. As examples, Ventura et al. (2015) conducted focus groups with primarily North American dairy industry stakeholders and identified shared welfare concerns of lameness, cow comfort, and on-farm mortality. Burton et al. (2012) used in-depth interviews with dairy farm staff in New Zealand to analyze farm culture, which they conclude involves an interaction between the people, cows, and the physical structures of the farm. One specific finding was that when staff were given the chance to work repeatedly with cattle, their ability to recognize the early stages of illness and diseases improved. Finally, Seabrook and Wilkinson (2000) interviewed British dairy farmers to better understand their attitudes and behaviours toward dairy cows. Study participants spoke of 'good' and 'bad' days. For example, 27% of participants said a 'good day' was one when a good cow calved. Interestingly, however, 55% of participants also mentioned that a 'good day' was one when 'nothing went wrong,' and 61%

stated that a ‘bad day’ was one involving an event such as ‘the death of a favorite cow, illness of cows, and forced culling of cows’ (Seabrook and Wilkinson, 2000).

The small amount of literature that examines perceptions of farm animal mortality mostly focuses on producer perceptions. For example, Vaarst and Sørensen (2009) interviewed Danish dairy cattle producers about calf mortality and found that producers felt more in control of emergencies when they had flexible time in their schedules. Rault et al. (2017) conducted a survey with Australian pig farmers and found that ‘confidence’ was correlated with ‘being comfortable with euthanasia’ and additionally, lack of knowledge and empathy were indicators of ‘trouble deciding’ and ‘avoiding euthanasia’. Finally, some studies simply note the need for additional research to investigate dairy industry professionals’ perceptions of end-of-life options (Alvåsen et al., 2014b; Fusi et al., 2017).

1.6 Thesis objectives

In summary, there is some literature on dairy cow mortality in European countries and the USA, but very little in Canada, and only a few papers, mostly using data collected at slaughterhouses, analyze the reasons and risk factors for ES. Additionally, little is known about perceptions of and how dairy industry professionals deal with end-of-life options for dairy cows. This thesis will analyze one end-of-life option, the ESP in BC. The specific reasons for ESP use are unknown, and thus an examination of these reasons could establish the type of injuries and/or conditions that ultimately lead to ES. Identification of these injuries and/or conditions could not only enable dairy industry professionals to take proactive management measures to avoid such situations, but also determine which injuries and conditions are most appropriate for the ESP.

Additionally, anecdotal reports suggest that the ESP may be controversial among dairy industry professionals, but the overall perceptions including concerns and benefits of the

program have not been studied. Analysis of these perceptions can be used to provide recommendations for the ESP and thus improve situations where cow welfare is compromised and individuals are faced with making a decision that is unexpected, perhaps uncertain regarding the diagnosis and prognosis of the cow, and unwanted as dairy producers ultimately strive to keep cows in their herd for milk production.

Therefore, the thesis objectives were:

1. To examine use of the ESP in BC through the analysis of ante-mortem inspection documents.
2. To understand dairy industry professionals' perceptions of the ESP in BC through interviews and focus groups.
3. To identify shared views about the ESP in order to provide recommendations for the program.

Chapter 2: Use of the Emergency Slaughter Program in British Columbia

2.1 Introduction

Dairy producers in BC have a few end-of-life options when they remove cows from the herd. These options include 1) culling and transporting the cow to auction or slaughter, 2) killing the cow and using the meat for family consumption, 3) killing and then composting the cow on-farm, 4) contacting a deadstock transporter to kill and transport the cow for rendering, and 5) selling the meat through use of the on-farm ESP. Altogether in 2015, cows removed from BC dairy herds through these options accounted for approximately 27,200 cows (calculated using the national removal rate of 35.8%) (Canadian Dairy Information Centre, 2017).

The ESP in BC is a somewhat unique end-of-life option because although not exclusive to dairy cows, it is used primarily for dairy cows. The ESP began being used frequently when BC created its own meat inspection program with provisions for on-farm ES in 2014. Before 2014, the CFIA was responsible for inspecting both federal and provincial slaughterhouses in BC, but in late 2011, the CFIA announced that provincial meat inspection responsibilities would be returned to the province effective 2014. This change included not only BC, but also Manitoba and Saskatchewan (Canadian Food Inspection Agency, 2015). Federal slaughterhouses would still be managed by the CFIA, but each province was now responsible for developing their own meat inspection program for provincial slaughterhouses (Canadian Food Inspection Agency, 2015).

The ESP is regulated by BC's *Meat Inspection Regulation* section 14.1 under the *Food Safety Act*. The specific requirements in the law state that 'an animal ... may be slaughtered and the carcass delivered to a slaughter establishment for inspection ... if all of the following requirements are met' which include 1) if the animal 'is in a physical condition that precludes it

from being transported without undue suffering’, or 2) if the animal ‘poses a high risk of significant injury to humans if it is transported to a slaughter establishment’.

Two guidance documents are used to interpret the law (British Columbia Ministry of Agriculture, 2017). The ‘Guidelines for Establishment Operators and Animal Producers or Agents — Emergency Slaughter Under the B.C. Meat Inspection Regulation’ (British Columbia Ministry of Agriculture, 2017) provides information about the requirements and process of on-farm ES. The ‘Guidelines for Veterinary Practitioners’ document includes the definition of an ‘emergency’, which is ‘an event which requires immediate action’, instructions on how to perform an ante-mortem inspection, examples of unacceptable and acceptable conditions for ES and administrative requirements.

If a producer decides to use the ESP, the first requirement according to the ‘Guidelines for Establishment Operators and Animal Producers’ document is that a producer ‘must obtain pre-approval’ from the slaughterhouse that the carcass can be accepted. Then, the producer must ‘hire the services of a veterinary practitioner’ to perform an ante-mortem inspection and complete the ante-mortem inspection document, the ‘Document for an Approved Emergency Slaughter on Farm’ which certifies that the animal is fit for human consumption (British Columbia Ministry of Agriculture, 2017). A transporter with an SRM permit must also be available at the same time to humanely slaughter the animal after the ante-mortem inspection is complete. The animal is then shot and bled at the farm, and the carcass must be transported to the slaughterhouse within two hours of death, at which point the slaughterhouse operator will receive the carcass and the meat inspector will perform a post-mortem inspection. The meat must be sold in BC because it is processed at a provincially licensed slaughterhouse. The veterinarian and transporter fees are paid by the producer, and the producer would later receive payment from the

slaughterhouse based on the amount of meat deemed usable (i.e. not damaged or bruised) for human consumption.

The ESP is relatively new, and thus the use of the ESP is not well understood. Knowledge of the situations that lead to ES could help producers develop proactive management plans to reduce the incidence of such extreme outcomes. Such knowledge could also inform discussion of what conditions should and should not be acceptable reasons for use of the program. This study thus examined how the ESP is used through the analysis of ante-mortem inspection documents.

2.2 Methods

Ante-mortem inspection documents (Appendix A) were obtained from the BC Ministry of Agriculture for the period from January 1, 2014 to December 31, 2015. These documents contain ‘secondary data’, which is defined as ‘pre-existing data that have been collected for a different purpose or by someone other than the researcher’ (McGinn, 2012). Using secondary data can reduce the amount of intrusion into research participants’ lives which is advantageous because neither the research process nor the researcher influences data collection (McGinn, 2012).

The following information was requested on the ante-mortem inspection documents: 1) species slaughtered; 2) age of the animal; 3) reason for emergency slaughter; 4) history of the animal’s condition; 5) results of clinical examination; 6) time of stunning, time of bleeding, time carcass shipped; 7) date and time the carcass arrived at the establishment; 8) disposition, and, if condemned, the reason for condemnation. Condemnations were cases where the entire carcass was condemned, not when parts of the carcass were deemed unusable for human consumption due to bruising or other damage. All identifying information, including farm names, individuals,

and locations, was redacted by Ministry of Agriculture staff before the documents were released to the researcher.

1,041 documents were received from one slaughterhouse. Inclusion criteria required that the information requested was complete on each document. Of the 1,041 documents, 177 used an earlier version of the document that did not include ‘disposition and reason for condemnation,’ 31 were illegible or information had been inadvertently removed during the redaction of identifying information, 11 were missing information, four pertained to male animals and six were duplicates. On this basis, a total of 229 documents were excluded leaving 812 ante-mortem inspection documents from August 12, 2014 to December 31, 2015 for analysis.

Microsoft Excel was used to calculate descriptive statistics for the ages of cows in the ESP, the days during the week when the ESP was performed, and the time elapsed between stunning and bleeding and between stunning and arrival at the slaughterhouse. Time stunned is defined as the point at which the animal is stunned with a firearm. Time bled is defined as the point at which the knife enters and severs the carotid artery and jugular vein. For each ante-mortem inspection document, the proximate reason for ES was determined and verified by veterinarians. Some proximate reasons mirror those developed by Thomsen and Houe (2006) and Cullinane et al. (2010), but are more anatomically focused and do not include conditions such as systemic illnesses which are not allowed in the ESP. Chi-squared tests were used to test for relationships between cow age and the proximate reason for ES. Information about condemned carcasses was also analyzed.

Two text elements on the ante-mortem inspection documents, namely the ‘history of the animal’s condition’ and ‘results of the clinical examination’ were uploaded into NVivo Qualitative Data Analysis software to perform document analysis. Document analysis was used

by coding, that is, assigning a short label or definition to the text (Charmaz, 2006) and then developing codes into major themes (Bowen, 2009).

2.3 Results: Descriptive statistics

Of the 27,200 BC dairy cows that were removed in 2015 (Canadian Dairy Information Centre, 2017), 631 (approximately 2.4%) underwent ES. Cow age ranged between 1 and 13 years. Four age groups were created to facilitate analysis and give a number in each group that would be satisfactory for Chi-squared tests: 1-2 years old, 3-4 years old, 5 years old, and 6 years and older. Of the 812 cows, 15% were 1-2 years old, 39% were 3-4 years old, 35% were 5 years old, and 11% were 6 years or older with a mean age of 4.1 years \pm 18.25 days (SEM).

The ESP may be utilized Monday-Friday from approximately 6:00 am to 2:00 pm when the slaughterhouse is open to receive carcasses. A Chi-squared test showed a significant relationship between the number of ES cases performed and day of the week ($\chi^2 = 18.12$, $df=4$, $p < 0.01$). ES was performed most often on Tuesdays and least often on Thursdays.

50% of the documents recorded 0-60 sec from stun to bleed; 38% up to 120 sec; and 9% up to 180 sec. The remaining 4% were 240 sec and longer. The mean time from stun to arrival at the slaughterhouse was 74 min \pm 57 sec (SEM) (minimum 4 min, maximum 178 min).

For each animal, a single proximate reason for ES was established based on what was written under 'history of the animal's condition' and 'results of clinical examination'. Proximate reasons were established based on the anatomical region of the cow that was injured or compromised. Proximate reasons include: leg injuries (34.5%), hip injuries (20.4%), nerve injuries (11.5%), spinal injuries (8%), foot injuries (7.1%), injuries with minimal description (7%), hind-end injuries (7%) and rarely occurring injuries (4.2%).

Injuries that occurred most often included those related to the leg, hip and nerve damage. Rear leg ‘injuries’ and ‘dislocations’ (35% of total leg injuries) occurred three times as often as front leg ‘injuries’ and ‘dislocations’ (11.1% of total leg injuries). Approximately 11% of leg injuries were specifically classified as fractured femurs. Stifle injuries were also common (16% of total leg injuries), as were ruptured gastrocnemius muscle injuries (9% of total leg injuries). Hip injuries most commonly included partial and full hip dislocations (58%), adductor muscle injuries (9%) and ‘splayed legs’ or the ‘splits’ (13%). The most common nerve injury was obturator nerve damage (61%) which likely occurs during calving when pressure is exerted on the obturator nerve (Greenough, 2016).

Injuries that occurred less often included those related to the spine, feet, hind-end and also injuries with minimal description and injuries that occurred rarely. Spinal injuries were less detailed, but the majority were classified simply as spinal column injuries (55%). 69% of foot injuries were classified as pedal arthritis and lameness, lameness being commonly associated with foot injuries (Cook and Norlund, 2009). Hind-end injuries were poorly described, but the majority (68%) mention some form of hind-end weakness. Injuries with minimal description typically include little information; for example, ‘down’ is the only comment written on 94% of these documents, or 6.3% of the documents in total. Finally, the category ‘rarely occurring’ represents cases where specific conditions were the proximate reason for ES, for example digestive disorders, metabolic conditions, broken tails, emaciation, and lacerations.

Table 2.1 Emergency slaughter cases (n=812) from Aug. 14 2014 to Dec. 31 2015 categorized by reason for emergency slaughter and cow age group.

Reason	1-2 yrs old	3-4 yrs old	5 yrs old	6+ yrs old	Total
Leg injury	57	112	80	31	280
Hip injury	25	73	58	10	166
Nerve injury	15	35	39	4	93
Spinal injury	11	28	18	8	65
Minimal	3	21	30	5	59
Foot injury	1	15	31	11	58
Hind-end injury	9	20	15	13	57
Rare	3	12	10	9	34
Total	124	316	281	91	812

Chi-squared tests were used to test for relationships between cow age group and reason for ES. Injuries classified under the broad reason of ‘minimal description’ and ‘rarely occurring’ were not included in the Chi-squared test due to variation in these reasons. Analysis showed highly significant differences between age group and reason for ES ($\chi^2 = 47.18$, $df=15$, $p < 0.001$). Specifically, foot injuries (primarily lameness) were most common among older cows (5 years and older) ($\chi^2 = 21.7$, $df=3$, $p < 0.001$) and hind-end injuries were most common in cows aged 6 years and older ($\chi^2 = 9.2$, $df=3$, $p < 0.05$).

Of the 812 cases, 11 were condemned upon arrival at the slaughterhouse mostly because of lymphosarcoma, also referred to as bovine leucosis (7 cases). Lymphosarcoma is a common reason for the condemnation of dairy cow carcasses as it can only be diagnosed via blood test, or confirmed upon sight of lesions on the lymph nodes during a post-mortem inspection (Nagy, 2016). Other condemnation reasons include neoplasm (1), nephritis (1), waiting for residue result (1) and unspecified (1).

2.4 Results: Document analysis

Document analysis involved coding the text written by the individuals responsible (veterinarians, slaughterhouse managers and meat inspectors) for completing one or more parts of the ante-mortem inspection document. Codes were then categorized and developed into major themes that highlight some of the overarching uses of the ESP, including: 1) non-ambulatory cows and recumbency duration, 2) inhumane to transport, 3) calving-related issues, and 4) unusual cases.

‘Down’, ‘sternally recumbent’, ‘unable to rise’ or a similar variation of the term ‘non-ambulatory cow’ was written on 511 ante-mortem inspection documents (63%). Thus, regardless of the proximate reason for ES, approximately 2/3 of ES cows were non-ambulatory. The ante-mortem inspection document does not require veterinarians to write recumbency duration or the number of days passed since the injury or onset of the condition. However, veterinarians did include this information on 35 documents. Table 2.2 shows a large range of the number of days between injury or onset of the condition and use of the ESP. Some cows underwent ES on the day they were injured, for others the decision was made after several days, and for a few, the injury or condition occurred weeks before the ESP was performed.

Table 2.2 Emergency slaughter cases (n=35) categorized by history of the animal's condition and number of days passed since onset of condition.

History of the animal's condition	# days passed
Sternally recumbent, down this morning	0
Non-ambulatory, laterally recumbent, found down in alley this morning	0
Animal couldn't stand this morning, poor BCS (body condition score)	0
Injured left hind-limb this morning	0
Found down in alley yesterday PM	1
Legs split out – injury yesterday	1
Down since yesterday	1
Went down in barn yesterday, injured LH (left-hind) leg	1
Went down yesterday, having trouble getting up on hind legs	1
Went down in back of holding area last night, unable to get up since	1
Found down yesterday, likely jumped by another cow	1
Unable to rise on back – paresis for last 1.5 days	1.5
Went down Oct. 19, 2014 (ESP used Oct. 21, 2014)	2
Went down 2 days ago, did splits	2
Unable to walk now 2 days	2
Went down with the splits 2 days ago, still eating, can't get up	2
Back injury after calving 48 hours, downer, unable to stand	2
Calved 2 days ago, was weak after, then fell down and injured	2
Stepped in cattle guard Saturday, 2 days ago, AM; broke leg	2
Recent onset of inappetence. Examined 2 days ago, diagnosed with intestinal obstruction. Still not better today	2
Went down 3 days ago, cannot get up	3
Knee injury 3 days ago, doesn't put any weight on it anymore	3
Damaged leg 3 days ago, no improvement	3
Mid lactation cow found down in stall 3 days ago, eating/drinking well but cannot get up	3
Unable to rise for 4 days	4
Fresh 4 days, down since calving, unable to weight bear on hind-limbs	4
5 days in milk. Downer after 1 day	4
Calved 4 days ago, down with milk fever, got up and wasn't eating, went down again yesterday	4
Went down in barn 5 days ago, wasn't able to get up	5
Swollen sore foot on Friday (Oct. 9, 2015) swelling has progressed up the leg (ESP used Oct. 13, 2015)	5
Down for 6 days, unable to get up	6
Called June 1, 2015. Injured right hind-limb. Cannot get up today. (ESP used June 8, 2015)	7
Injured 2 weeks ago, difficulty getting up after injury	14
Injured LF (left-front) leg 3 weeks ago	21
Weak hind legs since calving 4 weeks ago	28

The ante-mortem inspection document requires veterinarians to state the ‘reason for emergency slaughter’ for which two choices are given: 1) inhumane to transport or 2) behaviour/size of animal. Inhumane to transport was selected on all 812 documents. Additionally, the phrase ‘inhumane to transport’ was written on 102 documents (13%). One of the stipulations to use the ESP is if the animal ‘is in a physical condition that precludes it from being transported without undue suffering’. This stipulation would include non-ambulatory cows and also ‘lameness’, which was written on 74 documents (9%).

Certain details written on the ante-mortem inspection documents indicate conditions that might be related to calving. These include hind-end weakness/injury (45 cases), adductor muscle injuries (15), pelvic injuries (8), splits (21), fractured femur (32), ruptured gastrocnemius (26), nerve injuries including hind-end paralysis, leg, obturator, peroneal and sciatic nerve damage (90), down (55) and specific fresh cow problems including ketosis, low phosphorus, non-responsiveness to milk fever treatment, retained placenta, and uterine tear (11). In total, 303 ES cases (37%) involved proximate reasons that could be a consequence of calving.

Finally, cases classified as unusual include oestrus-related injuries, cows that became stuck, and injuries that occurred during routine farm practices. Oestrus-related injuries (9 cases) include instances where the ‘cow was recently in heat’, was ‘jumped by another cow’ or was ‘in heat, injured’. Cows that became stuck (caught) (18 cases) include instances like ‘stuck in stall’ and less commonly, ‘leg stuck in manure slot or fence’. Injuries that occurred during routine management practices occurred six times, including three instances of cows ‘injured during hoof trimming’, one instance of a cow injured when she was ‘moved pens’, one from a cow ‘injured during breeding’ and one cow underwent ES due to ‘a claw amputation gone bad’.

2.5 Discussion

Most animals in this study were bled promptly after stunning (88% in 2 min, 9% in 3 min, and 4% in 4 min and longer). The Humane Slaughter Association recommends that cattle stunned using a penetrative tool such as a firearm (as is the case in the ESP) are bled within 60 sec to ensure death (Humane Slaughter Association, 2016). However, if the firearm caliber is sufficient for the size of the cow and the shot placement is precise, this can kill the cow by destroying the brain stem (Appelt and Sperry, 2007; Shearer et al., 2013; Schiffer et al., 2017).

Most animals arrived at the slaughterhouse within the required 2 h (mean 74 min \pm 57 sec (SEM), minimum 4 min, maximum 178 min). The ESP guidelines and guidelines in other provinces and the EU allow a maximum carcass transportation time of 2 h and encourage shorter shipping times in warm weather. Thus, most transportation in this study was well within the guideline, with only 4.6% of the ante-mortem inspection documents recording a transportation time that surpassed 2 h.

The proximate reason for ES was considered to be the correct diagnosis though there were inconsistencies on the documents and their purpose is primarily to verify that the cow is fit for human consumption. These reasons can be compared to major culling reasons and other dairy cow mortality studies and can be used to identify the major risk factors for ES. Major culling reasons in Canada include reproductive problems (17.7%), feet/leg problems (7.6%) and accidents (4.8%), all problems that occurred in a number of ES cases (Canadian Dairy Information Centre, 2017). Some culling reasons, however, such as mastitis (11.7%) and sickness (5.1%) would not be allowed in the ESP. Additionally, many dairy cow mortality studies attribute mortality to 'unknown reasons' which could be compared to ES cases where little description about the proximate reason for ES is provided or, for example, where 'down' is

the only text written on the ante-mortem inspection document (6.3% of documents total). Finally, many dairy cow mortality studies attribute on-farm mortality to calving-related injuries (Thomsen et al., 2004; Thomsen and Houe 2006; McConnel et al., 2009; Thomsen et al., 2012a; Alvåsen et al., 2014b; Fusi et al., 2017), similar to the present study that found 37% of ES cases could be a consequence of calving.

Chi-squared tests revealed differences between age group and reason for ES. Foot issues, primarily lameness, were most common in cows aged 5 years and older, and hind-end injuries were most common in cows aged 6 years and older. In other studies, lameness prevalence has consistently been shown to increase with age (Espejo et al., 2006; Solano et al., 2015). Although information about hind-end weakness on the ante-mortem inspection documents was minimal, it is possible that these cows were suffering from milk fever, the incidence of which also increases with age (Horst et al., 1996). Additionally, if a cow remains recumbent for a prolonged period of time, she may develop secondary recumbency, which occurs when pressure is exerted on the nerves and muscles in the hind-limbs thus making it difficult for the cow to stand (Green et al., 2008; Stull et al., 2007).

Broadly, the various uses for ES can be divided into two categories: traumatic incidents and inhumane to transport. A traumatic incident is a clear emergency situation where a cow is suddenly incapacitated. The majority of leg, hip, spine and rarely occurring injuries (545 cases) can be classified as emergency situations. A leg injury like a fractured femur could occur if a cow develops splayed legs or ‘does the splits’ due to weakness after calving (Huxley, 2006). Other injuries may occur during displays of oestrus behaviour (e.g. mounting), or perhaps due to overstocking of pens resulting in increased competition for stall space (Fregonesi et al., 2007) or feed bunk access (Huzzey et al., 2007).

The inhumane-to-transport category could be used for various conditions, for example lameness, hind-end weakness, or non-ambulatory cows, and the determination of allowable cow conditions in this category is based on an individual's assessment of the animal's condition and may be less obvious than some traumatic incidents. Foot, hind-end, and nerve injuries, together with cases involving minimal description (267 cases) can be classified as non-emergency situations. For example, lameness (written on 9% of the ante-mortem inspection documents), can be caused by factors such as calving, diet, trauma and infectious agents (Cook and Norlund, 2009). Additionally, cows may remain lame if they are not identified and treated appropriately, for example by hoof trimming or foot baths (Cook and Norlund, 2009). Lameness, therefore, represents a gray area of the ESP because although a veterinarian may confirm that the transport of the animal is inhumane (as required on the ante-mortem inspection document), the 'Guidelines for Veterinary Practitioners' state that 'an animal suffering from a chronic condition that develops over time (which lameness could be considered) is not eligible for emergency slaughter'.

In recent years, research about dairy cattle transport has been conducted (González et al., 2012; Schwartzkopf-Genswein, 2015) and transportation laws have been amended to include provisions that prohibit the transport of non-ambulatory animals. 'Inhumane to transport' was written separately on 13% of the ante-mortem inspection documents and 2/3 of the cows were considered non-ambulatory, both conditions that would prohibit live transport under the Canadian *Health of Animals Act and Regulations*. The frequent designation of 'inhumane to transport' indicates that dairy industry professionals are aware of these legislative changes and are considering the stresses and duration of transport when making transport decisions.

Information about recumbency duration, which was included on 35 documents, showed a large range of days between the injury or onset of condition and slaughter. This provides insight into how decision-making regarding the ESP and compromised cows in general occurs on farms. In cases when a decision was made on the day of the injury, the amount of time that an animal may have been suffering was likely minimal compared to other cases when delays in decision-making meant that several days passed between the injury or the onset of the condition and slaughter. There is evidence that the likelihood of non-ambulatory cows recovering after being non-ambulatory for more than 24 hours greatly decreases (Green et al., 2008) even with treatment such as flotation tank therapy (Stojkov et al., 2016). This information should be disseminated so that decisions are made promptly and research that has started to examine compromised cow management on farms (e.g. Fogsgaard et al., 2016) should continue.

Additional insight regarding ESP use was the observed relationship between the number of ES cases performed and day of the week. Peak program use occurred on Tuesday, which could possibly indicate that cases developed over the weekend but decisions regarding the cow had not been made by early afternoon on Monday. The ESP was used least often on Thursdays, which could reflect that decisions were delayed until Friday, the final day of operation of the ESP.

Thus, both traumatic incidents and inhumane to transport would technically be allowable conditions for the ESP according to the current rules and guidelines of the program. Traumatic incidents are clear cases for the ESP. In the inhumane-to-transport category, it is unclear whether the condition occurred suddenly, was chronic, or perhaps treatment failed to resolve the condition. In all cases, the veterinarian is responsible for making the final determination if the

cow can undergo ES based on her condition, information from the producer, and the ESP guidelines and rules.

2.6 Conclusions

In summary, a large proportion of cows in the ESP were recumbent (63%), had sustained leg and hip injuries (54%) or calving-related injuries (37%). The time elapsed between death and arrival at the slaughterhouse was for the most part less than the two hours required and only 11 cases were condemned upon arrival at the slaughterhouse due mostly to lymphosarcoma.

Although some cases of ES were performed promptly after the cow was injured there were other cases where a number of days had passed between the injury and ES. The various reasons why cows underwent ES can be divided into two categories including traumatic incidents, when the use of the ESP is clearly valid (e.g. fractured femur) and ‘inhumane to transport’, when the fit to the ESP is less obvious (e.g. lameness).

The dissemination of information to producers about likely recovery times, particularly in the cases where cows are ‘non-ambulatory’, could aid and perhaps quicken a producer’s decision to use the ESP. The establishment of humane endpoints and euthanasia protocols should be developed and used regularly on farms. Additional information concerning which cows qualify under the inhumane-to-transport category where the reason for ES is less obvious could provide clarity to veterinarians and producers. Future studies should investigate the possibility of obtaining post-mortem inspection documents from the ESP for analysis, and if possible, conducting interviews with dairy producers to understand how they make end-of-life and transportation decisions for their cows.

Chapter 3: Perceptions of the Emergency Slaughter Program in British

Columbia

3.1 Introduction

Different dairy industry professionals play specific roles in the ESP and all dairy industry professionals, as members of the dairy industry, are affected by the existence of the program.

The coordination of these individuals on ESP cases is critical due to the time-sensitive nature of this program for cow welfare, slaughterhouse availability and the availability of individuals that play a role in the program. As discussed in Chapter 2, the ESP guidelines state that if a producer decides to use the ESP, they must first verify that the slaughterhouse can accept the carcass.

They must also contact a veterinarian to perform an ante-mortem inspection on the farm, and if the cow passes the inspection, a transporter will shoot, bleed, and transport the carcass to the slaughterhouse where post-mortem inspection occurs.

Since 2014, the ESP has been regulated by BC's *Meat Inspection Regulation* and two documents are used to interpret the law. One document, 'Guidelines for Establishment Operators and Animal Producers or Agents — Emergency Slaughter Under the B.C. Meat Inspection Regulation' is intended for dairy industry professionals such as producers and includes information about the requirements of the program. The second document, 'Guidelines for Veterinary Practitioners', is intended for veterinarians, and includes guidance on how to perform an ante-mortem inspection and specific examples of allowable cow conditions for ES.

Little is known about how the ESP is perceived as an end-of-life option by dairy industry professionals who encounter the ESP in their work, and thus the concerns about and perceived benefits of the program are unknown. The objective of this study therefore is to use semi-

structured interviews and focus groups to understand the perceptions that influence how the ESP is used in practice and identify shared recommendations for the program.

3.2 Methods

This study was approved by the University of British Columbia Behavioural Research and Ethics Board (BREB). Semi-structured interviews and focus groups are ideal methods for revealing participants' perceptions about a topic and allowing researchers to collect data in a systematic way that can produce rich textual data for analysis (Marshall and Rossman, 2015). For the purpose of this study, perceptions are defined as 'a way of regarding, understanding, or interpreting something'. A semi-structured interview guide (Appendix B) was designed and pilot tested in Spring 2016 through 4 interviews and 1 focus group with a total of eight participants. Pilot testing with a small number of participants helps the researcher confirm that the guide is an effective tool for data collection (Marshall and Rossman, 2015). The pilot test confirmed the effectiveness of the guide and thus no changes were made for the expanded study in Summer 2016.

3.2.1 Participants

Sampling criteria required that participants be dairy industry professionals in BC familiar with the ESP. A letter of introduction was used via email, telephone, or in person to introduce the study in a consistent way to all participants. Sampling methods included purposive and referral sampling. Purposive sampling is used to select participants 'according to predetermined criteria relevant to a particular research objective' (Guest et al., 2006). This sampling method was used to select participants who had experience with the ESP for the pilot study, participants known to play a specific role in the ESP, and to select veterinary clinics known to participate in the ESP.

Referral sampling is a technique whereby existing or known study participants help to recruit future study participants (Marshall and Rossman, 2015). Veterinarians were asked to help recruit their clients to participate in the study by using the letter of introduction. Veterinarians were free to do this in the way they saw most convenient but were required to follow BREB protocol. One clinic sent the letter of introduction to all of their clients, and clients interested in participating were free to contact the researcher. At another clinic, when clients agreed to participate in the study, the veterinarian gave their contact information to the researcher. The researcher had no access to any private information about the participants, unless their telephone number was provided willingly through the veterinarian or the participant contacted the researcher directly.

Before the interview or focus group, each participant was given a consent form, allowed to ask questions, and was then asked to sign the form before discussion began. Interview duration ranged from 14 min to 64 min, with an average time of 33 min. Focus group duration ranged from 52 min to 66 min, with an average time of 59 min. Interviews and focus groups were conducted in person at the participant's home (20), office (3), at a location of the participant's choosing (1), or on the telephone (4).

25 interviews and three focus groups were conducted with 40 participants. Participants (35 men and 5 women) were categorized as 'dairy producers' (24 participants), 'large animal (dairy) veterinarians' (12 participants) or 'other dairy industry professionals' (4 participants) which includes individuals who play unique roles in the ESP. Herd size of the producers ranged from 70 to 700 cows. The average herd size in BC in 2015 was approximately 180 cows (Canadian Dairy Information Centre, 2017). All producers used loose-housing systems; as is typical of BC dairy barns (Canadian Dairy Information Centre, 2017). All participants lived in

the Fraser Valley, a region in southwestern BC, except for one veterinarian and one producer on Vancouver Island. Finally, the number of interviews and focus groups was not predetermined; rather interviews and focus groups continued until data saturation of the perceptions of the ESP, defined as sampling and conducting interviews until no new data emerges (Guest et al., 2006), was reached. The goal was to identify the range of perceptions across all dairy industry professional groups, not each group separately.

3.2.2 Data analysis

Interviews and focus groups were transcribed and checked for accuracy by the researcher. Before data analysis began each participant received a copy of their interview or focus group transcript and was given two weeks to review. No modifications were requested. This process represents a basic form of member checking, where participants are given the opportunity to confirm that the data, in this case the transcript, accurately represents what they intended to convey during the interview (Marshall and Rossman, 2015). Each participant was given a unique identifier which included a letter, designating their dairy industry professional group (p=producer, v=veterinarian, o=other industry professional) and three random numbers generated in Microsoft Excel.

Applied thematic analysis (ATA) was the analytical framework selected for this study. ATA closely resembles grounded theory (Guest et al., 2012) in that inductive, data-driven coding was used to develop themes that answer a research question and can be applied in a real-world setting. Unlike grounded theory, however, ATA does not require that a theory is built from data analysis (Guest et al., 2012). Initial line-by-line coding, a process of defining and labeling segments of data with words or short phrases (Charmaz, 2006), was used by the researcher, and once complete, codes were refined and organized through the creation of a codebook that

included 1) the code name, 2) the definition of the code and 3) examples of the code, as outlined by Guest et al. (2012). This process enabled the researcher to eliminate redundancies and define differences between codes. Codes were then developed into themes.

Inter-coder agreement, a process whereby multiple researchers analyze the same data and compare and discuss results (Marshall and Rossman, 2015; Guest et al., 2012), was used. The goal of inter-coder agreement is to increase the credibility of a study through the acknowledgment that the primary researcher may have biases which can be reduced by inter-coder agreement and provide a platform for discussion about data interpretation (Guest et al., 2012). In this study, inter-coder agreement was used in two instances. First, during the initial coding process, the primary researcher and another trained researcher coded four transcripts separately; this helped to develop initial codes and emerging themes. Second, after the primary researcher had coded each transcript and the codebook was complete, the primary researcher recruited a different trained researcher to code five transcripts using the codebook. In each instance, coding discrepancies were discussed and resolved (Guest et al., 2012).

3.3 Results

Anecdotal reports suggest that the ESP may be controversial and thus it is not surprising that the results showed negative and positive perceptions of the program. Perceptions ranged from an inability to find anything wrong with the ESP to questioning the necessity of the program. These perceptions influence the decisions that dairy industry professionals make when faced with the possibility of using the ESP. Three major themes emerged from data analysis. First, perceptions were heavily influenced by individual values. Second, perceptions were influenced by the operational legitimacy of the ESP. Third, participants perceived the ESP as a partial response to overarching concerns regarding dairy industry accountability to the public.

3.3.1 Individual values

Perceptions of the ESP were influenced by individuals' values that can be categorized into three sub-themes: 1) cow welfare 2) financial gain and 3) waste reduction.

All participants valued cow welfare but took different actions regarding use of the ESP. One group of participants believed that the ESP promoted fast decision-making and thus was positive for cow welfare because it reduced the delay in slaughtering compromised animals. As one veterinarian stated:

V913: 'The only other positive I see is some farms might be quicker to slaughter these animals than try to rehabilitate them, when really [there] wasn't a lot of hope. So you might have the animal that's crawling around a pen for a week, and then shot. Rather than it's decided that, while she's freshly injured, and you know that she hasn't got a lot of bruising and she's not suffering, while they're [the producers] trying to decide will she get up or not, they just decide that maybe emergency slaughter is a quicker solution.'

In this instance, the ESP is perceived to be positive for cow welfare as it decreased the amount of time that a cow may suffer and potentially die unassisted due to indecision or rehabilitation failure.

Contrastingly, another group of participants believed that the ESP was negative for cow welfare because it extended suffering and delayed death due to several factors. First, there were differences in the amount of time producers thought was acceptable to wait with a compromised cow, and for some, any delay for an injured animal was unacceptable:

P778: 'My guess is that you have animals that are waiting around so that the emergency slaughter program can happen, rather than being euthanized in a prompt fashion.'

Second, some also believed that the logistical complications of the ESP, including time and availability of the veterinarian, transporter and the slaughterhouse, caused delays that were unacceptable if a cow had sustained a traumatic injury.

P342: 'If I have an animal in distress, I'm not waiting for the whole thing to get coordinated and someone to show up. No. Not going to happen.'

In summary, participants valued cow welfare but were divided on whether the availability of the ESP shortened or delayed decision-making for compromised cows, where a fast decision would be positive for cow welfare and delays in decision-making or indecision altogether would be negative for cow welfare. Finally, some were unsure, and could see how the ESP could be positive or negative for cow welfare depending on how empathetic a producer may be toward their cows, as is articulated by a veterinarian here:

V255: 'If you had a cow that dislocated her leg or did something on a Thursday night, and that has to wait until the following morning at 7? That's several hours of pain and discomfort. Would the farmer had gone and euthanized the cow with his own gun or phoned a deadstock guy to come and pick up that animal before 7? Maybe, maybe not. And that depends on the client, really. Some people will be more apt to show compassion for the animal than others, and at the end of the day, the extra money that they would get from making sure that she went through the emergency slaughter program is not worth it to them, and they pull the plug on her right then and there. And then others will wait.'

Thus, regardless of whether the ESP is used as an end-of-life option or not, decision-making speed when a cow is compromised is one factor that will dictate whether the ESP is positive or negative for cow welfare.

On another level, participants perceived the ESP as a positive way to recoup some economic loss from a compromised cow. This value emerged when participants were discussing the positives of the ESP:

P891: 'Maybe cows are being euthanized before they just die, right? If a guy says, oh, this cow's down, this [ESP] is an option I can make a few dollars on, they'll use it rather than fight with her for an extra four or five days hoping she'll stand up.'

Although financial gain was appreciated by participants, using the ESP was also about avoiding the cost of carcass disposal:

P891: 'Revenue neutral is fine. ... I'm not doing it for the money, right? I don't want to be out of pocket, right? I can make money rather than spend it.'

The quotes above illustrate that participants preferred receiving some revenue instead of paying or even dealing with carcass disposal.

Another important perception is that when asked about the positives of the ESP, participants saw it as a way to salvage meat and they appreciated the option to do so:

P280: 'I see it as a waste when you have a perfectly healthy animal, and you have to essentially ... put her down because ... she can't walk. And now, at least we're using the meat.'

The words 'perfectly good' and 'perfectly healthy' were often used by participants who perceived the ESP as a positive opportunity to salvage meat. This was a solution to dealing with cows that had unfortunately been injured, and some participants expressed strong sentiments about what this meant for farmers:

P686: 'Somehow, psychologically, it's just a lot better, as a farmer, when you know that, okay, I've put a lot of work into this cow. She's been a good cow. And now she's going to go for meat, and that's good because everything's good about her except she hurt her knee. And somehow, psychologically, it's just easier for a farmer to know that it's not being wasted.'

Veterinarians also understood that their clients may feel that the unexpected euthanasia of an animal after putting large amounts of time, resources and effort into raising and developing a relationship with the animal would be disappointing and considered to be wasteful:

V825: 'Because that cow you've raised from a calf, right? If all of a sudden she has an injury. The meat's still good, but oh, I got to throw her in the compost because she can't go anywhere. That's kind of a letdown to producers too because they do have relationships with these animals.'

In summary, individual values held by participants influenced their perception of the ESP. Participants who used and did not use the ESP both felt that their decision promoted cow welfare. Financial gain was valued, but an opportunity to salvage meat and reduce waste was more important for most.

3.3.2 Operational legitimacy of the ESP

Operational factors of the ESP influenced perceptions of the legitimacy of the program. Certain factors increased the perceived legitimacy of the ESP and gave people confidence in the program (i.e. a positive view), while other factors caused concern and decreased participants' confidence (i.e. a negative view). The legitimacy of the ESP revolved around how participants perceived: 1) the implementation of the ESP, 2) logistics of the ESP including veterinarian-producer relationships, 3) oversight of the ESP and 4) food safety concerns.

Participants believed that communication about the use and purpose of the ESP during the implementation process could have been improved, and this ultimately decreased confidence in the program. Specifically, lack of communication about which cow conditions and injuries were appropriate for the ESP caused confusion among participants, as one recalled:

O284: 'It was a learning curve ... what kind of animals fit the program? ... where do you draw the line, right? And that was something that had to be dealt with between the veterinarians, and it was a learning curve for them, too.'

When asked to describe how they learned about the ESP, one veterinarian expressed a lack of communication about the implementation of the ESP itself:

V255: 'I think in the beginning it was a little bit chaotic. I mean, the actual launch of the whole program itself was kind of all of a sudden it [the ESP] was here ... there wasn't even for us a lot of instructions as vets. That would have been nice— to have a little bit more information transfer.'

Thus, without training in ante-mortem inspection, and without adequate information and guidelines, veterinarians felt they had to rely on their judgement about what was acceptable and not acceptable for the ESP at the time of program implementation. Additionally, the sentiment in the expression, '*all of a sudden it [the ESP] was here*', was echoed by others. Some wondered why they were not consulted during the development of the ESP and even stated that they

learned about the ESP via word of mouth instead of in a more official way, and this decreased their confidence in the program.

Overall, participants were divided on their level of confidence with the logistics of the ESP. When asked about their experience with the ESP, some described a quick and easy process, where, as P919 states, *'the vet [will come] and check her out and send her on her way.'*

Others believed, however, that the amount of coordination and paperwork made the ESP inconvenient:

P477: 'You got to get the vet out, and then it's the time factor to actually shoot and bleed an animal, to then transport her. And so sometimes it's kind of like, "Is it worth all of this?" But that's just the reality of what it is. And you do have your paperwork part of it too. So there's a fair bit around it.'

Other participants expressed concerns about the time constraints of the ESP based on the availability of the slaughterhouse and the transporter.

P891: '[We] can't always do it the same day, which I think is more important ... especially [for] cows that aren't doing well. If the slaughterhouse will accept these types of animals till this time, maybe extend that time so they can fit more animals in that time frame.'

In this instance, limitations with transporter and slaughterhouse availability decreased confidence levels in the program and increased concerns that the ESP could delay the death of injured cows.

Some participants who expressed initial apprehension about the ESP gained confidence as time passed. When asked about how dairy industry professionals perceive the ESP, one participant stated:

O202: 'People seem to have kind of gone on board ... it seems as though it must be working, I guess very well or else it wouldn't continue. We're three years in or whatever we're in to this ... obviously it's working fairly well.'

Thus, the perception that the ESP seemed to be working well and was continuing, and the fact that the ESP was well known by dairy industry professionals increased program legitimacy.

Another operational aspect of the ESP is that a veterinarian is required to perform an ante-mortem inspection. Although the ESP guidelines state that first, a producer must verify that the slaughterhouse can receive the carcass and then a veterinarian must perform an ante-mortem inspection, during interviews, two main answers were given when asked to describe the ESP process. Some participants described that the veterinarian would be telephoned first, others would telephone the transporter. A lack of clarity and consistency of the ESP process at this stage had the potential to create a feeling of obligation and pressure for veterinarians to sign an ante-mortem inspection document for a cow, as one veterinarian articulated:

V262: '[The ESP] hasn't worked where we're asked to come and evaluate if it's [the cow] suitable or not, so we're making that call when the truck's there and the rifle's loaded.'

This quote exemplifies the shared perception that the ESP can potentially create an uncomfortable situation where, if veterinarians are not the first point of contact for the ESP, or are not given adequate time to assess the cow, they could be asked to simply endorse a decision that has already been made.

Interestingly, participants also felt assured by the fact that the ESP required veterinarian approval, and were confident in the veterinarians' ability to perform ante-mortem inspections and judge whether or not a cow was fit for human consumption. This assurance improved their perception of the program:

O780: 'I think the key to the whole success of the program is ... veterinary practitioner oversight ... a high degree of ethical and technical and professional standards that they apply on the farm.'

Oversight was highly regarded by other participants as well:

P280: 'The veterinarian has to come out and check everything ... and he asks us some questions and everything like that. So he has to approve it first.'

In addition to veterinary oversight, confidence was also increased by the perceived oversight from legislation and meat inspection at the slaughterhouse.

P138: 'It's just more regulated, right? You have ... a set parameter of what cows can be in there, a set time of how long it takes to get to the kill plant. I know it's very strict.'

Thus, oversight from veterinarians, meat inspectors, and the fact that the ESP is governed by rules that are perceived to be strict increased participants' confidence in the overall legitimacy of the ESP.

Finally, participants shared food safety concerns related to transport and carcass cleanliness. In contrast to live cows walking into a slaughterhouse, many cows in the ESP were non-ambulatory (approximately 63% of the ante-mortem inspection documents) and could have been non-ambulatory in a pen for a number of days. Thus, some participants doubted that the same degree of carcass cleanliness maintained in a slaughterhouse could be achieved through ESP use:

V913: 'I've seen these animals that are dragged through manure, and I mean they are completely covered with manure. How do you possibly skin these animals cleanly and effectively without contaminating the meat underneath? I have no idea.'

In summary, some participants were confident in the various levels of oversight of the ESP and appreciated the ESP as an option for cows, but a poor implementation process and food safety concerns decreased confidence in the ESP. In addition, participants were divided in their perception of whether the process and logistics of the ESP made it viable and easy to use or too complicated and inconvenient to be worthwhile.

3.3.3 Overarching concerns about the dairy industry

Participants perceived the ESP as either a full or partial solution to some overarching concerns about the dairy industry that revolve around accountability to the public and how the industry is represented to the public. An awareness of, and often concern about, public perception of the dairy industry was discussed frequently, and it clearly influenced participants' perception of the ESP. Sub-themes include: 1) concern that the public may misinterpret the ESP, 2) belief that the ESP reduces the transport of compromised cows, 3) accountability to oneself and the public regarding meat quality and 4) concern that other dairy industry professionals may misuse the ESP.

Due to the proximity of farms to cities, participants feared that the public might misinterpret practices like the ESP or that the ESP might appear on social media. When asked about any potential negatives of the ESP, one producer stated:

P265: 'If you're walking past a farm, and the farm's close to the city, and this [ESP] is happening really close to a road where everybody can see what's happening, and nobody really knows what's happening, they're just taking pictures and putting it on social media.'

The fear of misinterpretation and its spread via the media and social media was echoed by many participants. This was often linked to the sentiment that the public is largely unaware of how dairy farms operate in general, and therefore there is a high risk that farm practices including the ESP would be misinterpreted.

Although participants did fear that the public may misinterpret the ESP, they also feared what the public might see off farm and expressed the belief that the ESP greatly reduced the number of compromised cows seen on trucks and at auction markets. Auction markets are open to the public; hence many participants believed that a positive outcome of the ESP is that it eliminates the chance that compromised cows would be seen:

P517: 'If you can eliminate these marginal animals going to market, I think it's just better all-around for the industry.'

While the focus of this quote is that preventing compromised cows from being shipped to auction is positive for public perception of the dairy industry, participants also expressed concern about the welfare of compromised cows if transported through the normal routes.

V646: 'I think there's also a huge humane factor in it [the ESP] where ... we really don't want that animal to be walking around for the next forty-eight hours, waiting for the right truck to go here or the right ... auction ring to facilitate her movement through.'

Despite the fact that participants believed that the ESP reduced the transport of compromised cows, some participants did not perceive the ESP as the final solution to compromised cow management in general. Proactive culling was discussed as a more appropriate and long-term solution that could be used to decrease ESP use and avoid situations where unwanted and unexpected decisions would have to be made if a cow became compromised. As one producer stated:

P350: 'We try to eliminate that by selectively culling before they get to that poor stage in life. If they're getting too old, we'll look at her and say, "Why would we re-breed that cow? Her legs are falling apart. Her udder is not good. She's done her job. She's in good health. She still can be used for consumable products." So instead of trying to say, "Okay, we're going to have one more calf", now we've got an issue. We've got a downer in the barn. We've got all these other problems with her. The whole thing is trying to [be] preventative, before we get there. But for us it's a lot less stress if we cull on time because we don't have these animals that we know are potentially going to be problems.'

Thus, although participants acknowledged that accidents happen on farms, participants appreciated that certain management practices like proactive culling could decrease the number of injuries on farms and could reduce potential problems in the future.

A number of participants noted that their decision to use the ESP for a cow was often guided by asking themselves or others, 'Would you eat it?' Producers held themselves accountable for the product they knew would be available for public consumption. Veterinarians

also found asking this question helpful when discussing potential ESP candidates with their clients. One stated:

V262: 'Without examining the cow, I'd say, "Would you eat her?" And if they say "no" we'd both agree that, okay, let's not send it, regardless of why she's down or how long she was down. If the farmer and I can look at each other honestly and say we wouldn't eat this, how can we expect someone else to?'

This represents a sense of accountability for using the ESP. Producers considered their individual perception of meat quality and held themselves accountable to that perception knowing that the public would consume the meat.

Other producers had doubts about meat quality from ESP cattle and were concerned about the effect that a traumatic injury could have on overall meat quality. As P350 reasoned:

P350: 'Usually there's a considerable amount of bruising, because obviously if she is down, she's been in a serious wreck. The hindquarters, which is the highest yield, is probably going to be condemned.'

In summary, some participants felt comfortable utilizing the ESP for their cows because they were confident in the product they were sending for public consumption, although others questioned meat quality in general.

Finally, some participants expressed concerns that although the ESP could decrease the number of compromised cows transported, having the option to gain financially could lead to poor decision-making regarding compromised cow management. When asked about the potential negatives of the ESP, some participants were concerned about how others may use the program, for example by delaying ES until a drug withdrawal period passed:

P653: 'If you have a cow with a meat withdrawal and she goes down ... I don't like the fact that you can leave that cow down for seven days [until] her meat withdrawal is clear and then they slaughter her—but I haven't heard too many of those cases. It shouldn't be a tool to fix poor management.'

Although P653 saw the potential that the ESP could be abused, he also doubted that this happens often and focused on dairy producer accountability for using the ESP appropriately.

In summary, participants' perception of the ESP was clearly influenced by overarching concerns about the dairy industry including public perception, transportation of compromised cows, accountability to consumers, and concerns about how other dairy producers may use the ESP. In terms of reducing the transport of compromised cows, participants perceived the ESP as a positive step, but not the final solution for improving compromised cow management.

3.4 Discussion

Participants in this study provided care for their cows so they would produce milk, and if a cow became compromised, knew that it was their duty to care for the animal. Some producers also felt strongly that if the cow had to be euthanized but was in a good condition, the ESP was a positive opportunity to reduce waste. These values of care are rooted in the pastoralist ethic-of-care worldview as described by Fraser (2008). Individuals that hold this worldview believe that animals may be used for purposes such as food production as long as appropriate care is provided (Fraser, 2008).

Little research has examined how dairy industry professionals perceive end-of-life options for cows. Wilkie's (2005) characterization of human-animal relationships, especially the 'concerned detachment' characterization, can be applied to dairy farmers in this study as was done in Bock et al. (2007). The 'concerned detachment' relationship Wilkie describes is similar to the pastoralist ethic-of-care worldview in that participants are concerned about their animals but also remain detached since their animals are used for food production. Participants in the present study expressed similar sentiments, appreciating that a '*good cow*' that has '*done her job*' would be used for the ESP.

All participants in this study expressed concern about cow welfare. This led some participants to readily use the ESP, as they believed it promoted fast decision-making for compromised cows while others refused to use the program as they believed it extended suffering. The desire to minimize suffering was also a predominant shared value in de Greef et al. (2006), and as the authors discuss, shared values can help find common ground among diverse groups of stakeholders. In this study, variation in ESP use among participants – all of whom valued minimizing cow suffering – could be due to differences in how individuals perceive cow pain. For example, Kielland et al. (2010) found that participants with positive attitudes toward cows were more empathetic toward cow pain. In another study, Thomsen et al. (2012b) asked veterinarians and producers to rate pain based on various dairy cattle diseases and conditions and found a large variation between respondents in terms of which diseases were considered ‘very painful’ and ‘not very painful’.

Veterinarian-producer relationships were affected by the operational aspects of the ESP. On the one hand, producers held veterinary oversight in high regard. Derks et al. (2013) found similar sentiments in a survey with Dutch dairy farmers where 83% of farmers were willing to discuss new topics with their veterinarian, and would take advice from their veterinarian. On the other hand, veterinarians and producers also saw a potential conflict of interest in ESP cases, especially where communication about ESP candidates was lacking, or when the veterinarian felt obligated to approve a cow for the ESP. This feeling could be influenced by the way the ‘Guidelines for Establishment Operators and Animal Producers or Agents — Emergency Slaughter Under the B.C. Meat Inspection Regulation’ are written, as the first requirement for on-farm emergency slaughter is that a producer ‘must obtain pre-approval’ from the slaughterhouse that the carcass can be accepted. Then, the producer must ‘hire the services of a

veterinary practitioner' to perform an ante-mortem inspection, and thus, the veterinarian is not necessarily the first point of contact concerning cow eligibility for the ESP.

Guidelines and instructions for the euthanasia of farm animals exist (Passler, 2014; Shearer and Ramirez, 2013; Shearer et al., 2013) and the creation of SOPs for farm animal euthanasia is acknowledged to be important (Turner and Doonan, 2010). Only recently, however, have the perceptions and management practices of farm animal euthanasia been studied (Fusi et al., 2017; Rault et al., 2017) and steps are currently underway to ensure clearer guidance. In particular, the National Farm Animal Care Council (NFACC) *Code of Practice for the Care and Handling of Dairy Cattle* requires prompt care (although the definition of 'prompt' is not provided) for injured cattle and has been adopted by the *Dairy Cattle Regulation* under BC's *Prevention of Cruelty to Animals Act* as 'reasonable and acceptable dairy farming practices'. Additionally, the proAction Animal Care Quality Assurance Program, a Dairy Farmers of Canada initiative, requires that farms have an SOP for performing euthanasia which includes a list of trained individuals who can perform euthanasia.

This study can be considered an example of how a diverse group of dairy industry professionals perceive the legitimacy of a program specifically in the context of program development and outcomes. Factors that give a policy or program legitimacy are analyzed by Bradley and MacRae (2011) in their examination of the NFACC code development process. These authors discuss legitimacy as 'whether [stakeholders] consider the regulatory body or network developing the rules to be authoritative, to use right process, to be adding value, to be legitimate'. Further, they divide factors that confer legitimacy into 'inputs' (how the program was developed, if stakeholder representation was present) and 'outputs' (whether the program or policy is ultimately perceived as effective). Participants in the present study perceived a poor

implementation process and lack of stakeholder consultation which indicates that input legitimacy was lacking. Despite this, many participants expressed confidence in the program outcomes, and some who were apprehensive became more confident in the ESP over time, indicating output legitimacy.

Many participants perceived the ESP as a solution to reduce the transport of compromised cows. Participants alluded to the inappropriate transport of cows before the ESP was available, and before regulatory changes made shipment of non-ambulatory cows illegal in 2005. Both the regulatory change and the positive perception that the ESP reduces transport of compromised cows indicate an increased awareness of, and a desire to avoid, compromised cow transport.

Participants were also sensitive to the impact of undercover videos on animal agriculture, and although some feared that the public may misinterpret the ESP, more appreciated that the ESP reduces the chance that the public may see and photograph compromised cows at public auction. Participants often referred to previous local and international instances of undercover videos that reduced public confidence in animal agriculture. Undercover videos have been shown to increase negative attitudes held by the public toward animal agriculture industry groups (Tiplady et al., 2013). This sensitivity was perhaps also motivated by the fact that producers and veterinarians believed the public lacked awareness and therefore could potentially misinterpret farm practices, as is described by Benard and de Cock Buning (2013).

Finally, although the ESP may help reduce the transport of compromised cows by providing producers with another option and keeping compromised cows out of public view, some participants believed this was a partial solution and overlooked the overarching issue of compromised cow management. Based on participant concerns that the ESP may be used as a

tool for poor management, more research about how dairy industry professionals manage compromised cows and clarification about appropriate uses of the ESP is necessary.

Chapter 4: General discussion, recommendations and conclusion

The ESP is one end-of-life option for dairy cows, but the use and perceptions of the ESP in BC had not previously been studied. In addressing this knowledge gap, this thesis had three main objectives. The first was to examine ESP use through the analysis of ante-mortem inspection documents in order to identify situations where cows may be especially vulnerable to ES so that proactive measures to avoid ES may be taken, and to determine which injuries and conditions are most appropriate for the ESP if such situations cannot be avoided. The second objective was to understand dairy industry professionals' perceptions of the ESP in BC through semi-structured interviews and focus groups to order to identify the factors that influence how the ESP is used in practice and to highlight the perceived advantages and disadvantages of the ESP. It was hoped that this knowledge could improve situations where cow welfare is compromised and individuals are faced with making difficult decisions. The third and final objective was to identify areas of shared views and concerns and to make recommendations for the ESP in BC.

4.1 Limitations

This study has certain limitations. First, the main purpose of the ante-mortem inspection is to confirm that an animal is suitable for human consumption, and sometimes minimal detail about the animal's condition was provided on the documents. Additionally, the diagnosis of compromised cows is difficult (Huxley, 2006) and post-mortem information was not available to confirm the proximate reason for ES as identified on the documents. To deal with this limitation, the reasons for ES are clearly designated as 'proximate', and reasons that included minimal information were included in the 'minimal information' category. However, the ante-mortem inspection document is a legal document and veterinary oversight increased the operational

legitimacy of the ESP, and thus for the purpose of this study, the proximate reason for ES written on the document was considered to be accurate within the broad categories used.

Second, interviews and focus groups require trust between the researcher and participant(s), especially for sensitive topics like the ESP (Marshall and Rossman, 2015). Additionally, while focus groups are beneficial in that participants may discuss in an existing social group, one challenge is that power dynamics likely exist which can affect what individuals say. In order to overcome these challenges, the researcher focused on interview techniques that include having an open attitude to responses and asking follow-up questions (Seidman, 2006).

A final limitation is that this study examines use and perceptions of the ESP in BC which occurs mainly in the Fraser Valley. Therefore, some findings may be somewhat context dependent, including that some participants perceive the process and logistics of the ESP to be viable partly because of the geographic proximity of farms to a participating slaughterhouse. Thus, caution is needed in extending the findings of this study to other dairy-producing areas and animal agriculture in general, although the individual values, operational legitimacy and dairy industry concerns that influenced perceptions of the ESP may be transferable to other contexts and populations.

4.2 Methodological approach

This study used a mixed-methods approach which has numerous strengths (Guest et al., 2012). Mixed-methods studies use complementary techniques to provide thorough evidence to answer a research question. Each data set in this study yielded results that informed different aspects of the thesis objectives. The analysis of the ante-mortem inspection documents allowed the reasons for the use of the ESP to be better understood, and the in-depth interviews enabled analysis of diverse dairy industry professional perceptions about the ESP.

The thesis also used triangulation or the process of using two data sets (in this case, the ante-mortem inspection documents and the interviews and focus groups) to increase the credibility of research findings (Guest et al., 2012). One of the most common methods of triangulation, namely the use of multiple methods, was employed to arrive at conclusions and recommendations.

4.3 Conclusions and recommendations

In conclusion, use of the ESP as an end-of-life option can be positive for individual cow welfare, and beneficial to farmers and the dairy industry. If used as a tool for poor management, the ESP can be negative for individual cow welfare and the dairy industry. Ultimately, whether the ESP is overall positive or negative will depend on the dairy industry professionals making decisions on farms. The following are shared recommendations that could help address concerns and negative perceptions of the ESP while retaining the advantages of the program.

4.3.1 Clarification of the purpose of the ESP

The ESP was perceived to be an alternative and more humane option to transportation of an injured animal. In interviews and focus groups, participants agreed on this point, and on every ante-mortem inspection document, ‘inhumane to transport’ was selected as the ‘reason for emergency slaughter’ and ‘inhumane to transport’ was also written separately on 13% of the documents. During data analysis, the code ‘ESP reduces transport’ was applied to the transcripts and the ante-mortem inspection documents. This strengthened the finding that the ESP was largely seen as a positive way to improve the image of the dairy industry, to avoid the potential negative ramifications of transporting compromised cows and to improve cow welfare.

As mentioned in Chapter 2, two main categories of why dairy cows underwent ES emerged. These were traumatic incidents (true emergencies) and inhumane-to-transport, a

category that may include non-emergencies. The majority of leg, hip, spine and rarely occurring injuries (545 cases) can be classified as emergency situations, whereas most foot, hind-end, and nerve damage, together with cases involving minimal description (267 cases) can be classified as non-emergency situations. Although a reading of the ESP guidelines would technically allow each category, there is a need for additional clarification on the purpose of the ESP and allowable conditions for cows in the inhumane-to-transport category.

Clarification could also help producers to understand which cows are clear candidates for ES and potentially reduce the shared concern that the ESP may be misused or cause delays in decision-making. In interviews and focus groups, participants expressed that using the ESP was often unexpected and invariably unwanted, and if prognosis was unclear and the cow showed signs of recovery, producers would sometimes delay making a decision. This finding was also reflected in analysis of the ante-mortem inspection documents that showed up to four weeks between the injury or onset of the condition and use of the ESP. Clarification about allowable conditions especially in the inhumane-to-transport category should be included in the ESP guidelines and made known to all dairy industry professionals.

Clarification about the purpose of the ESP as well as allowable conditions would help veterinarians who felt that initial guidelines and information about the ESP were lacking, as well as producers who may have yet to learn about or use the ESP. Specific veterinarian training on the ESP may also be useful, as is done in Alberta, or the use of designated veterinarians to perform ante-mortem inspections, as is done in Ontario. This would clarify gray areas of allowable and unallowable cow conditions and help eliminate the sense of obligation that may be felt by veterinarians who have relationships with their clients.

4.3.2 Time restrictions for use of the ESP

A shared value among participants was a desire to minimize cow suffering. Participants who perceived the ESP to delay the death of an injured animal sometimes described a hypothetical situation where a cow would sustain an injury on Friday afternoon, and due to the operational hours of the ESP, be held until Monday morning when the ESP could be performed. Although many stated that this would not occur and the animal in such a situation would be euthanized, this concern could be resolved easily by the implementation of precise timing parameters in the ESP guidelines and perhaps in BC's *Meat Inspection Regulation*.

4.3.3 ESP process

Participants lacked confidence in some operational aspects of the ESP. First, the guidelines of the ESP are somewhat unclear in the designation of who the producer should contact first if they decide to use the ESP: the slaughterhouse, the veterinarian, or the transporter. The clear designation of the veterinarian as the first point of contact for confirming cow eligibility for the ESP would clarify this aspect of the program and could potentially eliminate any sense of obligation felt by veterinarians to endorse a decision that may have been previously made. Food safety concerns were mostly related to carcass cleanliness, and thus one recommendation is to shoot and bleed the animal in a clean area. Additionally, use of proper equipment to ensure proper bleeding as well as transport cleanliness could improve the operational legitimacy of the ESP.

4.3.4 Extending access to the ESP

Geographical and operational constraints limit the use of the ESP in BC. Specifically, the program requires a willing slaughterhouse, proximity of farms to the slaughterhouse and availability of a veterinarian and transporter. The ESP occurs in the lower Fraser Valley region

and occasionally on Vancouver Island but rarely if at all in other areas of the province. Given the advantages of the ESP, the dairy sector might negotiate with slaughterhouses in other parts of the province to participate, and secure the services of local transporters in other regions.

4.3.5 Reducing the need for the ESP

Finally, participants disliked having to use the ESP, and some perceived proactive culling as a way to reduce ESP use. The National Farmed Animal Health and Welfare Council (NFAHWC) recently published a consensus statement on cull dairy cow management that encourages proactive culling (NFAHWC, 2017). Thus, proactive culling should continue to be promoted, dairy industry professionals should work together to provide guidance and training opportunities on proactive culling, and individual farms should develop their own proactive culling and end-of-life protocols.

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Appendices

Appendix A Document for an Approved Emergency Slaughter on Farm



Ministry of
Agriculture

Document for an Approved Emergency Slaughter on Farm

The veterinary practitioner must complete and ship this document with the carcass to the licensed establishment.

To be filled in by Veterinary Practitioner

CFIA - SRM transport permit #: _____ Species slaughtered: _____

(Cattle require an SRM Permit from the Canadian Food Inspection Agency. The SRM emergency permit number is 1-866-788-8155)

Age of animal: _____ Approved identification #: _____
(CCIA, CSIP ear tag, or PIGTRACE ID)

Reason for emergency slaughter: Inhumane to transport Behaviour/size of animal

History of animal's condition: _____

Clinical Examination Results

Results of clinical examination: _____

I verify that this animal was humanely stunned and properly bled

Time of stunning: _____ am/pm Time of bleeding: _____ am/pm Time carcass shipped: _____ am/pm

In my opinion this animal cannot be loaded and transported humanely, is fit for slaughter and has undergone the proper withdrawal time for any veterinary drugs or treatments.

Veterinary Practitioner: _____
(Veterinarian Signature) (Print Name)

Clinic/Practice Name: _____ Date: _____
(yyyy/mm/dd)

PRODUCER or AGENT DECLARATION

I certify that the animal described above has undergone proper withdrawal times for any drugs or treatments that it has received.

Producer or Agent: _____
(Signature) (Print Name)

To be filled in by the Establishment Operator

Date and time carcass arrived at establishment: _____ am/pm
(yyyy/mm/dd) (time)

Establishment Name: _____ Establishment Number: _____

Operator: _____
(Signature) (Print Name)

To be filled in by the Meat Hygiene Inspector

Date: _____ Time _____ am/pm
(yyyy/mm/dd)

Disposition (if condemned provide reason): _____

Inspector: _____
(Inspector ID #) (Signature) (Print Name)

Appendix B Interview and focus group guide

Theme	Primary questions	Follow up questions
General experience with the ESP	Tell me about your involvement with the ESP.	Does your role vary? Can you describe any specific examples of how you have been involved with or exposed to the program?
General perceptions of the ESP	What have you heard about the program?	
	What do you feel are the positive aspects of this program?	
	What do you feel are the negative aspects of this program?	
	Why do supporters support the program?	
	Why do opponents oppose the program?	
Outcomes for dairy industry professionals	How does this program affect: -veterinarians -producers -meat inspectors -other dairy industry professionals?	
Outcomes for dairy cattle	One of the goals of this program is to prevent animal suffering. Is the ESP achieving this goal?	Why or why not?
	Does this program currently have the ability to improve the welfare of dairy cattle, especially at the end of their lives?	Does the ESP have any unrealized potential? Is there anything that it could do but is not yet achieving?
Final thoughts and recommendations	What in your work has changed as a result of the implementation of the ESP?	
	Would you recommend that other provinces or jurisdictions adopt ES? If yes or no, what changes would you recommend?	Is there anything else you'd like to add?