PROMOTING FARMER AND VETERINARIAN COOPERATION TO IMPROVE DAIRY CALF WELFARE

by

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Abstract

Over the last decades, increasing scrutiny by the public related to farm animal welfare has placed pressure on farmers and veterinarians to adopt practices that lead to improvements in farm animal care. Despite these growing demands from the public, and a growing body of knowledge on what farm animals need and want, challenges remain regarding how to motivate farmers and veterinarians to adopt management changes to improve animal welfare. Dairy calves, in particular, face many welfare challenges in the early stages of life. Considering that the farmer is directly responsible for calf care on dairy farms and the veterinarian is a trusted advisor, this thesis explores how farmers and veterinarians cooperate to improve calf welfare.

Chapter 1 introduces key concepts such as animal welfare, motivating factors for behavioral change, and the context for the Canadian dairy cattle industry. Chapter 2 reviews current literature on dairy farmer and veterinarian perspectives on cattle welfare and suggests that increased cooperation between these stakeholders could lead to improvements in welfare by identifying shared values for improving welfare, promoting their different perspectives as complementary, and improving communication. To examine this proposition, Chapter 3 reports on a focus group study that explores how veterinarian concerns and actions related to calf welfare correspond to their professional and personal obligations to improve it. Chapters 4 and 5 report on an interview study with dairy farmers that participated in a benchmark study on calf immune system status and growth. Chapter 4 describes how access to information and peer comparison in the form of benchmark reports motivated farmers to improve calf management. Chapter 5 describes how including the veterinarian in the benchmarking process influenced the ways that farmers viewed their veterinarian as an advisor for calf management. Chapter 6 concludes the thesis with a summary of strengths and limitations of this dissertation and
recommendations such as creating interventions to improve calf welfare that complement the current management systems and leverage existing relationships between farmers and veterinarians.
Lay Summary

Dairy calves face welfare challenges soon after birth; many of these challenges can be overcome through cooperation between farmers and veterinarians. This thesis examines how motivating factors and roles for dairy farmers and veterinarians intersect to influence management practices that impact calf welfare. First, a review of the literature on dairy farmer and veterinarian perspectives indicates that cooperation to improve welfare can promote shared values, complementary roles, and improved communication. A first study identifies how veterinarian concerns about calf welfare align with their beliefs about their responsibility to improve it. A second study examines how information on calf immune system status and growth motivated farmers to improve because of increased awareness and confidence in calf management. The final study examines how cooperation improved farmer perception of their veterinarian’s ability to advise on calf topics. In conclusion, understanding dairy farmer and veterinarian motivating factors can promote cooperation to improve calf welfare.
Preface

A version of Chapter 2 has been published as Sumner, C. L., M. A. G. von Keyserlingk, and D. M. Weary. 2018. Perspectives of farmers and veterinarians concerning dairy cattle welfare. *Animal Frontiers*, 8:8-13. C. L. Sumner developed the main ideas for this project and wrote the manuscript. M.A.G. von Keyserlingk and D.M. Weary acted in the typical role of supervisors, providing input and editing drafts. This chapter did not require ethics approval.

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I am indebted to my family who has always supported the choices I make in life.

Finally, I turn to my husband Danny FitzGerald. I do not have words both qualitatively and quantitatively to fully express my feelings about your support and love. The best I can do is offer, “thank you”.
Dedication

This thesis is dedicated to all the animals that have inspired me to work for change.
Prologue

I came to UBC motivated to understand how to improve dairy cattle welfare. I decided to study what motivates farmers and veterinarians to improve calf welfare. This thread of motivation has felt forced at times when I struggled with navigating a doctoral program and I am reminded that motivation is not an all or nothing phenomenon. There are times we aim for the stars and make it, and times we fall short of the glory. This is how I have come to expect how improvements in calf welfare will proceed.

This thesis is a snapshot in time and should be interpreted as such. As humans, we change as we interact with other people and animals. Even writing this prologue as I near the end of my doctoral program seems distant from the individual chapters that have been created over the course of four years. The qualitative researcher must acknowledge themselves in their work. One cannot be separated from the other. On one hand I can bracket my experiences and bias and set them aside as I retell the stories I have heard from farmers, veterinarians, and others. On the other hand, I can retell these stories as they are also my own story to tell. Both ways indicate that the knowledge generated through my doctoral work is co-constructed. I did not do this alone. These stories do not stand on their own. All of these stories of people, of animals, of myself are inextricably linked. I take solace in this recognition that hopefully this work can atone for times when I did not live up to my own expectations of how to treat animals.

My own identity is central to this thesis. I am an animal person; their welfare is core to how I see myself existing as a moral agent. Prior to coming to UBC, I spent many years working with animals in systems that rely on them for their existence: farms, sanctuaries, and zoos. I eat animals (sometimes), consume their byproducts, and live with them. It is through this lens of
animal use and companionship that I see how this thesis exists. This thesis is part of a long
dialogue we humans must continue to have with animals if we are to claim any sense of morality.
I admittedly remain in an animal welfare orientation towards my relationship with the animals
around me; we should continue to improve the quality of their lives on farms, in captivity, and as
companions.

However, as I noted above, this is a snapshot in time. I remain open to how my
relationship with animals will evolve as my interactions with them and other people continue to
shape my worldview.
Chapter 1: Introduction

1.1 Establishing the context for dairy cattle welfare

Over the last decades, increasing scrutiny by the public for how farm animals are cared for has placed pressure on farmers and veterinarians to adopt practices that promote welfare. This increased scrutiny has also led to research efforts to understand what types of practices improve animal welfare. Despite growing demands from the public, and a growing body of knowledge on what dairy cattle need and want, challenges remain regarding how to motivate farmers to adopt practices that promote welfare.

Animal welfare can be thought of as three overlapping areas of concern that include an animal’s affective state (i.e. how they are feeling), biological functioning (including health), and natural living (i.e. the extent the animal uses behavioral adaptations; Fraser et al., 1997). However, different stakeholders place emphasis on different aspects. For instance, industry stakeholders, such as farmers and veterinarians, are typically concerned with health, including production diseases such as lameness (Te Velde et al., 2002) and on-farm mortality (Ventura et al., 2015). In contrast, the public are often concerned about practices that they view as being unnatural such as separating the cow and calf shortly after birth (Ventura et al., 2013) and restriction of movement associated with confinement housing (Hötzel et al., 2017). Animal welfare scientists are often most concerned about affective states, such as painful procedures (Weary et al., 2006); however, they also believe that solutions to improving welfare should incorporate all three types of welfare concern (von Keyserlingk et al., 2009; Marley et al. 2010; Barkema et al., 2015).
1.2 Dairy farmers, veterinarians, and animal welfare

Understanding the human element of animal welfare is central to finding solutions (Lund et al., 2006). For farm animals, it is worthwhile to consider two of the most pertinent stakeholders responsible for animal care: the farmer and veterinarian. Although some reports suggest that dairy farmer perspectives about animal welfare are primarily production-oriented (Vanhonacker et al., 2008; Bruijnis et al., 2013), many farmers hold a broader view of animal welfare and place value on how the cows feel (Kauppinen et al., 2010; Hansson and Lagerkvist, 2016; Schreiner and Hess, 2017). This also includes concerns about emotional states, such as avoiding situations in which their animals experience suffering (Bock et al., 2007). Other work has reported that dairy farmers view their cows’ welfare as a reflection of their own success (Russell and Bewley, 2013; Smith et al., 2013), and an important component to ensuring their own well-being (Kauppinen et al., 2013; Hansson and Lagerkvist, 2015).

Less is known about veterinarian perspectives concerning welfare. Some reports indicate that veterinarians are concerned about a broad range of issues, including disease, painful procedures, calf care and comfortable housing (Ventura et al., 2015), as well as the ability to engage in natural behavior (Angus et al., 2005). Additional concerns include care for cattle in organic systems where the use of non-conventional treatments are often in conflict with other practices for treatment of diseases (Duval et al., 2016a). In at least one study, veterinarians expressed frustration with a narrow welfare focus of fellow veterinarians that only included health and production (Ventura et al., 2016b). Veterinarians have also reported concerns beyond treating pain and disease, including a moral duty to provide pain relief for painful procedures or conditions (Fajt et al., 2011).
1.3 The Canadian dairy context

In the sections below, I present a brief overview of the dairy industry in Canada to provide context for the work in this thesis.

1.3.1 Dairy farmers in British Columbia

There are approximately 400 dairy farms in British Columbia (that ship milk off the farm; CDIC, 2017b). The average herd size in British Columbia is approximately 140 cows (BC Ministry of Agriculture, n.d.) and over 96% of farms use freestall barns (CDIC, 2017a). Many dairy farmers rear their own heifer replacements (i.e. future lactating cows) on their farms. Although facilities specializing in rearing heifers do exist in British Columbia, the proportion of calves reared in these systems is not known.

Approximately 98% of dairy farms are family owned and operated indicating that much of the labor on farms is family-based (BCDA, n.d.) Although dairy farms also use hired labor such as herd managers, calf managers, milkers, and calf feeders who may report to the owner or the owner’s adult children, the extent to which non-family labor is used across the province is not known. A recent Canadian survey found that family members are in charge of calf care on the majority of farms with help from hired labor, and commonly calf care is managed by two individuals (Medrano-Galarza, 2017).

Dairy farming in British Columbia has mirrored trends in other parts of Canada with an ongoing consolidation of farms and increasing reliance on hired immigrant labor (Barkema et al., 2015). Another trend happening on farms in British Columbia (and in other parts of Canada) is the increasing use of automated calf feeders, which reduce the need for labor to feed calves (Medrano-Galarza et al., 2017).
1.3.2 The veterinarian’s roles on dairy farms in Canada

In Canada, the relationship between farmers and veterinarians is shaped by societal and professional expectations of the role that veterinarians have in animal livestock production. Veterinarians in Canada (and elsewhere) must balance professional duties towards the client, the public, and the animal (Morgan and McDonald, 2007; Hernandez et al., 2018). Competing ethical perspectives can lead to disagreements about how veterinarians should perform their duties. Different ethical perspectives include: the moral status of animals, (i.e. if the animal has value based on its own interests in contrast to interests of humans), the extent of responsibility to provide care for the animal (e.g. level of care provided and cost of care to the client), and how to determine what is in the best interest of the animal (e.g. when should an animal be euthanized; Morgan and McDonald, 2007). Livestock veterinarians face unique challenges with providing care to farm animals. For example, livestock veterinarians can be asked to participate in mass slaughter of healthy surplus farm animals, potentially violating societal expectations that veterinarians should protect animals (Whiting and Marion, 2011). Additionally, the role of livestock veterinarians has been questioned as attending more to corporate farming interests than the animal (Hernandez et al., 2018).

With respect to the dairy farmer-client, the structural context of dairy farming in Canada has changed in recent decades requiring that veterinarians adapt to their clients’ changing needs. Major changes in the dairy industry, both within and outside of Canada, including the adoption of new technology in dairy farming, increases in herd size, and advances in epidemiology, have shifted the role of the veterinarian from diagnosing and treating the individual animal to managing the health of the herd (e.g. disease management, reproduction, milk production;
LeBlanc et al., 2006). There are 1,733 veterinarians in British Columbia (CVMA, n.d.a.). Recent survey work has found that 1% of veterinarians in British Columbia practice large animal veterinary medicine (dairy included; Jelinski and Barth, 2015), suggesting there are approximately 20 dairy veterinary practitioners in British Columbia.

Additionally, veterinarians working with farm animals must meet societal expectations by holding up standards of care on farms in accordance with federal and provincial law that protect both the public and the animal. For example, British Columbia provincial law requires that dairy veterinarians report non-compliance with instructions for diagnosing and preventing disease (Animal Health Act, 2014). British Columbia provincial law also requires veterinarians to report instances of cruelty (Prevention of Cruelty to Animals Act, n.d.). Abiding with these legal requirements comes with challenges including interpreting language used to determine what constitutes a reportable offense, and the inconsistent use of standards to determine reasonable practices (Fraser et al., 2018). In April 2016 an amendment to the Prevention of Cruelty to Animals Act was enacted, stipulating that the Code of Practice for the Care and Handling of Dairy Cattle (a national multi-stakeholder developed document; NFACC, 2009) constituted reasonable and generally accepted practices on dairy farms (Dairy Cattle Regulation, 2015).

Veterinarians are also encouraged to respect and adhere to the Canadian Veterinary Medical Association’s position statements on animal welfare. These position statements are developed based on current scientific knowledge and ethical reasoning (CVMA, n.d.b.). For example, the Canadian Veterinary Medical Association opposes tail docking in cattle (CVMA, 2016a), and promotes dehorning or disbudding calves with pain relief (CVMA, 2016b). These
statements may influence interpretations of the laws surrounding animal welfare and are intended to guide veterinarians in decision-making (CVMA, n.d.b.).

Food safety is another responsibility of the livestock veterinarian. A recent change in the availability of antibiotics for use on farms illustrates how veterinarians must account for multiple interests. For example, British Columbia provincial law allows farmers (and employees) to provide treatment to their livestock in the absence of the veterinarian (Veterinarians Act, 2010). As of December of 2018, a documented veterinary client patient relationship will be required for farmers to use antibiotics that are important for human health. This includes restrictions to antibiotics important for humans that were previously accessed over the counter in retail stores or available in pre-mixed feed without prescription (Government of Canada, n.d.). These veterinary client patient relationship agreements stipulate that the veterinarian is responsible for clinical decisions, must have knowledge of the animal including recent examination, and be available for follow-up evaluation before a prescription can be provided to the client (CVMA, n.d.b.). The intent is that the formalization of this agreement will make the veterinarian more accountable for safeguarding antibiotic drugs that are important for human use.

Keeping in mind these expectations of the veterinarian’s role in agriculture, potential conflicts of interest may arise. Fundamental disagreements (between veterinarians and farmers and among veterinarians) can occur on whether policy and programs lead to better outcomes for cattle. For example, a recent federal ruling has demonstrated differences of opinion, even within the veterinary profession, on whether reducing transport time for livestock leads to improvements in welfare. Some veterinarians view these changes as a misguided response to pressure from animal activists, whereas others see these as essential for reducing the stress of transport (Johnson, 2017). Some disagreements are about principles. For example, in British
Columbia, emergency slaughter is allowed on dairy farms to minimize cattle suffering (i.e. quicker death in the event of an emergency) and reduce food waste. For farmers to use this program, a cow must be examined by a veterinarian and deemed acceptable to slaughter for human consumption (e.g. absence of disease; Koralesky and Fraser, 2017). This program was intended for emergency situations (e.g. broken leg), however, recent work has found that farmers use this option for both emergency and chronic conditions (e.g. lameness; Koralesky and Fraser, 2017). Some veterinarians believe that this program helps farmers make quicker decisions about end of life options for their cattle, whereas, others believe this program can prolong animal suffering because farmers wait too long to make the decision to slaughter (Koralesky, 2017).

1.3.3 How do farmers relate to their veterinarian?

Collectively, Canadian dairy farmers are organized at the provincial and federal level through a supply management system that regulates the price of milk and the quota for milk production levels, and restricts milk imports (Barichello, 1999). On the national level, the Dairy Farmers of Canada acts as the advocacy group promoting the interests and accountability of the dairy industry. The Dairy Farmers of Canada recognizes the value in veterinarians promoting the health of the cow and has taken an active role in collaborating with veterinarians in both government and academic sectors to promote campaigns for mastitis and Johne’s disease control (DFC, n.d.). The Dairy Farmers of Canada also supports the role of the veterinarian in promoting good stewardship of antibiotic use on farms (DFC, 2015). Farmers and veterinarians (in addition to academics, milk processors, and advocacy groups) have collaborated on the development of the Codes of Practice, a series of documents promoting recommended and required practices on farms (NFACC, 2009). Although the Codes were not written as regulatory documents, as noted
above, the Code of Practice for the Care and Handling of Dairy Cattle has been integrated into the British Columbia provincial laws as guidance for determining acceptable farm practices.

Little is known about how individual Canadian farmers view the role of the veterinarian on their farms. At least one study has identified that Canadian farmers believe that the veterinarian is important in promoting welfare and that when they collaborate this can result in improvements in animal care (such as using pain relief during dehorning; Winder et al., 2016b). Canadian dairy farmers and veterinarians both indicated that disease management priorities rank highly as a concern (Bauman et al., 2016), so farmer recognition of the role of the veterinarian as an advisor for disease seems logical. However, two studies with Canadian farmers suggested that farmer recognition of the veterinarian, as an advisor on disease, does not necessarily reflect compliance with this advice. Ritter et al. (2016) found that farmers recognized their veterinarian’s role in promoting biosecurity, but despite this recognition these authors found no evidence that veterinary encouragement actually motivated farmers to improve. Sorge et al. (2010) found similar outcomes in terms of farmer attitudes towards veterinary recommendations to reduce disease on farms, in part because farmers perceived these recommendations to be too many, too costly, and failed to see the value of implementing the changes.

1.4 Efforts focused on the farmer and veterinarian to improve animal welfare on

Efforts to improve farm animal welfare that have focused on recognizing that dairy farmers vary from one another based on socio-psychological factors, life experiences, personality, and goals (Ritter et al., 2017). A number of studies have examined differences in farmers’ trust of external sources of information and external advisors, and found that understanding these differences can help veterinarians tailor their approach to motivating change
(i.e. direct consult versus a newsletter; Valeeva et al., 2007; Jansen et al., 2010b; Kristensen and Jakobsen, 2011b; Ritter et al., 2016). At least one study reported that veterinarians use this type of approach (e.g. characterizing their clients as proactive, open to advice and change, or reluctant and disengaged) in their consultation efforts with their client farmers (Richens et al., 2016).

Other examples have focused on improving dairy cattle welfare through motivating farmer and veterinarian behavior change. In one study, Bell et al. (2009) found that a lack of farmer and veterinarian compliance with action plans to reduce lameness on dairy farms was a key reason for why interventions failed. In a different study, Jansen et al. (2010a, 2010c) reported on a behavioral intervention targeting practices that reduce mastitis on farms, such as using on-farm study groups to discuss mastitis assessment and treatment, goal setting, and milking techniques, and an indirect promotion campaign advocating for the use of gloves during milking. The program was successful in increasing knowledge and interest in controlling mastitis, and increasing compliance using gloves during milking (Jansen et al., 2010a, 2010c).

These examples share a focus on motivating behavioral change to adopt practices that improve welfare, for example with veterinarians (i.e. using tailored approaches for clients about management practices), with farmers (i.e. adopting improved hygienic practices), or with both parties (i.e. encouraging collaboration in identifying and reducing on-farm welfare risks). However, these efforts resulted in mixed outcomes in adopting behavior changes, indicating a need to further understand how to motivate dairy farmers and veterinarians to improve welfare.

1.5 How is motivation understood?

In the sections below, I review key concepts related to motivations for behavior change to help frame the overall aims and research questions of this thesis.
Key to motivating behavior change is understanding the antecedents of behavior including: values, norms, attitudes, and perceived control over behavior (Ajzen, 1991; Eagly and Chaiken, 2005; Webb and Sheeran, 2006). Values are abstract ideals that inform thoughts and behaviors (see Maio et al., 2006). Values represent what is important to people, motivate action based on goals, and can be characterized based on the needs of the individual or society (Schwartz, 2011). In this thesis, I have elected to report values as described by the research participants, for example, as they relate to tasks such as calf management practices, concepts of animal welfare, or personal values such as pride.

Norms are beliefs about behaviors that are contingent on the acceptance of a particular group of people (Southwood and Eriksson, 2011; Bicchieri, 2017). People follow descriptive norms because of an empirical expectation that others behave the same way. What distinguishes social norms, is that people believe they should adhere to a particular behavior; there is social pressure to behave in a certain way (Bicchieri, 2017). Additionally, compliance with social norms is ensured through positive or negative sanctions of the pertinent group (Bicchieri, 2017). There are some disciplinary-based distinctions with terminology for norms. Subjective norms are the perceived social pressure a person feels to behave in a certain way (Ajzen, 1991). Subjective norms have been described as the perception of a social norm (Burton, 2004). Others have equated the term “subjective norm” with the term “injunctive norm”, i.e. expectation of what should be done (Rimal and Real, 2005).

Attitudes are a person’s emotional, cognitive, and behavioral evaluation of an object (Fabrigar et al., 2005). Perceived behavioral control refers to an individual’s belief about how difficult or easy it would be to perform a behavior and is consistent with a concept of self-efficacy in performing a behavior (Ajzen, 1991).
Many of these concepts interact with each other as determinants of human behavior. For example, attitudes and values have bidirectional influences on each other; values inform a positive or negative attitude towards an object, whereas attitudes reveal underlying values (Maio et al., 2006). Norms are mechanisms of accountability to ensure a group behaves according to the associated values (Southwood and Eriksson, 2011). According to the theory of planned behavior, intention to behave (i.e. motivation to behave) is measured based on a combination of a person’s beliefs about attitudes, normative beliefs that inform subjective norms, and control beliefs that indicate perceived control over behavior in a given context (Ajzen, 1991).

Several studies have focused on determining motivational factors of farmers to improve animal welfare. The theory of planned behavior has been used to study farmer intention to improve on-farm welfare for dairy cows (Bruijnis et al., 2013; Jansen, et al., 2010c; Kauppinen et al., 2010) and pregnant sows (de Lauwere et al., 2012). Other studies with dairy farmers have focused on exploring a farmer’s motivation to improve welfare based on values. Kauppinen et al. (2010) argued classifying a farmer’s attitude towards welfare based on the cow’s instrumental use or intrinsic value can be predictive of the farmer’s behavior towards improving welfare. The authors found differences in how farmers responded to expert consultants about improving welfare, depending on how they view welfare on this instrumental/intrinsic value dichotomy (Kauppinen et al., 2010). For certain parts of this thesis, I relied on the theory of planned behavior (Chapters 4 and 5). The decision to use the theory of planned behavior was based on two reasons: there is a large number of studies that have used it indicating a robust theory for predicting motivation (or as the theory describes, intention to change) and there are a number of studies that have used the theory with qualitative research designs.
For the purposes of this thesis, the concepts described above may be collectively referred to as “motivating factors”.

1.6 Can cooperation between dairy farmers and veterinarians improve welfare?

In many instances, farmers and veterinarians cooperate to improve farm management, including practices related to reproduction (LeBlanc et al., 2006) and milk production (Mee, 2007; the challenges with these efforts are discussed in Chapter 2). With regards to animal welfare, it is less clear the extent that these stakeholders cooperate. Dairy farmers believe that veterinarians have an influential role in improving animal welfare (Kauppinen et al., 2010; Pothmann et al., 2014; Wolf et al., 2016). In turn, veterinarians have identified farmers as the most important stakeholder for improving welfare (Ventura et al., 2016b). These views, and the available evidence that increased dairy farmer-veterinarian cooperation is beneficial for managing disease on-farms (Derks et al., 2014; Ritter et al., 2015), suggest that cooperation (defined in Chapter 2) between these stakeholders is key to promoting welfare improvements on dairy farms.

1.7 Thesis aims

To better understand how farmer and veterinarian cooperation can help motivate improvements in dairy calf management, my thesis has the following aims: to characterize and distinguish dairy farmer and veterinarian motivating factors on calf welfare to understand 1) where these stakeholders share concerns; 2) where these stakeholders may offer complementary perspectives on the topic; and 3), how communication can influence normative beliefs and
beliefs about capacities to manage calves. I focus on two issues where calf welfare outcomes are related to farm practices: poor colostrum management (Windeyer et al., 2014) and inadequate milk allowance (as reviewed by Khan et al., 2011).

This thesis explores how dairy farmer and veterinarian motivating factors (e.g. values, attitudes, social norms, perceived behavioral control) and roles intersect to influence calf management recommendations and practices that improve calf welfare. Chapter 2 undertakes a review of the current literature on dairy farmer and veterinarian motivating factors, resulting in the proposition that cooperation between these two stakeholders can lead to improvements in animal welfare. In Chapter 3, I explore this proposition by analyzing how veterinarian beliefs about professional duties and personal values to improve calf welfare correspond with their descriptions of calf welfare problems and their role in improving them. This is accomplished through a focus group study on Canadian dairy veterinarian perspectives of calf welfare, identifying their concerns, actions, and related responsibilities. Chapters 4 and 5 are both based on an empirical study that paired dairy farmers and their veterinarians to improve calf management through benchmarking calf immune system development and growth. In Chapter 4, I explore the question of how access to information and comparison with peers (through the benchmark reports) motivated farmers to improve their calf management. In Chapter 5, I explore the question of how dairy farmer and veterinarian cooperation during the benchmark study influenced farmer perception of their veterinarians as an advisor for calf topics. Finally, in Chapter 6, I discuss the strengths and limitations of this thesis, and implications for how this thesis can inform future work.
Chapter 2: Dairy cattle farmer and veterinarian perspectives on cattle welfare

This review uses the concept of cooperation to frame the current literature on dairy farmers and veterinarian perspectives (defined below). I present the idea of cooperation as an example of how understanding motivational factors can be applied on farms.

2.1 Purpose of this review

The term cooperation refers to the act of more than one party intentionally working together towards a common goal (Tuomela, 1993). In this chapter, I review and assess the argument that farmer-veterinarian cooperation can reduce barriers to improvements in dairy cattle welfare. I will demonstrate that farmer-veterinarian cooperation 1) can establish common ground based on concerns shared by farmers and veterinarians about welfare, 2) define complementary roles based on farmer and veterinarian perspectives about welfare, and 3) promote meaningful welfare improvements by enhancing farmer-veterinarian communication about priorities and goals.

2.2 Approach of this review

In this review, I use the term ‘perspective’ as an umbrella term to encompass the descriptions farmers and veterinarians provide related to animal welfare, including perceptions, values, attitudes, opinions, beliefs, and empathy (Ajzen, 1991; Te Velde et al., 2002; Burton, 2004; Kielland et al., 2010; Bruijnis et al., 2013). To facilitate this review, I undertook a systematic search of databases (Web of Science™, PubAg, PubMed, and Social Sciences Citation Index) using the combined terms: dairy cow(s), dairy cattle, dairy calf (ves), dairy heifer
(s), dairy farmer(s), dairy producer(s), dairy veterinarian(s), and animal welfare, animal wellbeing, and specific terms such as pain, disease, or natural living, and attitude(s), opinion(s), belief(s), value(s), motivation, perception(s), perspective(s), and preference(s). Articles were included if the primary topical focus was dairy cattle welfare in commercial dairy herds, and included studies using quantitative or qualitative methodologies published between 2000 and August 1, 2017 that included an explicit focus on farmer and veterinarian perspectives. Articles were excluded if topics were exclusively focused on dairy production or reproduction outcomes, without reference to animal welfare concerns. Once the search was completed, I then searched the reference lists of identified articles for any additional papers that met the search criteria described above.

The perspectives reported in this review are therefore those reported by the stakeholders themselves. This review is focused on dairy farmers and veterinarians, but where appropriate I have also cited literature addressing similar issues identified for beef cattle and pigs.

Although there are numerous issues that have been raised in relation to dairy cattle welfare (see von Keyserlingk et al., 2009; Barkema et al., 2015), I have elected to frame this discussion using three features of animal welfare: disease management (biological functioning and health), painful procedures (affective states) and lastly the promotion of natural living (natural behaviors). There are challenges with natural living as a welfare concern, including difficulty with discerning what this means on a conceptual level (Fraser et al. 1997), and the lack of literature about farmer and veterinarian perspectives on this aspect of welfare. Multiple issues related to farmer and veterinarian perspectives about natural living will be included in this review, but a reduction in anti-microbial usage on organic farms is given more attention since this is one area where the concept of naturalness and welfare has been studied more from the
farmer and veterinarian perspective. One limitation with this approach is how this issue is framed; this review uses an animal welfare science approach, but organic dairy farmers understand natural living as an organic principle and the two approaches do not always align. Lund (2006) provides a detailed analysis of this issue.

2.3 Establishing common ground based shared concerns about welfare

Cooperation implies working towards a common goal (Tuomela, 1993). For the common goal of improving welfare, an initial step is to identify where farmers and veterinarians share concerns about specific dairy cattle welfare issues. Farmer-veterinarian cooperation can establish these shared concerns as common ground from which to promote specific welfare improvements.

2.3.1 Shared concerns about disease

The perspective of both farmer and veterinarian on how best to manage disease on farms has received considerable attention from the research community and indicates this is an area where these two stakeholders share many concerns. A recent on-line survey with Canadian dairy stakeholders indicated that disease management priorities rank highly for both farmers and veterinarians (Bauman et al., 2016), although the authors caution readers given the low response rate and that the sample was biased towards farmers with access to the internet. Farmer concerns included managing disease related to calf rearing (Boersema et al., 2013), production (Fulwider et al., 2008; Schewe et al., 2015), and biosecurity (O’Hagan et al., 2016; Sok et al., 2015). Similarly, veterinarian concerns also included production diseases (Lastein et al., 2009; Espetvedt et al., 2013), disease treatment and prevention (Cattaneo et al., 2009; Richens et al., 2016), and biosecurity (Sayers et al., 2014; Pritchard et al., 2015; Shortall et al., 2016). In a study
on ranking hazards during the calf rearing period, good agreement was found between farmers and veterinarians about disease as a top concern, however, these two stakeholders differed in the ranking of specific diseases; veterinarians tended to place a slightly higher ranking on diarrhea, whereas farmers placed a higher ranking on pneumonia (Boersema et al., 2013). A potential shortcoming of the Boersema et al. (2013) study was that only veterinarians were consulted for input when developing the list of hazards that were then used in the study that focused on both farmers and veterinarians. Failure to include farmers during the initial phase may have resulted in failure to identify certain hazards that are unique from a farmer’s perspective. In contrast, Sok et al. (2015) first used qualitative interviews with farmers to determine underlying beliefs about a vaccine program for Bluetongue disease, and then developed a questionnaire based on the results of these interviews, resulting in a study more grounded in farmer beliefs.

### 2.3.2 Shared concerns about pain management

Dairy farmers and veterinarians also share concerns about pain management. Studies have found that farmers agree cows feel pain (Kielland et al., 2010; Bruijnis et al., 2013; Bennett et al., 2014), and that in at least one study, they believed painful conditions such as hock lesions, impacted welfare (Potterton et al., 2011). Although the latter study only used a small sample of farmers, a strength of the study was that it was based on photographs of hock lesions, and not the farmer’s own cows, potentially minimizing social desirability bias (King and Bruner, 2000). Some studies suggest a cultural component to pain sensitivity. Norring et al. (2014) found that Finnish veterinarians who scored higher on empathy tests also had higher scores for pain assessment, and the authors argue that these scores and the comparatively high scores for Norwegian veterinarians (Thomsen et al., 2012) may indicate a regional effect.
Farmers and veterinarians typically agree about what conditions or procedures are painful such as sole ulcers and sole ulcer treatments (Becker et al., 2013), diseases such as E. coli mastitis, acute metritis, and interdigital necrobacillosis, injuries such as swollen hocks, neck callouses, and fractures of the tuber coxae (Thomsen et al., 2012). Interestingly, although Thomsen et al. (2012) found that farmers rated conditions more painful than veterinarians, Becker et al. (2013) found the opposite. A limitation with these studies is that the respondents’ ratings for pain may reflect what they perceive to be a more socially acceptable answer (King and Bruner, 2000), but clearly more work is needed in this area.

Agreement among veterinarians has been found with attitudes towards pain in different countries using rating scales (scale of 1-10) for painful procedures such as claw amputations, cesarean-sections, sole ulcer treatment, and dehorning calves (UK, Huxley and Whay, 2006; Norway, Kielland et al., 2009; New Zealand, Laven et al., 2009; Switzerland, Becker et al., 2013; Denmark, Thomsen et al. 2012). Most veterinarians believed that performing disbudding and dehorning of calves without analgesics is painful (Hewson et al., 2007; Misch et al., 2007; Hötzelt and Sneddon, 2013; Winder et al., 2016b) and this concern is shared by many dairy farmers in North America (Hoe and Ruegg, 2006; Winder et al., 2016b), Brazil (Cardoso et al., 2016), and Europe (Gottardo et al., 2011; Wikman et al., 2013; Hokkanen et al., 2015; Kling-Eveillard et al., 2015). At least one study reported that veterinarians who score higher on pain sensitivity to dehorning were more likely to use pain relief (Hewson et al., 2007). However, challenges exist with interpreting these studies. A North American study using an on-line survey platform reported that farmers and veterinarians overwhelmingly agreed with using pain relief during dehorning (Robbins et al. 2015), however, the authors caution that they may have biased
participants’ responses with the vignette presented at the beginning of the study indicating that pain relief was inexpensive.

Although studies on attitudes towards pain indicate general agreement that certain procedures are more painful than others, interpreting attitudes toward pain can be challenging. For example, Kielland et al.’s (2009) study on veterinarian attitudes towards pain found that respondents scored lameness relatively high (median value 7/10). However, Fajt et al. (2011) included veterinarian self-reported use of pain relief in their study on attitudes and found that although scores for pain from chronic (5.7/10) and acute (mean 6.3/10) lameness indicated they thought the conditions were painful, just over half of the sample indicated they provided pain relief for these conditions for >50% or cattle. Similarly, these same authors found that veterinarians rated pain from dehorning calves as high (mean 6.3/10 < 6 months of age; mean 7.7/10 >6 month of age), but only 62.5% and 74% of veterinarians used pain relief for >50% of calves <6 months of age and >50% of calves >6 months of age, respectively. Huxley and Whay (2006) found that veterinarians scored pain from disbudding and dehorning high (median 7/10 and 8/10, respectively), and that although nearly all veterinarians provided pain relief during the procedure (local anesthetic), only a few (2-6% for dehorning and 1-7% for disbudding) provided pain relief post procedure. Hötzel and Sneddon (2013) reported that all but one veterinarian extensionist in Brazil interviewed for their study considered dehorning painful, but none of them reported recommending the use of pain relief to farmers who dehorned their own calves.

2.3.3 Shared concerns about natural behavior

Less is known about farmer and veterinarian perspectives on promoting natural behavior as a component of animal welfare; therefore, shared concerns are not as clear. Restricted
movement as a concern for natural behavior has been identified in at least three studies. Ventura et al. (2015) found in their focus group study of mixed dairy industry stakeholders (farmers, veterinarians, researchers, industry specialists), that restricted movement due to the use of tie-stalls was a universal concern for natural behavior. Angus et al. (2005) found that veterinarians considered access to forage, space to groom, and space to exercise as important aspects of natural behavior. These authors linked space to groom and space to exercise with freedom of movement, however, they did not provide more detail about what access to forage indicates leaving it unclear if the veterinarians saw this as a nutritional issue or natural behavior issue (Angus et al., 2005). Vaarst et al. (2001) found that veterinarians linked reduction in metabolic disease with loose-style housing and exercise. Collectively these three studies provide evidence that veterinarians and farmers are concerned with the ability of the cow to move around as an aspect of natural behavior. However, all three studies were designed to determine the types of things that characterize a phenomenon (i.e. what matters for farmer and veterinarian perspectives for natural living as a welfare issue), and not the extent these views are shared among the population of farmers and veterinarians.

Access to pasture as a welfare concern has been noted in studies on adoption of automated milking systems. Oudshoorn et al. (2008) found that organic farmers ranked grazing (after economics) as the second most important concern for the sustainability of Dutch organic dairy farming but had mixed feelings about grazing as a welfare issue; some thought grazing improved welfare, and others thought this was conditional and did not necessary indicate improved welfare. Farmers in the U.S. and Europe thought technology such as automated milking systems would increase the likelihood of farmers transitioning from pasture access to total confinement, leading to reduced welfare for cows (Schewe and Stuart, 2015). Finally,
Fulwider et al. (2008) found that some U.S. farmers believed that cow welfare had diminished in recent years in part due to cows having less access to pasture.

Farmer and veterinarian perspectives on calf rearing and welfare concerns related to natural behavior have been documented in the literature. An on-line survey in North America with mixed stakeholders found that 61.1% of farmers and 100% of veterinarians believed early separation of the cow and calf shortly after birth was in the best interest of the calf (Ventura et al., 2013). However, opponents to early separation thought this practice diminished the calf’s opportunity to develop natural behaviors. Although this study indicated specific stakeholder responses to whether the respondent did or did not support early separation, the reasons why (i.e. barrier to calf behavioral development) applied across all stakeholders including the public and animal advocates, making it impossible to distinguish to what extent concern about natural behavior development is a concern of farmers or veterinarians in this study. One study with Norwegian veterinarians found that the ability for the cow and calf to stay together was the most important welfare advantage in organic herds (Ellingsen et al., 2012). An interview study with Nordic farmers found that naturalness and calf rearing included keeping the cow and calf together after birth, however, all but one farmer (who did not separate at all) separated the cow and calf within 2-5 days (Vetouli et al., 2012). Additionally, access to outdoors and socializing with other calves was seen by these farmers as important for naturalness (Vetouli et al., 2012). Access to outdoors was also seen by Danish organic farmers as an important measure for natural behavior for calves even if it contributed to increased risk of disease (Vaarst et al., 2001). This trade-off in access to pasture with increase in potential harms has also been noted in studies with beef ranchers (Spooner et al., 2012) and pig farmers (Spooner et al., 2014). Both ranchers and pig farmers varied in their perception of the value of trading off potential disease, injury, or costs.
with access to outdoors, but these concerns were all linked with the animals’ natural behavior (Spooner et al., 2012; 2014).

One area where some progress has been made is understanding both farmer and veterinarian perspectives on naturalness is related to reducing antimicrobials in organic herds. Farmers (Vaarst et al., 2003, 2006) and veterinarians (Duval et al., 2016a) share concerns with reducing disease such as mastitis, but there is disagreement on the best way to accomplish this (discussed later in this review).

Nearly all these studies (except for Fulwider et al., 2008 and Ventura et al., 2013) were designed to provide depth of understanding about natural behavior from the farmer and veterinarian perspective, using small sample sizes and qualitative methods. More studies designed to identify how representative these views are in populations would contribute to understanding this topic. In addition, the lack of literature in general about veterinarian perspectives about these issues limits our understanding of how this stakeholder views natural behaviors as welfare issues.

In summary, farmers and veterinarians share concerns about dairy cattle welfare, however, the extent of agreement varies depending on the topic; areas with ample literature indicate where common ground is clear (i.e. that calves experience pain during dehorning) and areas with much less research indicate shared concern exists, but the common ground is not well understood (i.e. promoting herd health in organics through the reduction in the use of antimicrobials).
2.4 Are farmer and veterinarian perspectives complementary?

Although dairy farmers and veterinarians share concerns about welfare, they also have unique perspectives that can be barriers to welfare because they can lead to differences in interpreting when a welfare problem exists, or how to address it. Ellis-Iversen et al. (2010) characterize these barriers as intrinsic circumstances such as beliefs, and extrinsic circumstances that can include capacities such as level of knowledge. Intrinsic barriers to welfare improvements include beliefs based on: desensitization from exposure to a problem, different thresholds for when an issue becomes a problem, and lack of consensus that there is a problem. Extrinsic barriers to welfare include: lack of awareness or understanding of the nature or extent of a problem, and overestimation of knowledge about an issue that instills a false sense of security. Farmers and veterinarians vary in their beliefs and capacities and through cooperation, these unique perspectives can be framed as complementary roles towards the goal of improving welfare.

2.4.1 Beliefs as barriers to welfare improvements

Normative beliefs that create barriers to improvements in welfare are evident for disease management, pain relief, and promoting antimicrobial reduction on organic dairies. Some farmers believe that disease is an inevitable consequence of farming and thus beyond their control, and often have variable thresholds for when a problem warrants attention (Ritter et al., 2017). Although not as common, differences in thresholds about when disease should be treated have also been documented for veterinarians. For example, veterinarian intention to treat mastitis varied in terms of the waiting period following initial diagnosis (Epetvedt et al., 2013). Desensitization regarding an animal’s response to painful procedures can contribute to lack of
pain mitigation protocols by both farmers and veterinarians (Becker et al., 2014; Richert et al., 2013). However, other work has reported that exposure to painful procedures increases sensitivity to pain by both farmers and veterinarians (Winder et al., 2016b). Although farmers believe disbudding and dehorning to be painful, different thresholds for the severity of pain among farmers and veterinarians exist. These different thresholds can be based on the method used to remove the horns or the age of the calf (farmers: Gottardo et al., 2011; Hokkanen et al., 2015; Kling-Eveillard et al., 2015; veterinarians: Hötzel and Sneddon, 2013).

Challenges with reducing lameness also stem from differences in thresholds for considering this a problem (Bruijnis et al., 2013; Richert et al., 2013; Bennett et al., 2014) and lack of consensus among farmers (Leach et al., 2010a; Richert et al., 2013; Horseman et al., 2014). Horseman et al. (2014) argued that the lack of consensus concerning lameness could be linked to the different uses of language to describe symptoms that may contribute to the beliefs that cows were not lame.

Farmers with organic herds often believe that disease will resolve without conventional treatment (Langford et al., 2009) and that conventional treatments for disease violate organic principles (Jones et al., 2016). In contrast, veterinarians often believe that welfare issues persist on organic farms because natural treatments are ineffective and come at a potential cost to animal health (Vaarst et al., 2001; Duval et al., 2016a).

2.4.2 Lack of capacities as barriers to welfare improvements

A lack of capacity in identifying or reducing welfare problems is evident for both farmers and veterinarians. Ritter et al. (2017) provides a thorough discussion of farmer capacity such as lack of awareness about disease recognition and management indicating the reasons are many
and complex. At least one study has identified that some veterinarians believe they lack knowledge on biosecurity (Shortall et al., 2016). A lack of farmer knowledge may also contribute to problems with disease. For example, problems such as lameness persist in part because farmers underestimate the problem (Whay et al., 2003; Richert et al., 2013; Fabian et al., 2014; Tremetsberger and Winckler, 2015). Lameness may persist because farmers lack equipment to treat lameness (Horseman et al., 2013). Failure to properly treat pain may also stem from both farmer and veterinarian lack of awareness of how to assess (Becker et al., 2013; Hötzel and Sneddon, 2013; Kling-Eveillard et al., 2015) and treat pain (Misch et al., 2007; Hokkanen et al., 2015; Winder et al., 2016b), and lack understanding of the benefits of pain management (Becker et al., 2013). Farmer failure to treat pain may also be due to a lack of knowledge that pain must be treated under certain regulations (Becker et al., 2013) or from veterinarian perceptions about the lack of access to suitable analgesics due to regulations (Fajt et al., 2011).

Barriers to promoting naturalness in organic systems through the reduction in antimicrobials include a lack of knowledge by farmers (Duval et al., 2016b) and veterinarians about natural treatments (Duval et al., 2016a). Barriers also include veterinarian lack of knowledge about organic regulations (Ellingsen et al., 2012), limiting their advisory capacity to farmers.

Some research has indicated that experience in managing disease can mediate farmers’ fatalistic view that disease is an inevitable part of dairy farming, including managing disease related to calf mortality (Vaarst and Sørensen, 2009) and Johne’s disease (Hop et al., 2011). However, based on the persistence of beliefs and lack of capacities that contribute to farmers not recognizing that disease is a problem, farmer-veterinarian cooperation can provide additional
motivation to improve. Jansen et al. (2009) argue that for the issue of lameness, farmers act when they think a problem exists, and that this threshold for determining a problem is different for each farmer. Considering veterinarians believe that farmers’ lack of awareness prevent them from identifying welfare problems on their farms (Ventura et al., 2016b), and that farmers believe that veterinarians are their most trusted advisor for many welfare problems (Kauppinen et al., 2010; Pothmann et al., 2014; Wolf et al., 2016), the veterinarian is poised to help farmers overcome these barriers. As discussed in this section of the review, there are multiple reason why (e.g. beliefs and capacities) veterinarians do not take a more active role in dairy cow welfare management. However, veterinarian training in disease management and pain relief, coupled with their relationship with their clients, position them to challenge farmer beliefs about what is considered normal and to implement prevention or treatment plans. For issues of pain management, veterinarian involvement in routine procedures may contribute to increased use of pain relief. Winder et al. (2016b) and Hokkanen et al. (2015) found that farmers who have routine veterinarian visits were more likely to use pain relief during dehorning. Farmers who had adopted pain relief during dehorning often indicated their herd veterinarian was influential (Winder et al., 2016b).

Promoting naturalness through reduction in antimicrobials in organic farming can be accomplished through farmer-veterinarian cooperation, in particular as farmers become more concerned with promoting herd health (Vaarst et al., 2006). However, this may require more effort on part of the veterinarian to improve their capacity to offer advice using natural or homeopathic treatments.
2.5 Enhancing communication about priorities and goals

The social science literature on dairy farmers and veterinarians indicates that the perspectives these two stakeholders have about each other’s priorities towards improving welfare may not align (Kristensen and Jakobsen, 2011b). There is some evidence that veterinarians do not understand how their clients prioritize welfare improvements, specifically regarding economic concerns and farm goals (Kristensen and Enevoldsen, 2008). Shortall et al. (2016) describe a potential negative outcome of this poor communication as, “vets and farmers may be talking past each other” (p. 29). Improved communication between farmers and veterinarians may reduce such barriers (Kristensen and Jakobsen, 2011b), including issues about prioritizing the cost of improvements and understanding farm goals.

2.5.1 Cost of improvements

Farmer-veterinarian cooperation in improving welfare is sometimes hampered by a lack of mutual understanding of how to prioritize economic factors that are highly variable and context driven. A survey of Canadian farmers found that cost of disease was ranked as a top concern for animal welfare (Bauman et al., 2016), providing some evidence that economic concerns associated with poorly managed disease are important to farmers. However, the nature of this concern is likely context specific. For example, Dutch dairy farmers that had experienced breaches in biosecurity were more concerned with economic loss in contrast to farmers without breaches; the latter being more concerned with costs of prevention (Hop et al., 2011). The cost of veterinary services was viewed as a barrier preventing improvement in antibiotic management for North Carolinian dairy farmers (Friedman et al., 2007). Canadian dairy farmers enrolled in a Johne’s disease prevention program reported that cost was not a major barrier, with some stating
that the program would reduce costs (Sorge et al., 2010), but another Canadian study indicated that dairy farmers found cost and time as the primary barriers to enrollment (Ritter et al., 2015).

Farmer willingness to pay for pain relief is another complex issue. One study reported that although farmers were willing to pay for pain relief during dehorning they were unwilling to cover the total cost (Gottardo et al., 2011). A Brazilian study reported variation in farmer willingness to pay for dehorning with some stating that costs were prohibitive while others did not (Cardoso et al., 2016). Misch et al. (2007) found that some Canadian dairy farmers who did not use a local block during dehorning cited the cost of drugs as a disincentive for use.

Lameness reduction provides another example of differences in how farmers view the cost of treatment. Bennett et al.’s (2014) study on British dairy farmers indicated that the cost of paying for lameness reduction was linked with farmer perception of the inconvenience of doing so. Farmers were willing to pay a higher amount to ensure zero lameness in their herd than the amount they were willing to pay to avoid the inconvenience of doing so; according to the authors, this indicated a disincentive to change practices (Bennett et al., 2014). Reducing financial losses due to lameness was motivating for Dutch farmers, so long as the measures were perceived as cost-effective (Bruijnis et al., 2013).

Veterinarian perspectives about their clients’ willingness to pay can affect their willingness to advocate for welfare improvements. Veterinarian perspectives of farmer willingness to pay for biosecurity was reported as impeding their willingness to approach farmers about the topic (Sayers et al., 2014; Shortall et al., 2016). Richens et al. (2016) found that veterinarians thought vaccination was an important part of preventing disease on farms, but that willingness to advise use was influenced by their own perception of the farmer’s ability to see the economic value. Surveys that directly compared farmer and veterinarian attitudes towards
willingness to pay found that veterinarians were more concerned than farmers about the cost of pain relief for dehorning (Winder et al., 2016b), and for treatment of hoof disorders (Becker et al., 2013). Additionally, there is some evidence that veterinarians overestimate the priority of economic factors as a motivation for farmers. For instance some research indicates that farmers view the cost of biosecurity measures as less of a concern than the perceived value of the program (Sorge et al., 2010). Additionally, job satisfaction and farm efficiency may be more important to farmers than economic outcomes as motivations to reduce disease (Valeeva et al., 2007). Leach et al. (2010a) reported that British farmers underestimated the economic loss from lameness and that cost of mitigation methods was a barrier to implementing mitigation methods. Interestingly, a companion study reported that these same farmers stated that cost of treatment was the least important barrier to treating lameness; the most motivating reason to reduce lameness was cow pain and suffering (Leach et al., 2010b).

In summary, the literature on farmer and veterinarian perspectives about the cost of welfare improvements indicates that farmers vary considerably with their willingness to pay, and the priority that cost of improvements has with respect to quality of service. That veterinarians are influenced by their perception of their clients’ prioritization of economic concerns suggests that improved communication between these two stakeholders is needed to identify where and when approaching clients about welfare improvements will be more successful.

### 2.5.2 Misunderstanding of goals

The development of herd health management programs has provided a vehicle for farmers and veterinarians to discuss these herd issues (Noordhuizen and Wentink, 2001). Bard et al. (2017) argued that poor communication between farmers and veterinarians, due in part to
paternalistic veterinary consultancy style, has resulted in veterinarians having a poor understanding of their clients’ goals. These authors go on to suggest that this is because veterinarians are more concerned with convincing rather than listening to their clients. Herd health programs have strong potential to promote cooperation. Veterinarians are important advisors for farmers particularly in reference to disease management (Friedman et al., 2007; Garforth, 2011; Broughan et al., 2016). Additionally, Leach et al. (2010a) found that British dairy farmers turned more to their herd veterinarian for information regarding lameness reduction than other sources of information. However, there are challenges with relying on herd health programs to promote welfare improvements. At least one study indicates that both stakeholders believe that the veterinarian’s primary role in a herd health management program is to promote health and welfare of the animals (Hall and Wapenaar, 2012), but these programs do not always explicitly target welfare. Indeed, fertility and milk production are often the only topics discussed between farmers and veterinarians (Derks et al., 2013a), indicating a missed opportunity to cooperate on issues that improve welfare.

A barrier to improving welfare through a herd level approach is evident in farmer perspectives on the value of these programs. Some farmers have expressed mixed feelings about the benefits of adopting herd health management programs. Bell et al. (2006) found that although most farmers in their study considered problems such as mastitis and lameness important, 48% of them did not think herd health plans could be beneficial with addressing them; farmers did not see direct benefits of herd health plans, they disliked the paper work, and thought the plans were too bureaucratic. Additionally, challenges exist with farmer compliance with programs to control biosecurity. Kristensen and Jakobsen, (2011a) found that none of the 25 Danish farmers they interviewed in their study had adopted government required biosecurity plans a year after
mandate. Sorge et al. (2010) found Canadian farmers had low compliance with veterinarian suggested improvements to reduce Johne’s disease risk during a voluntary control program.

Some organic farmers believe comprehensive health management programs would improve herd performance, but they also believe that improved animal welfare is an unlikely outcome of these programs and that the programs are too expensive (Jones et al., 2016). An additional challenge for organic farmers is relying on their veterinarian to treat the cows while also wanting them to facilitate their transition away from antimicrobial use (Vaarst et al., 2006). Farmers also perceive that their veterinarians’ lack knowledge on available non-conventional treatments and interest in organic principles (Vaarst et al., 2006). Some farmers believe that their relationship with their veterinarian deteriorated after conversion to organic, in part because farmers did not think veterinarians had much to offer (Vaarst et al., 2003; Duval et al., 2017).

Veterinarian services offered through herd health programs often fail to fully integrate farmer perspectives on improving welfare. Kristensen and Enevoldsen (2008) found that farmers placed a higher priority on welfare over production in herd health management programs than veterinarians thought they did. Derks et al. (2012) found that only half of the farmers surveyed thought their veterinarians were aware of their farm goals, and almost a quarter felt that they were ignored. Additionally, the reasons farmers gave for not complying with their veterinarian’s advice were related to poor alignment between the advice given and the reality of the farm’s goals and daily management (Derks et al., 2012). Veterinarians have also admitted that they are often overly critically of farmers, citing lack of education in animal welfare, and poor understanding of the economic constraints facing farmers as barriers to maintaining relationships with their clients (Ventura et al., 2016b).
A few studies have found that farmers are generally interested in disease management, specifically as a topic for extension efforts (Russell and Bewley, 2011; Pothmann et al., 2014) and advice about biosecurity (O’Hagan et al., 2016). Despite this interest other studies have reported that veterinarians assume that farmers are not interested in disease management (Sayers et al., 2014; Shortall et al., 2016), have limited time for these topics (Richens et al., 2016), have a higher tolerance for disease on their farms (Shortall et al., 2016), and fail to place a higher priority on biosecurity (Shortall et al., 2016). In a study on farmer-veterinarian communication about setting goals during herd health, the primary reasons for failure were because veterinarians thought they knew what their clients wanted, and that goal setting was too formal (Derks et al. 2013b).

While organic dairy farmers often believe that natural and homeopathic treatments are effective for treatment of mastitis and other ailments, their attending veterinarians typically have more confidence in conventional treatments (Duval et al., 2016a). In one study, veterinarians characterized conventional treatments as logical and evidence-based, and considered organic approaches as “mystical”, and found it difficult to consult on herd health in the absence of herd-level data (Duval et al., 2016a).

In summary, there remains a misalignment in terms of effective communication between farmer goals and veterinarian services that create barriers towards improving welfare. Farmer-veterinarian cooperation can help improve communication because the emphasis of a cooperative relationship is to work towards a common goal, and in this case, understanding how farmers prioritize welfare improvements within the context of farm management. Moreover, improved communication can lead to welfare improvements because the efforts are based on a greater awareness of what each stakeholder prioritizes and values.
2.6 Conclusion

The primary goal of this review was to address the role of farmer and veterinarian cooperation as a way of improving dairy cattle welfare. Improving dairy farmer-veterinarian cooperation shows promise in mediating on-farm welfare problems, including efforts to promote tailored approaches that place the cooperation of farmers and veterinarians at the nexus of change. Increased communication between farmers and veterinarians is needed to address their respective priorities and interests towards welfare improvements. Dairy farmers and veterinarians differ in their perspectives on welfare, but also share concerns providing common ground to move forward. Common ground includes improving health, minimizing pain, and to some extent promoting health in organic herds where the focus on naturalness is linked with welfare. Improving welfare on dairy farms enables farmers and veterinarians to provide better lives for farm animals and contributes to addressing concerns of the public, which for the foreseeable future will demand improvements in how farm animals are raised.
Chapter 3: Veterinarian Perspectives on Calf Welfare

Efforts to improve dairy cattle welfare have mainly focused on motivating farmer behavior change at the farm level (Tremetsberger and Winckler, 2015; Ritter et al., 2017). Recently, others have argued that promoting improvements in dairy cattle welfare should consider all relevant social actors that influence the dairy farmer (Ritter et al., 2015; Shortall et al., 2016). Since most dairy farmers consider the veterinarian to be an important advisor for decisions about animal welfare (Friedman et al., 2007; Garforth, 2011; Broughan et al., 2016; Wolf et al., 2016), it is worthwhile to consider the veterinarian’s perspective.

The traditional role of the dairy veterinarian has focused on health (Fraser et al., 1997), reproduction (Mee, 2007), and milk production (LeBlanc et al., 2006), but more recent work indicates that dairy cattle veterinarians are also concerned about animal welfare, when related to disease (Lastein et al., 2009; Sayers et al., 2014; Shortall et al., 2016), pain (Thomsen et al., 2012; Becker et al., 2013), and housing (Ventura et al., 2015). Ventura et al. (2016b) found that European cattle veterinarians had multi-dimensional views on animal welfare beyond managing pain and disease, including beliefs that both barriers and solutions to improving welfare included economic concerns and diverse industry stakeholder input. Adding to the complexity of understanding of veterinarian perspectives is the multiple interests that they must consider; professional obligations sit at a nexus of the concerns for the animal, the client (i.e. the farmer), and for the public (Morgan and McDonald, 2007; Meijboom, 2017).

Veterinarians in Canada are expected to promote animal welfare (Barkema et al., 2015). Veterinarian perspectives about dairy calf welfare are less well studied, but include concerns about calf health and nutrition in organic systems (Ellingsen et al., 2012; Duval et al., 2016a),
disease management (Boersema et al., 2013; Bauman et al., 2016), and managing pain during routine procedures such as dehorning (Misch et al., 2007; Fajt et al., 2011). However, to our knowledge, no in-depth study has assessed the views of Canadian veterinarians regarding calf welfare.

Understanding the human perspectives, values, norms, and management priorities related to animal welfare is central to finding solutions that lead to improvements (Lund et al., 2006). As such, a poor understanding about veterinarian perspectives likely poses barriers towards implementing welfare improvements. Based on the dearth of literature on this topic, the goal of this study was to understand Canadian dairy cattle veterinarian perspectives on improving calf welfare. We wanted to determine how veterinarian’s professional duties to promote welfare correspond to their perceptions of calf welfare problems and their role in improving calf welfare.

Methodologically, as this is an underexplored topic, we used focus groups for two reasons: 1) guided discussion (including focus groups) among peers is one way to help people discuss an underexplored topic (Powell and Single, 1996); and 2) focus groups are also useful in eliciting a range of views on a topic (Stewart et al., 2017). Therefore, we asked veterinarians to engage in guided discussions on both descriptive (i.e. how things are) and normative dimensions (i.e. how they think things should be) of dairy calf welfare to provide a better understanding of 1) what veterinarians identify as welfare issues, and 2) what they think is their responsibility to address these issues.
3.1 Materials and methods

3.1.1 Ethics approval

This study was approved by the University of British Columbia Behavioural Research Ethics Board under: #H16-00421. All participants provided written consent prior to participation.

3.1.2 Study site and participants

We conducted five, one-hour focus group sessions (organized by both authors) as part of a continuing education workshop for Canadian cattle veterinarians. Thirty-three veterinarians participated (5 women, 28 men) from five Canadian provinces from different geographical regions (Maritimes, eastern provinces, and western provinces). The largest proportion of participants came from Ontario and Quebec, the two provinces with the largest number of dairy farms in Canada. One group included a farmer as a participant and this person’s contributions were not included in the data analysis.\(^1\) All veterinarians were dairy practitioners and represented 30 different clinics. Participants varied in age and number of years in experience, but the actual numerical range is unknown. We created five focus groups: one group of 10 participants exclusively from Quebec (French language group), and four groups of six participants each.

\(^1\) During the recruitment phase for this project, it was made clear that this focus group would be to learn about veterinarian’s perspectives on calf welfare. At the time of the focus group session, I decided to allow the farmer to participate in the discussion to avoid an awkward situation of rejecting their interest to discuss calf welfare, potentially creating an unwelcoming environment for others in the group. The analysis was based on the content of the focus groups and not the interactions. I felt it reasonable to exclude the farmer’s contributions from analysis, as this contribution was minimal, in line with the veterinarian’s responses, and mostly in response to the moderator. See Section 6.2.2 for further discussion of this topic.
(English language groups). The English language groups were balanced so that each group had participants from all represented provinces.

### 3.1.3 Data collection and analysis

Focus group moderators facilitated the discussion using guided questions developed by both authors about veterinarians’ perspectives on improving calf welfare. The goal of using guided discussion was threefold: 1) to ensure we asked questions that answered our research questions, 2) to ensure that all five moderators asked the same questions at each table, and 3) to ensure moderators kept the discussion on topic if it shifted to material not related to calves. The questions and follow-up probes (see Table 3.1) were modeled on previous work with dairy cattle veterinarians (see Ventura et al., 2016b).

To answer the research question about how veterinarian views and actions related to calf welfare correspond with their perceived responsibility to improve calf welfare, we used the following questions to guide our guided discussion script: 1) What veterinarians think are calf welfare concerns; and 2) What veterinarians think is their responsibility to improve calf welfare. For the guided discussion, the first questions explored what participants considered to be calf welfare problems. The following questions asked participants to draw on their experiences to address calf welfare problems, what they would change about their current practices in addressing calf welfare, and what they consider to be their responsibility to improve calf welfare. The last question was intended to shift the frame of reference and thus elicit views pertaining to the participants’ obligations to the public. We did not differentiate between the public as consumer or citizen.
<table>
<thead>
<tr>
<th>Questions (Q) and probes (P)</th>
<th>Thematic Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q1:</strong> What do sorts of things do you think are a part of dairy calf welfare?</td>
<td>Identify range of issues</td>
</tr>
<tr>
<td>P1: For example, do you think the health of the calf should be included?</td>
<td></td>
</tr>
<tr>
<td>Should issues of pain or hunger be included?</td>
<td></td>
</tr>
<tr>
<td>Should issues of social housing be included?</td>
<td></td>
</tr>
<tr>
<td>Should bull calves be included?</td>
<td></td>
</tr>
<tr>
<td><strong>Q2:</strong> What responsibility do you think you have in addressing dairy calf welfare?</td>
<td>Identify perceptions of responsibility</td>
</tr>
<tr>
<td>P2: For example, do you discuss calves with farmers?</td>
<td></td>
</tr>
<tr>
<td>Do you discuss calves with other veterinarians?</td>
<td></td>
</tr>
<tr>
<td>Do you engage in research that addresses these welfare issues?</td>
<td></td>
</tr>
<tr>
<td><strong>Q3:</strong> What are you currently doing to address these calf welfare issues?</td>
<td>Identify range of actions</td>
</tr>
<tr>
<td><strong>Q4:</strong> If given the opportunity, what would you change about what you do to address calf welfare?</td>
<td>Identify perception sphere of action/influence</td>
</tr>
<tr>
<td><strong>Q5:</strong> Put yourself in the shoes of the public, what concerns do you think they would have about the life of a calf on a dairy farm?</td>
<td>To offer a different frame of reference</td>
</tr>
</tbody>
</table>
Table 3.1 Guided questions and probes used by the facilitators during one-hour focus group discussions on calf welfare with Canadian cattle veterinarians.

Probing questions (i.e. questions seeking clarification or further explanation) were included in the guide to prompt discussion on topics (e.g. social housing or bull calf management) if the participants did not bring them up. The full script provided to moderators with all questions asked during the discussion is included here as Appendix A.

All groups were audiotaped, and the audio files were transcribed verbatim by a contracted professional transcription service. The French audio file was first transcribed in French and then translated to English. All transcripts were checked against the raw audio files for fidelity.

Our intention was to explore the descriptive (i.e. how things are) and normative (i.e. how things should be) dimensions of the veterinarian views on calf welfare. Comparison of these views related to our research question about how the descriptive and normative elements correspond as a way to understand motivations for veterinarian behavioral change towards animal welfare management practices. Considering little is known about veterinarian motivation to improve calf welfare, we followed Guest et al.’s (2014) approach to applied thematic analysis, using exploratory data analysis with the objective of identifying emergent themes based on how veterinarian concerns and actions related to calf welfare correspond to their responsibilities to improve welfare. Using focus groups to collect data allowed us to elicit diverse views from the landscape of values, attitudes, beliefs, and norms that influence veterinarian motivation to improve calf welfare and allowed us to determine how these motivating factors did or did not align with what they think are problems and current role they take in improving them. We also wanted to identify unifying ideas (e.g. shared values, professional duties) about veterinarian
responsibility to improve calf welfare, and thematic analysis allowed us to identify patterns of meaning across all focus group transcripts.

In the first step of analysis, the primary author and a research assistant independently read each focus group transcript to identify initial themes that emerged by observing the meaning in the text (Guest et al., 2014). This step allowed the analysts to familiarize ourselves with the transcripts before beginning the process of coding. Because little is known about how Canadian cattle veterinarians view their responsibility to improve calf welfare, we used an open-coding approach (i.e. we did not use theoretical constructs as code labels as later described in Chapters 4 and 5) to ground the analysis in participant experiences and motivating factors to improve calf welfare. As such, from this initial reading of the transcripts, we identified an initial list of codes, which were labels identifying specific portions of text that illustrated the meanings of the themes. All themes and codes from this open-coding process were identified first within individual focus groups and then compared across groups.

Next, the coders met to discuss their lists of initial themes and codes, identifying similarities and differences, and the relationship between these phenomena. We condensed these two lists into a single codebook that served as a guide for the next iteration of coding. The codebook was organized by themes, code labels, and definitions. Under each theme, related codes were hierarchically arranged based on increasing specificity of description. This format allowed the coders to visualize the relationship between the specific coded sections of the data and the overall thematic interpretation of the data.

Next, the primary author and research assistant independently coded all transcripts according to the codebook. This step was iterative allowing us to each add codes not noted in the first step and refine the organization of the codes under themes based on whether they were
referring to a descriptive norm (describing a current animal welfare norm) or injunctive norm (describing what a norm should be; Rimal and Lapinski, 2015).

During the third and final step, all transcripts were re-coded by both coders and any changes were discussed and included in the codebook. This final coding was done 90 days after the initial coding to check the validity of interpretation of the data (based on Guest et al., 2014). The final organization of the major themes is reported below. Quotes were chosen as exemplars to illustrate a concept and have been modified for length and clarity. Parenthesis inserted into quoted text indicate where we added words to clarify text. Attribution of quotes is indicated in parenthesis after each quote with the letter “V” indicating participant and the letter “G” indicating group. Participant numbers assigned during data collection and gendered pronouns have been altered in this manuscript to protect anonymity.

3.2 Results

Four major themes emerged during data analysis that characterize the descriptive (i.e. what are problems; what do veterinarians currently do) and normative (i.e. what veterinarians should do) dimensions of veterinarians’ understanding of improving calf welfare, and how these dimensions correspond to each other. Together, the descriptive and normative features of welfare reveal the underlying motivational factors veterinarians use to evaluate calf welfare concerns, and their responsibility to improve them. The first theme illustrates that veterinarian values play a role in determining welfare concerns; veterinarians consider calf welfare as a product of management decisions (i.e. expressing values related to why some concerns are more important than others). The second theme illustrates how veterinarians view calf welfare concerns as evolving based on sources of pressure to change from within and outside of the dairy industry.
Theme 2 also illustrates where veterinarians values differ from other stakeholders such as the public. The third theme indicates that participants believed their role is primarily social as educators, motivators, modelers of good practices, and holding clients accountable, revealing they view their ability to affect change on farm is from a social position interacting with their client. The fourth theme identifies the interface of the professional and personal values that underlie participant understanding of their role in improving calf welfare.

### 3.2.1 Theme 1: What dairy cattle veterinarians consider to be the causes of calf welfare problems

The theme below describes participants’ descriptions of calf welfare concerns and illustrates that they hold diverse views. Additionally, this theme indicates that calf welfare problems are not perceived as isolated events, but as the result of poor prioritization of calf management and the trade-offs among these concerns linked to values and norms about improving calf welfare.

#### 3.2.1.1 Calf welfare concerns and management practices

Participants’ descriptions of specific calf welfare concerns included: threats to calf health (e.g. disease such as pneumonia and scours, and wet navels on bull calves in the sales barn), affective states (e.g. pain and happiness), and social needs (e.g. social housing). Participants also discussed management practices that contributed to these welfare concerns: housing (e.g. barn hygiene and ventilation), routine health practices (e.g. vaccine and antibiotic use, and colostrum management), and providing pain relief during routine procedures (e.g. dehorning) and disease.
In particular, veterinarian concerns about calf welfare included issues such as hunger, inadequate nutrition, and stress. Ensuring adequate nutrition for pre-weaned calves emerged as a central issue. This theme arose in all five groups as they discussed problems associated with the amount of milk fed to calves. As one participant offered when describing calf nutrition management, “I think the very first thing I would like to change is just adequate nutrition, because I still think that that’s such a big issue on a lot of places…” (V1, G5). Veterinarian concerns with nutrition also referred to the perceived level of effort that they see farmers making to ensure calves were drinking the offered milk, as described by one participant, “… from day one, those calves need to be paid proper attention to... a lot of those calves are (the) last little chore before the end of the day as you rush through, right?...and the calf not drinking (impersonating farmer), ‘oh well, I got to go to this event now… (I’ll) check in the morning’” (V5, G2). Additionally, participants cited the amount of milk fed to calves as being a root cause for developmental problems: “… we underestimate nutrition; we underfeed our calves. I think it’s the start of abnormal pathologies of growth…” (V5, G3). Finally, the failure to provide adequate amounts of milk to calves was an issue linked with behavior problems, “… as far as nutrition, … if a farmer is only feeding two liters of milk to a calf, it spends the rest of the day, as long as it’s awake, sucking on anything it can get to because it’s so hungry” (V2, G1).

3.2.1.2 Priorities and trade-offs

Veterinarians framed some welfare concerns as a consequence of a failure by both the farmer and the veterinarian to prioritize calves. Participants linked concerns about calf health with how care was delegated to inexperienced employees, as explained by one participant, “…the calves are always pushed onto the hired help… it’s a new person coming through, it’s getting
them trained and recognizing health events...” (V3, G4). Another concern raised by participants was the lack of economic outputs that related poor calf welfare with substandard housing, “…the calves aren’t producing milk, so the milk cows get the comfortable stalls and that’s where investment is...” (V1, G1). Participants also identified concerns within the veterinary clinic indicating their own culpability in calves being a lower priority “…we establish management practices for the herd and we don’t include calves....” (V3, G3).

Bull calf management was also viewed as a welfare concern and again related to prioritizing. These concerns were nearly always explicitly linked to economics. For example, bull calves were characterized as, “…a waste product of a dairy farm…” (V4, G5). The quality of bull calf care was considered price dependent which then dictated the level of concern, “… if they’re worth twenty bucks, they get fed, sort of” (V6, G2). Bull calf problems were also linked to the routine practice of selling them shortly after birth, which shifted the responsibility of care away from the dairy farmer (and arguably the herd veterinarian) as described by participants in Group 2 discussing bull calf shipments:

Vet 1: …there’s a lot of (farmers) that feel that if they know they’re not keeping the bull calves and they don’t know where they’re going, then (as) soon as that navel’s dry or the calf’s dry, it’s on the truck and gone, right?
Vet 3: They might not even really get colostrum.

For issues about calf housing, participants linked three different concerns about calf welfare: health, social needs, and hunger. Participants in all groups described these concerns in terms of trade-offs. This characterization of trade-offs indicated that while participants prioritized health and equated good health (i.e. freedom from disease) with individual housing, they were also aware of the social needs of calves, as one participant described, “…it would be great if we can raise calves in a group, for them, but I’ve personally seen quite a few issues with
it for other reasons, disease-wise” (V1, G5). Participants that addressed both threats to calf health and social concerns saw this as finding a compromise between the two, “…you want a bit of social aspect for the calf, but then you don’t want to jeopardize its health, so you got to kind of make something work that’s in the middle” (V2, G4).

Managing milk allowances within a social group created some concerns for participants because of challenges associated with competition and poor hygiene when using automated calf feeders. That said, participants also felt that automated calf feeders facilitated socially housing calves and addressed the problem of under feeding milk, but these positive attributes of social housing were nearly always discussed at the cost of health, particularly when it came to maintaining hygiene, as one participant described, “…automatic calf feeders, you know that’s the solution to … giving more milk … but on the disinfection side it’s often…(farmers) think that everything will get done by itself and the disinfection doesn’t happen” (V3, G3).

3.2.2 Theme 2: The shifting norms of calf management

Concerns about calf welfare described in Theme 1 were not seen as static events, instead these were viewed as related to processes driving changes on farm with how calves were managed. Participants described how calf management practices were changing and distinguished between pressures driving change as either external or internal to the dairy industry.

3.2.2.1 External sources of pressures to change calf management practices

External pressures to change came from outside of the dairy industry and represented group dynamics, e.g. how different sectors of society, such as the public put pressure on farmers
to change their calf management. These pressures were seen as driving change in the dairy industry as a whole.

Participants linked shifting norms of calf management practices on farms with external pressure from the public based on perceptions of calf welfare. All groups discussed early separation of the cow and calf after birth (cow-calf separation) as a primary public concern. Additional public concerns included keeping calves in individual housing, bull calf management including euthanasia, painful procedures such as dehorning, castration, and extra teat removal, nutrition provided to the calf, health and hygiene, and mortality. Public concerns were attributed to a lack of education about dairy farming and romanticism of traditional farming imagery. At times, these concerns were viewed as understandable, as one participant stated that public concerns about cow-calf separation were, “totally logical… because… (the public) don’t see the same things we do” (V9, G3). However, the perception about the public’s lack of education about dairy farming also fueled participants’ justifications of cow-calf separation because the public does not, “…realize that for the health and welfare of the calf, (cow-calf separation is) probably one of the best things you can do” (V4, G1). Veterinarians repeatedly claimed to support cow-calf separation to facilitate management practices that they perceived improved calf health by reducing the risk of disease (e.g. hand-feeding colostrum to calves and individually housing calves), and for some, this practice was also important so that the cow could rejoin the lactating herd after the birth of the calf. Participants credited anthropomorphic perceptions of the mother-offspring relationship as a reason for the public’s perceptions of calf welfare because, “… they’ve had a kid and they couldn’t imagine someone taking their kid away from them when it was born” (V2, F4).
Participants discussed how educational efforts such as farm visits or increased agricultural education in schools could address public concerns. As one participant explained,

I think you can explain to the public why (the calves) don’t stay with mum fairly well. And most people, if you take the time to have a conversation with them, they will understand (V1, G4).

Other assertions were more ambivalent, “…I don’t know how to implement the education of the general public, but there has to be an education aspect there as well” (V4, G4). Participants justified public concerns with calf welfare with concerns they shared as veterinarians, including poor hygiene or high rates of morbidity by asking themselves, “… ‘would I want to be bringing somebody (on this farm) and walk them around and would they be drinking milk after they’ve had this visit?’” (V6, G1). Justifying public concerns also emerged for bull calf management and dehorning without pain control. Some participants aligned themselves with the public when describing welfare issues, for example,

… I think the public would have a big problem with, and I had a big problem with six years ago when bull calves were worth nothing, …the way that a number of our farmers were euthanizing the bull calves (V2, G1).

To a lesser extent, participants discussed the media as an external pressure on shifting norms by increasing awareness, as described by one participant, “…You’re hearing about (calf welfare) more and more, and it’s getting more face time, so people are going to pick up on it” (V3, G4). Avoiding negative media attention was also seen as a rationalization for improving problems such as bull calf management because, “…if the public was more aware of what was going on there, it’s not probably going to make good press” (V1, G5).

Participants also described the economic pressures that influenced the shifting norms of calf management. The economic benefits of shifting from treating to preventing disease was argued to be why farmers were building facilities with improved ventilation to minimize health
problems, “… they realize that it’s important, all those bottles of various long acting antibiotics, they’re all expensive…” (V1, G4). Economic pressures were noted for facilitating improved bull calf management, particularly when considering the opportunities for increased revenue from beef (from bull calf sales), and the drive towards increasing milk allowance during the pre-weaned period which has been linked to increased milk production later in life. Participants also discussed the cost of management practices that promote welfare, notably, providing pain relief during dehorning. Some participants indicated the cost of pain relief during dehorning was a barrier to the use of pain relief on farms. However, others disagreed, as this participant, who dehorns their client’s calves, argued,

I think we focus on cost a lot… but I would say ninety-five percent of my (farmers) don’t even look at the (veterinary) bill at the end of the visit. They just want a good visit and good advice and good discussion… (V4, G4).

3.2.2.2 Internal sources of pressures to change calf management practices

Internal pressures to change calf management were seen by the participants as arising from the dairy industry itself including farmers, veterinarians, and industry regulations. These pressures were driving change across farms (i.e. industry group regulations) and also acted on the farmer individually through pressures from individual farmers and veterinarians.

Internal pressures to change calf management were seen by the participants as arising from the dairy industry itself including farmers, veterinarians, and industry regulations. Pressures to improve welfare from colleagues that had recently graduated from veterinary school were seen to facilitate changing practices within the clinic. One participant described the pressure felt from colleagues to change practices and use pain relief during dehorning, “… the younger vets… are pushing, … if I don’t do the job well or (if) I do the same thing I did (for dehorning) the last
twenty years…” (V6, G4). Participants also noted pressure coming from their clients as the impetus for them to rethink their role in promoting calf welfare, as described by this participant,

I had a (farmer) phone me on a Sunday morning for a calf with a broken leg, and I get out there and it was a back leg, and I lift up the leg to look at it, and said, ‘…this is a bull calf.’ And the farmer, he made me feel so small. He said, ‘So?… Fix the leg’ (V1, G2).

Pressure to improve welfare was also seen as a generational shift in farmer interest, leading to the observation that, “… we see a lot of the younger generation that’s coming onto the farm that seem to really want to push the calf welfare issues” (V3, G4). Internal pressure for improving calf welfare was linked to the social influence that farmers have on each other. For example, one participant described the social pressure to provide good care during the first week of life to bull calves because farmers “…know that the calf (is) going to their neighbor and they don’t want a bad reputation” (V1, G2). Social pressure among farmers was also noted for the use of pain relief during dehorning, as described by one participant:

…one farmer (says), ‘That it (using pain relief during dehorning) is the best thing we’ve ever started doing. I don’t know why we didn’t start doing that earlier.’ And another farmer’s like, ‘Well, I still just do my own. I wait till they get this age and I gouge and hot iron them.’ And he (the first farmer) looks at him and it’s like, ‘You—why? That is so stupid and it’s hard... I threw my gougers away years ago and I have never looked back.... What you’re doing is wrong’…. (V1, G2).

Regulations were described as an internal pressure on the shifting norms on calf management practices. Participants described regulations from within the dairy industry as forcing farmers to adopt practices aimed at improving welfare. Regulations were also considered as leverage to drive change on farms because they relieved the veterinarian of the burden of pressuring clients. When describing a national industry-based program, this participant explained how it would facilitate change in using pain relief during dehorning because,
…it helps us. …They (farmers) really don’t like this (regulation), but I use this as, ‘you won’t have the choice. I don’t have the choice either, so let’s do it right now and it’s going to be okay’ (V6, G4).

3.2.3 Theme 3: Veterinarian roles in improving calf welfare

When participants described their role in improving calf welfare, they often placed themselves in a position of exerting social influence on each other, on their farmer clients, and on the public. As described by one participant: “I think we have a role, which is directly social…” (V9, G3). They described different types of roles they embodied including educator, motivator, and model, and associated strategies on how they could facilitate improved calf welfare.

3.2.3.1 Educator

Participants described themselves as teachers to their farming clients, with an emphasis on building client capacity for technical skills such as using pain relief during dehorning: “…we’ve had tremendous uptake of the freezing (local anesthetic) and the pain management afterwards, and (farmers) are freezing themselves. We’re not doing it. We teach them to do it” (V3, G4). Educating clients also included improving awareness of problems not commonly discussed, such as measuring colostrum quality because,” … a lot of the people don’t know, so we’re trying to make our clients more aware of the (colostrum) quality…” (V6, G5).

Common strategies used by our participants to educate their clients included one-on-one meetings between the veterinarian and farmer, large group meetings at the clinic, and use of printed materials such as newsletters and written protocols. They also used informal discussions to promote improvements because this was seen to improve rapport between the veterinarian and their client: “…I like to have a lunch meeting with (farmers). That’s the most valuable because
then I can sit down and go through one topic with them and just hang out, and it’s fun… (V2, G2).

Participants also saw themselves as educators of the public to address the public’s lack of awareness of dairy farming practices as a root causes of concerns about calf welfare. Educating the public about dairy farming was viewed as a way to counteract negative views of large farms because “…people see grain bins with legs on them and think that that’s a factory farm…” (V4, G2). At times, the participants took on a more introspective look at their role in educating the public, including linking trust and transparency because, “… our role is to be transparent and to show them or explain why we do that. Often when they understand why we do things, they’re a little more open” (V1, G3).

3.2.3.2 Motivator

Participants also saw their role as motivating clients to use management practices that improve welfare because, “…sometimes when things are going well, then (farmers) get away from doing those things (that work well) … all of a sudden, (they) fall back into some of the old problems, so you have to kind of keep hammering away that, you know, stay the course because that’s what got you there” (V6, G1). Strategies used to motivate clients included collecting data related to calf health. One participant described using data on serum total protein to motivate farmers to improve colostrum management,

… some (farmers) don’t want to talk about (calf mortality) … and then when you come back with some (total protein) numbers, say, ‘Listen, I think you could do a much better job,’ … they usually (say), ‘Okay, now, what should I do?’ (V6, G5).

Participants also described how they used training procedures to motivate clients to improve calf welfare. This form of motivation emerged when participants described the positive
effects of training clients to sedate calves prior to dehorning, “…one (farmer) was, like, ‘This isn’t even a challenge anymore.’ …another (farmer’s) like, ‘This changed my life,’ …they love the pain mitigation and the sedation...” (V4, G2).

3.2.3.3 Modeling

Participants considered themselves as models for promoting calf welfare, reflecting how their own views and practices had influenced clients: “…if it doesn’t seem important to the vets, then it’s not going to seem important to the (farmer) lots of times…” (V1, G4). Incorporating more services specifically for calves was a way that participants modeled prioritizing calf welfare. They described shifting their clinic’s philosophy from treatment to prevention because, “…prevention is certainly a lot better than treatment and less time consuming” (V6, G1). Participants also described how they expanded services to include improved ways of diagnosing problems on farms by,

… collecting information, collecting samples, getting diagnostics done so that we can make a change quicker. I guess part of that comes from earlier days in practice where you tried this and then you tried that and then you tried this, and realizing that sometimes you got lucky, and often you didn’t… (V4, G1).

Some veterinarians discussed alternative treatment options that provided lower cost options for farmers such as using technicians to weigh calves and collect blood samples. Technicians were seen as a way of directing attention to any issues noticed during farm visits. In the words of one participant, “… they’re (the technicians) really good with coming back and saying, ‘Hey, you know, I noticed this. Next time you’re out there, you really should bring it up…’” (V1, G5).
3.2.3.4 Accountability

Participants saw themselves as holding clients accountable for adopting and maintaining practices that promoted improved calf welfare. For example, holding clients accountable for calf health was described as, “…start(ing) early with good management, … You can’t let it slide for those who really need it…” (V8, G3). Participants used discussion to hold farmers accountable for calf management but specifically mentioning the need to talk to the people on farm who take care of the calves because, “… they seem to get the message better when you’re talking directly to the person involved” (V4, G4). Protocols were used to hold farmers accountable for ensuring tasks were completed according to a standard, “…we have a few clients that have these lists (of questions) for their workers if they’re feeding calves… ‘Are they upright? ears up? snotty nose? coughing?’, just to remind them that it’s not just feeding calves, it’s looking at them” (V1, G4). Protocols also held the clinic veterinarians accountable for ensuring they were consistent about how they informed clients about procedures, “…we kind of all want to be giving the same information… so we’ve come to an agreement that at least the minimum standard is this here and show it to them” (V1, G2).

3.2.4 Theme 4: The interface of professional and personal values underlying views about calf welfare

Participants’ normative claims about how things should be with respect to calf welfare reflect the shifting interface between professional and personal values that informed what they think about calf welfare concerns and their responsibility to improve it. The previous three themes all indicate outcomes of this tension between the professional and the personal values: in Theme 1, veterinarians recognized farmer and veterinarian management decisions and
differences in priorities as leading to calf welfare concerns; in Theme 2, veterinarians described the normative pressures from the public and from industry actors as driving changes in calf management on farms; and in Theme 3, veterinarians described the different roles that they embody to facilitate changes in calf management. Theme 4 below explores the underlying veterinarian values that contribute to this tension. These values included how veterinarians should act as professionals, their moral judgment on topics related to calf welfare, and the ensuing dilemmas they experienced in addressing calf welfare.

3.2.4.1 Professional duties

Professional duties included multiple obligations to both the calves and clients and revealed that veterinarian professional duties to improve welfare are rooted in their perceived roles in improving welfare.

Consistent with their perceived roles as modeling good practice, were assertions that veterinarians need to do more as practitioners. Professional duties towards the calves were broadly characterized as taking a more active role in calf management, “I think as a vet, we have to do more, be involved more in the calves…” (V6, G5). Responsibilities to do more to improve calf welfare rested on their position and training. Participants identified themselves as having a prominent role in improving welfare arguing, “…with the training we get, our background and all we see, it’s up to us to take a leadership role in the group” (V3, G3). Assertions to do more to improve calf welfare also held a normative claim for veterinarians to be more transparent with their clients about their professional position on calf welfare, as described by this participant, “We have a responsibility to be categorical about what we believe…” (V5, G3).
Consistent with their perceived role as an educator and motivator, participants felt their professional duties included starting conversations about calf welfare, “I think we’re directly responsible for it. …If we don’t start that conversation, who’s going to” (V6, G2). Others viewed conversation as the initial step in helping their clients think more critically about calf welfare,

… just starting the conversation, start getting our clients to start thinking about sort of the next step, beyond just health and hygiene, or nutrition of the calf, and just start to think about what’s the next level or the next tier as far as overall health and welfare of the calves (V1, G5).

Consistent with their perceived role as holding their clients accountable for improved calf welfare, professional duties reflected an advisory capacity that revealed a paternalistic attitude towards clients. These duties included linking good welfare and good financial well-being of their clients:

…if the welfare is that compromised, then they’re going to be financially paying for it too. Like, the bad welfare equals bad efficiencies equals less profit. …And if they don’t understand that, that’s our duty as veterinarians, A, to look out for the welfare of the animals, and B, look out for the welfare of the (farmer). That’s your livelihood. I think that’s part of being a veterinarian, is standing up and telling them this is good or it’s not good (V3, G2).

Looking out for the client’s well-being also indicated a paternalistic approach that limited choices for their clients, for example leveraging industry-based recommendations about providing pain relief during dehorning, “I think the onus is on us. If you give them an option that sends a subliminal message that it is optional… So, if we take on the responsibility to say, ‘This is necessary, this is currently accepted and recommended…, it’s the current standard,’ …the decision is taken away and it’s not considered an option anymore” (V5, G1). Participants were also concerned about what they thought would be their clients’ interpretation of what motivated them to promote management practices that improved calf welfare. As one participant explained...
their concern with promoting pain relief during dehorning: “…sometimes (farmers) interpret our recommendation (to treat pain) because I make money when I sell drugs…” (V6, G4).

3.2.4.2 Personal values

Participants also expressed a variety of values about the status of animals, calf welfare as a concept, on-farm practices, and people such as their farmer clients, the public, and other veterinarians revealing a diverse landscape of values influencing their concerns with calf welfare. The diversity in values revealed that improving welfare tapped into different values for different participants. Claims about the moral status of calves as animals indicated two different types of views: animals were either seen as having an anthropocentric value (i.e. value for use for humans), and a non-anthropocentric value. Both of these values were used to justify the need to improve bull calf management. Anthropocentric values about the future use of the bull calves in the beef supply chain emerged as a reason for providing quality care after birth because, “…once (they) go to the sale, that’s not the end of their lives. They still have to go on and be productive” (V4, G4). In contrast, non-anthropocentric values emerged as reasons for providing a bull calves with quality care after birth because, “It’s alive” (V2, G1).

Normative claims about conceptions of animal welfare revealed diverse views and indicated evolving ideas of what welfare is. Some claims about calf welfare on farms were based on participant expectations of what are normal outcomes for calves. This judgment of normality included concerns about morbidity, as one participant described: “…it’s not normal to have sick calves” (V10, G3). Participants reflected on their concept of calf welfare in relation to competing perspectives: “We are all animal welfarists, and I think all the (farmers) are animal welfarists. We just have different grades or different aspects of what animal welfare is…” (V4, G4).
Participants had competing ideas about animal welfare in relation to other animal-based outcomes such as productivity. For some participants welfare and future production were linked, as described by one participant: “… The not cared for calf doesn’t do well, doesn’t produce well or herd well... Healthy calves are healthy cows…” (V6, G2). However, concepts of welfare were also contextualized against evolving concerns about linking welfare and production. For example, one participant argued that animal welfare may become decoupled from animal productivity, “…the one thing I see that’s going to change is that we think of welfare right now as a side effect of production… I think eventually it’s not going to be a side effect…” (V1, G2).

Moral judgments about welfare emerged when describing a lack of action towards compromised welfare (e.g. pain or disease) and indicated a desire to see changes in calf management practices. Some moral judgments were attached to current practices did not meet some participants’ criteria for good welfare for example, “…penetration of pain control, like NSAIDS, is still not good enough” (V4, G5). When describing their concerns with calf welfare, participants in Group 1 indicated a moral dimension to treating disease:

Vet 6: … A calf untreated is…
Vet 4: Cruel.
Vet 6: …is not what we want to see.

Moral judgments were also waged against people including the public, farmers, and veterinarians. Claims about the public were often linked to participants’ perception that they were misinformed about the dairy industry leading to judgments that, “…their (the public’s) perception of animal welfare is skewed …and probably wrong, mostly” (V2, G2).

Moral judgments about farmers revealed that participants had expectations about what should motivate their clients to improve calf welfare: “You shouldn’t have to be losing a lot of calves to improve your calf health performance….” (V6, G1). Values based on economics were
seen in contrast to welfare for example, “I think we do have some (farmers) that are economic
driven, but I think the vast majority just… want to see it (the calf) do well and they don’t care if
it costs two or four dollars more per animal” (V2, G4).

Moral judgments also characterized farmers based on the compromised status of the
calves, as one participant described, “I’ve seen facilities where every single calf had scours… it
was just terrible because their management of the cleanliness of the environment…” (V4, G2).

Judgments about farmer willingness to change revealed that participants characterized
farmers based on their receptivity to changes, as one participant indicated, “I think that’s like
everything, a good (farmer) is doing well with (making changes), and a bad (farmer) is more
difficult for us…” (V2, G4). Receptivity to change was also characterized as good in the context
of generational differences between farmers, as one participant explained, “I’m kind of lucky
because a lot of the farms that I work on today, it’s the third generation I’m working with… and
they’re progressive” (V6, G1). These judgments also demarcated what a good (farmer) does and
how this should be promoted, as described with bull calf management:

… (farmers) who… still make sure it (the bull calf) gets all the colostrum that
their heifers do, gives them a first defense bolus (immune system booster)
because you never know what’s going to happen… that’s the (farmer) you’d like
to hold up as an example for everyone else, the one that’s doing the right thing...
(V4, G1).

Finally, participants made moral judgments about the veterinary profession, including
how they themselves may overlook calf welfare concerns. Some claims reflect how veterinarians
need to change regarding how they communicate with clients, for example,

I think we’ve done really good (with) the health part of things, …but we aren’t so
good at opening discussion on … what’s good welfare, socially for the calf, …
asking the (farmers), ‘what do you think of hutches’, or, ‘do you think they should
have contact with each other?’… (V2, G4).
Moral judgments about veterinarians also included claiming responsibility for a perceived lack of involvement with calves (as noted in the previous section), “I think that the only thing that stops us from becoming involved ourselves as vets is our lack of interest… I think it is our fault if we are not more involved than that” (V9, G3).

3.2.4.3 Dilemmas in negotiating improvements in dairy calf welfare

Participants’ descriptions about addressing calf welfare could be characterized as moral dilemmas (when it is not clear what the right action is to take) or practical dilemmas (when it is clear what the right action is to take, but it is difficult to take). These dilemmas indicate the tension participants experienced in making efforts to improve calf welfare on farms and that this tension is based on changing professional and personal values about calf welfare and navigating their clients’ values. Moral dilemmas occurred when participants identified cases where they had to balance competing values. For example, participants discussed balancing their professional duty to intervene on behalf of the animal, and their professional obligations to safeguard the financial health of their clients. For example, when discussing using pain relief during dehorning, this participant offered, “I’m probably one of the last guys to implement the pain management part of it, just because … I’m thinking what the cost for the (farmer) is…. ” (V1, G4). However, this same issue of providing pain relief was also characterized less clearly by some as a moral dilemma, indicating a shift in moral judgments about practices:

…we often, and I’m guilty of it, are wondering should we do it (provide pain relief) because it’s going to cost more, but I think…, if the visit cost four dollars a calf more, I’m not so sure at the end of the month they’re going to notice that (V4, G4).
Participants were concerned that a professional duty to take a more active role with calves, such as approaching their clients about welfare, put them at risk of potentially losing clients. As one participant stated: “I can preach many times but at some point, if I keep doing it I’ll lose that client. Sometimes we’re at the mercy of the client” (V4, G3).

Practical dilemmas related to improving calf welfare often involved the issue of time management. One participant described the perceived risk of upsetting clients by including calves into routine visits: “… if we go awry and then we end up with a huge herd health visit, and everything else gets delayed by an hour or an hour and a half, we’ll have a lot of grumpy people at the end of the day…” (V4, G4).

Another practical dilemma was the perception that the farmers had other competing interests, as explained, “If the (farmer) perceives it as a problem, then you have their attention. But for the (farmer), if he’s got other, bigger problems, then that is not significant to him at this time, and so it’s very difficult to try and engage him in discussion” (V5, G1). Additionally, practical dilemmas emerged for how best to approach their clients to discuss calf welfare, “… a challenge (for me), is how to bring up a topic without being insulting, right? You don’t want to (say), ‘Hey, you’re not doing it right’…” (V2, G2).

3.3 Discussion

Our results indicate a broad range of motivating factors influence how Canadian dairy cattle veterinarians: 1) identified many welfare issues for dairy calves that are the result of management decisions on farms, 2) see these issues evolving as pressures from within and outside of the dairy industry drive changes in calf management, 3) identify their role as primarily an educator in promoting improvements in calf welfare, and 4) believe they have a professional
and moral responsibility to address calf welfare. Collectively, these themes reveal that Canadian dairy cattle veterinarians are able to identify calf welfare problems, but the extent that they fulfill professional and personal obligations to find solutions to these problems is not fully realized. Below, we first discuss how concerns about calf welfare are grounded in different values. Next, we discuss how the veterinarian’s views of how they improve calf welfare indicates that they place themselves in a position to exert social influence in a variety of ways. Finally, we discuss the underlying normative claims that veterinarians have about improving calf welfare, which indicates that motivating veterinarians to take a more active role can come from multiple value-related obligations.

3.3.1 What dairy cattle veterinarians consider to be calf welfare issues

Participants in our study readily identified diverse concerns about dairy calf welfare; given the nature of the veterinary profession we were not surprised they considered pain and disease as major concerns. Veterinarian concerns with managing pain during dehorning (e.g. US, Fajt et al., 2011; Denmark, Thomsen et al., 2012; Canada, Winder et al., 2016b) and managing calf disease (e.g. Canada, Bauman et al., 2016; The Netherlands, Boersema et al., 2013) is well documented. In contrast, veterinarian concerns regarding hunger and lack of nutrition in young calves has received little attention in the literature, particularly associated with milk volumes. Vaarst et al. (2001) reported that veterinarian concerns about milk volumes were based on increased competition among calves housed in groups of varying age resulting in some calves failing to receive adequate amounts of nutrition during the milk-fed period. The concern with nutrition and hunger in our focus groups indicates this issue is a salient welfare concern for
veterinarians and we suggest more effort to understand how veterinarians can promote increased milk allowance for calves in the pre-weaned period.

Veterinarian views about cow-calf separation vary. A North American study reported that veterinarians believe early separation of the cow and calf to be in the best interest of the calf (Ventura et al., 2013). In contrast, a study with Norwegian veterinarians found that keeping the cow and calf together was the most important welfare advantage in organic herds (Ellingsen et al., 2012). The difference in opinions about cow-calf separation could be attributed to the emphasis of natural behavior in organic dairy farming (Ellingsen et al., 2012). In agreement with Ventura et al. (2013), the participants in our study believed that cow-calf separation helped to maintain calf health.

Although participants in our study supported cow-calf separation, they believed this issue to be a common concern in the public’s eye. Public concerns about cow-calf separation often center on natural behavior (Boogaard et al., 2010; Hötzel et al., 2017), and for some the practice is morally unjustified (Hötzel et al., 2017), indicating the concern is value-based. Participants in our study had nuanced views about the underlying reasons for why they thought cow-calf separation was a public concern; however, all groups felt that public education was the primary strategy to alleviate these concerns. Industry-based stakeholders’ characterization of public concerns with animal welfare as symptomatic of a lack of knowledge about farming has been found in other studies of pig farmers (Bernard and de Cock Buning, 2013). Previous work has shown that educational efforts are likely to be ineffective in situations where disagreements are driven by differences in values (see Hansen et al., 2003). Ventura et al. (2016a) found that an educational intervention (touring a working dairy farm) accentuated naturalistic concerns including those related to cow-calf separation. Participants in our study voiced their perception
of public concerns about other issues such as barn hygiene, bull calf management, and lack of nutrition, but for these examples (in contrast to cow-calf separation), participants agreed that these were important issues to address on farms, not within the public sphere. This approach of shifting frames has been used in other studies with cattle veterinarians to identify a variety of concerns related to biosecurity on dairy farms (Shortall et al., 2016). By using the public concerns to justify their own concerns regarding these practices (not including cow-calf separation), participants in our study shifted their frame of reference about calf welfare concerns revealing attitudes more amenable to change.

Ventura et al. (2015) studied North American dairy industry stakeholders (including veterinarians) and identified the lack of prioritization of calves by farmers as an important concern (see also Mee, 2013). Participants in our study identified multiple reasons, including economics, for why calves may be a low priority for both farmers and their veterinarians. The influence of economics on how veterinarians approach welfare is context-dependent. Veterinarians may be unwilling to advise practices that improve health such as disease reduction if they perceive their clients to be concerned with cost (Sayers et al., 2014; Shortall et al., 2016). Veterinarians may also overestimate the role that economic factors have on motivating behavioral change in farmers (Sorge et al., 2010). Specifically for calves, one study found veterinarians were more concerned than farmers with the cost of treatment for pain relief for dehorning (Winder et al., 2016b). In our study, participants had divergent views on the extent that cost of pain relief was a barrier to adoption. Some felt the cost was prohibitive, while others felt the cost of pain relief during dehorning was a non-issue to farmers who were more interested in how calves performed after the surgery and the value of the visit with their herd veterinarian.
Bull calf management practices on farms are not well documented (Winder et al., 2016a; Renaud et al., 2017). When discussed by our participants, their perceptions of the quality of bull calf care appeared contingent on economic factors such as the market value of bull calves and routine practices of shipping the bull calf off the farm shortly after birth. Risk factors contributing to bull calf mortality after arrival on veal farms (Winder et al., 2016a), and management practices on farm of origin (Renaud et al., 2017), indicate that the early rearing period for bull calves needs improvements. The concerns that arose during our study regarding poor nutrition and colostrum management of bull calves provide evidence that improving these practices would be supported by veterinarians. Our participants also provided examples of clients that provide adequate care for bull calves, suggesting that identifying mechanisms that encourage farmers to provide quality care for bull calves regardless of market value would be beneficial in improving calf welfare.

The trade-offs between socially housing calves and disease indicate that our participants align with other veterinarians in that they were primarily concerned with production-related concerns (Verbeke, 2009), advocating for hygiene over social housing (commonly associated with automatic milk feeders). This result suggests that educational efforts directed towards veterinarians should emphasize methods of reducing the risk of disease in social housing, for example, by promoting the use of pairs and small groups (reviewed by Costa et al., 2016). Given that the use of automatic milk feeders for grouped calves is increasing (Medrano-Galarza et al., 2017), identifying ways to promote improved hygiene with this system is also required.

Veterinarians may perceive their lack of consensus about a conception of welfare as a barrier to welfare improvements on farms (Ventura et al. 2016b), however, as our study shows, what veterinarians believe matters for calf welfare relates to their position as a veterinarian. The
perception of protecting the health of the calf is fundamental to how they view management practices on farms as either promoting or detrimental to the welfare of the calf. For example, participants believed that practices that harmed calf health such as current bull calf management, poor colostrum management, and inadequate nutrition and hunger needed improvement. However, participants’ views on changing management practices that they perceived to reduce the risk of disease, such as cow-calf separation, appeared to be the least flexible. Additionally, beliefs about changing practices that did not explicitly link to the physical health of the calf such as performing painful procedures without pain relief were less universal, suggesting that biological concerns are prioritized over those of affective states (i.e. pain). Understanding veterinarian conceptions of animal welfare is important for assessment (Meijboom, 2018), for example focusing on improving hygiene in group housing systems or promoting veterinary advocacy for increased milk allowance in the pre-weaned period.

3.3.2 The role of the veterinarian in improving calf welfare

The social influence of farmers and veterinarians on adoption of practices has been noted in other studies. Farmers indicate that veterinarians have an important role in advising clients on welfare concerns such as lameness (Kauppinen et al., 2010). Additionally, farmers can exert social pressure on each other to adopt management practices on farms for mastitis control (Swinkels et al., 2015). The influence of other farmers on calf rearing practices is likely context driven, based on the relationships farmers have with each other and the specific practice of interest (Sumner et al., 2018; i.e. Chapter 4 in this thesis). Our participants indicated that they believe their role in improving calf welfare is social and that improving communication with their clients and among each other is a way to exert this social influence. In some examples,
participants described the importance in making time to talk to their clients about calf welfare and their overall farm goals. Individualized approaches towards advisement that consider the contextual implications for farmer decision-making are argued as essential for future success with veterinarian-farmer communication (Kristensen and Jakobsen, 2011b). However, Bard et al., (2017) further argued that veterinarian efforts to communicate with clients should consider the approach as reinforcing a partnership rather than the typical advisor-client communication style characterized by persuasion. Social pressure from veterinarians to improve calf welfare remains underexplored and we suggest further work that identifies how veterinarian perceptions of their role may shift, as do the norms of calf management, and their use of their social positions to respond to these changing norms.

Our study provides evidence that Canadian dairy cattle veterinarians employ a variety of strategies to improve calf welfare on farms in response to their perceptions of shifting norms of calf management. Ventura et al. (2016b) found that cattle veterinary practitioners and researchers self-identified as lacking knowledge on how to improve welfare, perhaps compromising their role. This lack of expertise can also be felt from the farmer’s perspective. Studies have found that organic dairy farmers perceive that their veterinarian lacked relevant expertise needed for effective advising (Vaarst et al., 2006; Duval et al., 2017). The implication of offering atypical services for clients, in our case, practices that promote improvements in calf welfare, is that veterinarians require the appropriate training and knowledge. Participants in our study readily offered different strategies on how to improve calf welfare on farms, suggesting that this group of veterinarians was comfortable advising on this topic. These participants were attending a veterinary continuing education workshop, so presumably they were motivated to learn how to achieve improved outcomes.
3.3.3 The responsibility of the veterinarian to improve calf welfare

Veterinarian obligations to both animal patients and human clients are well described (see Morgan and McDonald, 2007; Meijboom, 2018). With respect to obligations towards the animal, dairy cattle veterinarians are primarily responsible for the health of the lactating herd (LeBlanc et al., 2006). Our study presents evidence that veterinarians believe they have a professional obligation to the dairy calf, placing the responsibility to address welfare concerns primarily in their realm of duties. Participants expressed both instrumental and intrinsic values about the moral status of calves indicating views are diverse and complex, however, they shared a sense of professional responsibility for the calf. At least one study has shown that dairy cattle veterinarians feel an obligation to treat and prevent pain, including pain associated with dehorning (Fajt et al. 2011). Strong moral judgments in our study, such as the cruelty of failing to treat disease, illustrate participants’ biological functioning-centered conception of welfare. However, participants also made strong moral judgements about current milk feeding practices and bull calf euthanasia they deemed as wrong. We suggest that further exploration of the range of moral judgments veterinarians make about calf welfare to further understand where veterinarians may be more likely to advocate for improvements.

Participants’ discussions about their responsibility to their clients reveal a complex relationship of moral judgments and professional obligations. For some participants, professional obligations to the calf resulted in paternalistic advising approaches that limited their client’s choices with respect to practices such as providing pain relief during dehorning. Other participants felt that their influence was more limited. Moral judgments about farmers typically characterized good farmers and bad farmers based on their willingness to change; the implication
of how this affects veterinarian willingness to address calf welfare concerns should be considered. Some studies have found that veterinarian perceptions of what is important to the farmer can inhibit approaching a topic (Sayers et al., 2014; Shortall et al., 2016). Veterinarians have also admitted that they are often overly critical of farmers, citing their own perceptions of their clients’ lack of education and poor understanding of economic factors as barriers to maintaining a relationship with them (Ventura et al., 2016b). Claims about what is important to farmers can also have negative outcomes from the farmers’ perspective. Derks et al. (2012) found that only half of the surveyed farmers thought their veterinarian was aware of their farm goals, and almost a quarter felt that they were ignored. These examples, and the results of our study, suggest that there are missed opportunities to improve welfare based on veterinarian assumptions about clients and calf welfare.

Balancing conflicting responsibilities has been described in a few studies with cattle veterinarians (Higgins et al., 2013; Ventura et al., 2016b). Similar to participants in our study, these responsibilities included those to the animals, clients, and to the clinic. For practical dilemmas, there remain concerns about understanding each actor’s perspective on the value of an action. For dairy cattle veterinarians, understanding their clients’ values about veterinary services can help reduce practical dilemmas. For example, Bell et al. (2006) found that farmers failure to see the benefits of adopting herd health plans was related to bureaucratic tasks and time constraints. Participants in our study indicated that navigating client schedules, recognizing client priorities, and at times limiting choices, could reduce barriers in addressing calf welfare.

Descriptions of moral dilemmas in our study included perceived competing veterinarian and farmer values on what to prioritize on the farm, and more ambiguously, balancing a duty to treat pain during dehorning with a professional responsibility for their client’s financial well-
being. Other studies have identified discrepancies in the level of pain veterinarians attribute to dehorning and the extent that they treat this pain (Huxley and Whay, 2006; Fajt et al., 2011). Winder et al. (2016b) found that more Canadian veterinarians now treat dehorning pain out of concern for the calf; however, this same study found that the primary reason that some veterinarians did not treat pain was concern over treatment costs. It is possible that veterinarians may prefer to use pain relief but feel constrained in their choices for fear of losing clients (see Hendrickson and James, 2005). Economic constraints for why cattle veterinarians do not more actively promote welfare improvements are well-documented for pain management during dehorning (Hewson et al., 2007; Ventura et al., 2016b; Winder et al., 2016b). Our study suggests constrained decision-making may also be evident for how veterinarians advise their clients for other calf concerns such as barn hygiene, nutrition, and bull calf management. Hendrickson and James (2014) argue an outcome of constrained decision-making is an erosion of one’s personal ethics. Morgan and MacDonald (2007) extend this erosion of ethics beyond the individual to the veterinary profession.

Some participants in our study identified a generational effect in both farmer and veterinarian values, suggesting that moral dilemmas involved in improving calf welfare may shift as farmer and veterinarians’ values shift, notably in treating pain as a moral duty for veterinarians and recognizing this is also important to their clients. Promoting dialogue between veterinarians and clients about professional and personal values can help reduce moral dilemmas by establishing boundaries for providing veterinary services (Morgan and McDonald, 2007). Self-reflection within the veterinary profession has been suggested as a starting point for addressing the tension inherent in the dual obligation to clients and animals (Morgan and McDonald, 2007; Meijboom, 2018). In addition to self-reflection, we suggest promoting
dialogue within the clinic on the evolving expectations of providing services related to calf welfare possibly reducing the challenges in weighing the professional duties to the calf against those of the farmer.

3.4 Interpreting this study

Our study provides insight into the views of a diverse sample of dairy cattle veterinarians regarding calf welfare, and how their expectations of what they should do to improve it align with their identification of problems and solutions. Our intention was to enter the normative space (i.e. what veterinarians think should be done to improve calf welfare) that frames these views to understand how this can guide efforts to promote improvements in calf welfare. This allows for identification for where veterinarians are able to improve calf welfare and how to guide efforts to improve welfare. Norms are based on a particular group’s acceptance; therefore, it is important to consider the context that these are Canadian veterinarians that attended a workshop on cattle welfare. It is unknown if veterinarians were motivated to attend this workshop based on the topic. This workshop fulfilled Continuing Education credits that Canadian veterinarians are required to earn and was the first time the focus was on welfare (previous workshop topics were based on reproduction).

The views described in this study do not represent all veterinarians and further work using in-depth discussion with different groups of veterinarians could provide additional insight into the extent that the views expressed here in this study are shared by other veterinarians. Additional studies may also identify the influence of cultural context in shaping how veterinarians view calf welfare, in particular the normative expectations of what should be done to improve.
Although focus groups can be beneficial for eliciting discussion on underexplored topics (Powell and Single, 1996), a limitation is that focus groups can reinforce power dynamics within a group leading to more dominant voices over-representing the members of the group (Stewart et al., 2011). Additionally, the time period for data collection was fixed at one hour, potentially rushing the conversation. However, we asked only five questions, falling within the recommended number of questions for the time given (see Krueger and Casey, 2017). The use of the guided script helped facilitate conversations that promoted participation for all members, allowed members to stay on topic, and took full advantage of the time permitted.

3.5 Conclusion

Veterinarians share concerns beyond those previously reported relating to health and growth and feel obligated to do more for the calves. Additionally, our study provides evidence that veterinarians are concerned about educating, motivating, and holding their clients responsible for calf welfare improvements. Future use of guided discussions such as focus groups can promote dialogue on topics such as calf welfare where the boundaries demarcating responsibility are shifting, and personal values and professional duties are evolving.
Chapter 4: How Benchmarking Motivates Farmers to Improve Calf Welfare

4.1 Introduction

Understanding the role of information in identifying and improving management on farms is a key area of interest in animal welfare research. Research aimed at adoption of practices to reduce welfare risks on farms has indicated that a lack of information is a barrier towards improving welfare. For instance, Leach et al. (2010a) reported that welfare problems such as lameness are more likely to persist on dairy farms when farmers underestimate the extent of the problem within their herd. Becker et al. (2013) found that farmers can underestimate the severity of pain in treating foot problems because they lack understanding of how to assess pain in cows.

Dairy calves face a number of risks in the early weeks of their lives, including inadequate colostrum for transfer of passive immunity (Windeyer et al., 2014), and inadequate milk to achieve their potential for growth and avoid hunger (reviewed by Khan et al., 2011). The technical solutions to these problems are well known; what is lacking is an understanding of the factors that limit adoption of these solutions on farms. Specifically, there is a lack of research on how farmers view these concerns, and what motivates them to make decisions when it comes to managing their calves. Increasing farmer awareness and education on health-related practices, such as colostrum management, may encourage improvement in welfare outcomes for calves (Heinrichs and Kiernan, 1994; Kehoe et al., 2007; Beam et al., 2009). The provision of information can influence a person’s attitude and behavior towards a phenomenon (as reviewed by Glasman and Albarracín, 2006). In addition to attitudes, understanding a person’s beliefs about who may influence their decision-making and how much control they have in making
decisions are key factors in understanding a person’s motivation (Ajzen, 1991).

One way of providing information is through benchmarking. Benchmarking is the process of measuring performance using specific indicators, and then comparing performance with that of peers with the intention of improving on those indicators (Fong et al., 1998). The key concept is to use data to identify performance gaps and drive improvements. Although often used to increase efficiency (Anderson and McAdam, 2004), benchmarking can also be used to motivate changes not directly linked with economic outcomes (Magd and Curry, 2003).

A previous study from our group evaluated benchmarking to improve lameness outcomes for mature dairy cows (Chapinal et al., 2013), but this study was retrospective, did not include controls, and assessed only the biological outcomes (e.g. lameness). Another older study compared calf mortality on two farms and suggested that the comparison of the under-performer with a high performer helped identify management and employee training not previously thought of as pertinent to calf mortality (Khade and Metlen, 1996).

In 2015, a benchmarking study was conducted in the Lower Fraser Valley of British Columbia to determine if and how provision of information would result in farmers making improvements in their calf management. During the study period, farmers received two reports on their calf immune system development (i.e. success or failure of passive transfer) and growth (average daily gains) which were provided by the herd veterinarian. In a companion paper to the current study (and the study described in Chapter 5), Atkinson et al. (2017) hypothesized that benchmarking would result in farmers making changes in their calf management relevant to the calf outcome measures in the reports. They also hypothesized that farmers who made changes would see improvements in related calf outcomes (i.e. farmers choosing to increase milk allowance would have an increase in calf average daily gains), and those making no changes
would not see improvements. Atkinson et al. (2017) reported that 83% of farmers made changes related to their colostrum management and milk feeding, leading to improvements in calf outcome measures (e.g. passive transfer of immunity and average daily gains).

Although Atkinson et al. (2017) showed benchmarking led to changes in calf management that improved health and growth, a challenge with this study is that it does not provide insight into how or why benchmarking led to these changes. To our knowledge no previous work has assessed the effect of benchmarking on farmer perceptions towards their animals and their motivation to improve management. Therefore, the aim of the current study was to determine how benchmarking motivated farmers to improve calf management. To understand the motivating factors related to improvements in calf management, we used a qualitative, interview-based approach to gather in-depth information from farmers throughout the benchmark study period. Our research question for this study was to determine how access to information in benchmark reports on calf immune system development and growth influenced farmer values, attitudes, and perceived social norms and behavioral control related to calf management.

4.2 Material and methods

This study was approved by the University of British Columbia Behavioural Research Ethics Board under # H14-03196. All participants provided written consent.

4.2.1 Study design

This interview study was designed from a critical realist perspective that emphasized understanding the meaning that people attach to a phenomenon, and the context within which
this occurs (Manicas, 2006; Maxwell, 2012). For the current study, we were interested in understanding farmer perspectives about the benchmarking process, in particular identifying factors that motivated them to make changes in calf management, the specific context of our intervention study. Following the framework of Maxwell (2012), this approach allowed us to identify mechanisms within the situation (i.e. the benchmarking study) that cause a particular outcome (i.e. why farmers made changes). Specifically, we were interested in describing the mechanism(s) of change that motivated farmers to improve calf management based on the provision of information in the benchmark reports about their calves and those of their peers participating in the study.

During the benchmark study period, collection of biological data on calf immune system development and growth was summarized in two different reports and provided to farmers by the herd veterinarian. Two concurrent research studies were conducted during the benchmark study period: 1) a study identified the changes farmers made in their calf management after having the benchmark reports (reported in the Introduction of this chapter), and 2) the current study identified how access to the information in these reports motivated farmers to improve calf management. Information has an important role in understanding motivational factors. Ajzen (1991) equates “salient information” as beliefs which are, “the prevailing determinants of a person’s intentions or actions” (p.189). Information also influences the formation and stability of attitudes (as reviewed by Glasman and Albarracín, 2006), and the interpretation of norms (i.e. to what extent people adhere to behaviors; Bicchieri, 2017).

We first approached a local veterinary clinic that specializes in dairy cattle medicine in the lower Fraser Valley of British Columbia to determine their interest in facilitating this project. After several meetings, they agreed to help recruit farmers and deliver the benchmark reports.
Veterinarians assisted with recruiting their clients by facilitating brief meetings on prospective farms where we (C. Sumner and D. Atkinson) described the study and consent process. To meet the sampling needs for Atkinson et al., (2017), we recruited a convenience sample of 18 commercial dairy farms based on the following criteria: 1) their herd size was large enough so that enough calves would be born during the study period to provide a herd estimate on the biological data; and 2) farmers did not rely exclusively on colostrum replacer (a powdered version). Farms in this study had an average (± standard deviation) herd size of 264 ± 110 with a range of 113 to 450 Holstein breed cows (Atkinson et al., 2017).

For the current study, with the use of interviews as a data collection method, we were concerned with building rapport with the farmers so that they would feel more comfortable during the interviews. Therefore, it was important for us to recruit farmers that consented to us making several trips to each farm including: 1) the first visits (for recruitment) when we met farmers to establish a relationship through the facilitation of the veterinarian, 2) the first and second visits when we interviewed farmers, and 3) for visits for when we observed and took notes during each report meeting between farmers and veterinarians.

For the current study, we wanted to interview individuals on the farms that could best speak about calf care because the benchmark study focused on tasks related to calf care. Calf care is typically delegated to family and hired on dairy farms (Medrano-Galarza et al., 2017), and we wanted to capture the experiences of the people directly feeding colostrum and milk. One challenge with calf management (see Chapter 3 of this thesis) is that the people providing direct care to the calves may not be included in discussions about calf management. Therefore, we wanted to include a range of people in the farm management structure so that we could capture diverse views. We talked to farm owners, herd managers, and calf managers providing a broader
perspective on calf management (i.e. instead of only talking to the owners). In some instances, multiple family members or employees interviewed together if calf duties were shared.

During the study, each farm received two reports, separated by 10 weeks. These reports described serum total protein from calf blood samples and average daily gains (as estimated from heart-girth tapings) and information on management practices on all study farms. Reports provided data on each farm and a ranking comparing performance to all other study farms. Data was presented as individual points for each calf, and summarized by average and range, and graphically presented to facilitate interpretation. Each report was presented by the herd veterinarian who also used examples of other study findings (e.g. on the effects of increasing milk ration on calf growth) and props (e.g. a colostrometer for testing colostrum quality) to facilitate the discussion. Discussion focused on the farmer’s own performance and the comparison among farms. Because the benchmark reports included novel information on the farmer’s calves and on peer farmers’ calves, we could test key concepts related to motivating behavior change: how provision of information on calf outcomes and peer farmer performance would affect attitudes, subjective norms, and perceived behavioral control in managing calves. Examples of the report content found in these reports can be found below in Figures 4.1 and 4.2.
Passive Transfer of Immunity in Newborn Calves

Serum total protein results

<table>
<thead>
<tr>
<th>Protein Level</th>
<th>Your Calves</th>
<th>Average</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT: Serum Total Protein at least 5.5 g/dL</td>
<td>59% (13)</td>
<td>72%</td>
<td>54-91%</td>
</tr>
<tr>
<td>MPT: Serum Total Protein between 5.2-5.5 g/dL</td>
<td>18% (4)</td>
<td>17%</td>
<td>6-31%</td>
</tr>
<tr>
<td>FPT: Serum Total Protein below 5.2 g/dL</td>
<td>23% (5)</td>
<td>11%</td>
<td>3-23%</td>
</tr>
</tbody>
</table>

SPT = Successful Passive Transfer (Serum Total Protein at least 5.5 g/dL)
MPT = Moderate Passive Transfer (Serum Total Protein between 5.2-5.5 g/dL)
FPT = Failure of Passive Transfer (Serum Total Protein below 5.2 g/dL)

Figure 4.1 Calf benchmark report data on transfer of passive immunity provided to farmers

Average Weight Gains of Pre-Weaned Calves

Averages of all farms

<table>
<thead>
<tr>
<th>Gains (kg/day)</th>
<th>Your Average: 0.68 kg/day</th>
<th>Your Range: 0.31-1.39 kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group Average: 0.65 kg/day</td>
<td>Group Range: 0.51-0.75 kg/day</td>
</tr>
</tbody>
</table>

Calves on your farm

- Your calf weights
- Top 10% Holstein heifers*
- Bottom 10% Holstein heifers*

Number of tapings: 41
Individual calves: 19

*Based on Holstein heifer girth tape measures from 16 farms in the Fraser Valley, BC

Figure 4.2 Calf benchmark report data on average daily gains provided to farmers
4.2.2 Interview guide, data collection, and participants

The goal of a critical realist approach is to understand why something occurred by identifying the causal mechanisms. We understood that determining why something happened, in our case why farmers may or may not make changes in their calf management, as congruent with understanding motivation. Our interview guide reflects this in three ways. First, we set out to answer “how” questions that would get at the underlying causal processes by identifying motivational factors (attitudes, normative beliefs, control beliefs, and values) about benchmarking, calves, and the social influence of other farmers. Second, the follow-up questions mirror the initial questions so that we could determine a change in farmer response based on the benchmark reports. The follow-up questions specifically asked farmers about changes in the previously mentioned motivational factors. Third, we approached this study using the theory of planned behavior to structure these questions as the theory equates intention to behave with motivation, and we added questions about values to more fully capture the farmer motivating factors.

The theory of planned behavior was useful in providing structure for operationalizing the research question (how benchmarking motivates farmers to improve calf management) into sub-research questions. The theory of planned behavior constructs (attitudes, subjective norms, and perceived behavioral control; values are discussed below) are key to understanding a person’s motivation to perform a behavior (Ajzen, 1991). According to the theory of planned behavior, attitudes are positive or negative evaluations of a behavior, subjective norms are the perceived social expectation towards performing a behavior, and perceived behavioral control refers to perceived ease or difficulty towards performing a behavior (Ajzen, 1991). The theory of planned behavior has been used as a framework to provide structure for open-ended qualitative inquiries.
(Goh, 2009; Borges et al., 2014), including with dairy farmers and decision-making (Hötzel and Sneddon, 2013; Brennan et al., 2016) and we felt it mapped well onto our overall question to determine motivation. We developed three sub-research questions based on the constructs of the theory of planned behavior. For the attitude construct, we asked how additional information about calf performance changed the way farmers thought about managing their calves. For the subjective norms construct, we asked how learning about peer performance changed how farmers thought about their calves. For the perceived behavioral control construct, we asked how benchmarking influenced how farmers felt about making decisions about calves. These sub-research questions then helped us develop the interview questions and follow-up probes for interviews with farmers before and after they received their benchmark reports. During the initial interviews, we asked farmers a series of open-ended questions and follow-up probes about calf management (How do you think your calf management is going?), how they felt about making decisions about their calves (How easy or difficult is it for you to make decisions about how you manage your calves?), how they felt about collecting data on their calves (Can you tell me about benefits or challenges you think there are with collecting data on your calves?), and how they felt about comparing their own farm performance against their peers (Who influences the way you manage your calves?).

Values are also key to understanding how a person is motivated to behave because they indicate what is important to a person (Schwartz, 2012). We also wanted to explore the values that farmers have about their calves and calf management and asked questions about the priority given to calves (What priority are calves given on your farm?).

In the subsequent interviews, after receiving two benchmark reports, we asked farmers the same questions from the first interviews but adjusted the wording to reflect that farmers now
had access to data on their calves and peer comparison. Additionally, we asked questions about how farmers felt about participating in the benchmark study and if farmers had any additional thoughts on the topic. The interview guide is provided in Table 4.1. This table is organized by the sub-research question listed at the top of each section. The pre and post interview and probing questions are also listed.
### 1. How does increase in information about calf performance change the way farmers think about managing their calves?

<table>
<thead>
<tr>
<th>Pre-report questions</th>
<th>Pre-report probes</th>
<th>Post-report questions</th>
<th>Post-report probes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can you tell me about how you think your calf program is going on your farm?</td>
<td>Are you satisfied with the level of calf monitoring on your farm?</td>
<td>Has learning about your calves from the benchmark report influenced how you think about your calf management?</td>
<td>Were there things in the reports you anticipated? Things you didn't anticipate?</td>
</tr>
<tr>
<td></td>
<td>What do you think are advantages of routine monitoring the calves with blood work and tapings?</td>
<td></td>
<td>Did the information in the report influence how much you monitor your calves?</td>
</tr>
<tr>
<td></td>
<td>What do you think are disadvantages routine monitoring the calves with blood work and tapings?</td>
<td></td>
<td>Are there other things beside blood and weight that you would consider monitoring?</td>
</tr>
<tr>
<td></td>
<td>What do you think are the advantages benchmarking how calves are doing?</td>
<td></td>
<td>Did you find advantages to monitoring your calves? Disadvantages to monitoring your calves?</td>
</tr>
<tr>
<td></td>
<td>What do you think are the disadvantages benchmarking how calves are doing?</td>
<td></td>
<td>Were there things discussed about calves that you agreed with? Disagreed with?</td>
</tr>
<tr>
<td></td>
<td>What do you think are the disadvantages benchmarking how calves are doing?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2. How does learning about peer performance change how farmers think about their calves?

<table>
<thead>
<tr>
<th>Pre-report questions</th>
<th>Pre-report probes</th>
<th>Post-report questions</th>
<th>Post-report probes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who influences the way you manage your calves?</td>
<td>Do you talk to other producers about the way you manage your calves?</td>
<td>Have there been any changes in who influences your calf program?</td>
<td>Has learning about what other producers are doing influenced how you manage you calves?</td>
</tr>
<tr>
<td></td>
<td>Do other producers come to your farm to see your calves?</td>
<td></td>
<td>Have there been changes in interactions with other producers during the benchmarking?</td>
</tr>
<tr>
<td></td>
<td>What sources do you rely on for learning about calf management?</td>
<td></td>
<td>Did you talk more about calves with other producers?</td>
</tr>
<tr>
<td></td>
<td>Do you think other producers routinely monitor of their calves?</td>
<td></td>
<td>Did you visit other farms during the study? Did other producers come to see your calves during the study?</td>
</tr>
<tr>
<td></td>
<td>To what extent are you interested in knowing what another farmer is doing to manage their calves?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Do you think there are animal performance topics that other producers might think is useful to benchmark?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Do you think other producers might think benchmarking calf performance is useful?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3. How does benchmarking influence how producers feel about making decisions about calves?

<table>
<thead>
<tr>
<th>Pre-report questions</th>
<th>Pre-report probes</th>
<th>Post-report questions</th>
<th>Post-report probes</th>
</tr>
</thead>
<tbody>
<tr>
<td>How easy or difficult is it for you to make changes in the way you manage your calves?</td>
<td>What are challenges you have with calf management?</td>
<td>Have there been any changes in how you feel about making decisions about your calves?</td>
<td>Were there particular changes you made in your program that were based on information you learned in the report?</td>
</tr>
<tr>
<td>What are the things that are going well with calf management?</td>
<td>Do you have any challenges with providing colostrum to the calves on your farms?</td>
<td>Were there changes you made in your calf program that didn't last? How come?</td>
<td>Were there changes you made in your calf program that did last? How come?</td>
</tr>
<tr>
<td>Do you have any practices that are successful?</td>
<td>How important is managing colostrum for heifers; for bulls?</td>
<td>Did you make any changes with your staff?</td>
<td>Did you make any changes with protocols?</td>
</tr>
<tr>
<td>Do you think monitoring the calves with blood samples is useful? Monitoring weight useful?</td>
<td>If no changes made, were there changes you thought might be beneficial, but just haven't implemented</td>
<td>Does knowing what your peers do for their calf management influence how easy or difficult you think it is to make changes in your calf management?</td>
<td></td>
</tr>
<tr>
<td>Do you think monitoring the calves with blood samples is feasible? Monitoring weight feasible?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you think benchmarking is feasible to do for the calves?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4. How do farmers value their calves?

<table>
<thead>
<tr>
<th>Pre-report questions</th>
<th>Pre-report probes</th>
<th>Post-report questions</th>
<th>Post-report probes</th>
</tr>
</thead>
<tbody>
<tr>
<td>What priority are calves on your farm?</td>
<td>In comparison to other things on the farm, how much of a priority are your calves?</td>
<td>Not available</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.1 Interview guide for interviews with farmers on the information in the benchmark reports
The first round of interviews took place before delivery of the first benchmark report on all 18 farms with a total of 21 people interviewed. We conducted follow-up interviews after farms had received their second benchmark report on 16 of the original 18 farms from the first round, interviewing a total of 19 of the original people interviewed in the first round (two farms were not included in the second round of interviews due to scheduling conflicts). For both rounds of interviews, there were two instances where multiple members of the family participated in the interview. Farms with multiple interviewees agreed to be interviewed together. Interviews were audiotaped and conducted by the first author on the participant’s own farms.

4.2.3 Data analyses

Interview audio files were transcribed by a contracted professional transcription service, and transcripts were compared to the original audio files to ensure fidelity. We used QSR’s Nvivo (version 10.2.2) for data analysis. We treated the participants as a single case, bound by context (participating in the calf benchmark study and geographic location) and conducted a within-case analysis using a variable-oriented approach based on a priori theoretical constructs of the theory of planned behavior (Ajzen, 1991) and inductive analysis. Consistent with a within-case approach analysis, all farmers were treated as a single entity, rather than using comparison among farmers. This approach enabled us to identify the major themes that arose based on identifying phenomena related to the variables of interest and the patterns that emerged between these phenomena (Miles et al., 2014).

We analyzed the interview data using a two-step coding process: the first step involved condensing the raw data into groupings (codes) and the second step condensed these groupings into, “more meaningful and parsimonious units of analysis” (categories; based on Miles et al.,
During the first step in this process data were organized using an a priori list of codes based on the theory of planned behavior constructs ("attitudes", "subjective norms", and "perceived behavioral control") and a code for "values". This was followed by the development of more specific codes to further distinguish the different topics that emerged during the analysis. For example, data classified under the ‘attitudes’ code were separated into attitudes about calf management and attitudes about benchmarking. The lead author and another trained individual helped to develop a list of code definitions that were then used to code a subset of the interviews; discrepancies on how data were coded were discussed until consensus was reached. The lead author then coded the remaining interviews. During the second step in the analysis, sections of the transcripts labeled with more than one code were further organized into categories based on the relationship between the overlapping codes. These categories were then organized into the three major themes reported in the Results section of this paper. Quotes were selected to represent examples of a given category within each theme; we specifically identified statements reflective of many responses and that more clearly expressed a given concept. Quotes have been modified for length and clarity: ellipses indicate where text was omitted to reduce quote length, and parentheses indicate the authors’ addition to the text. Participant numbers assigned during data collection and gendered pronouns have been altered in this manuscript to further protect anonymity.

4.2.4 Validity

To stay consistent with our critical realist approach, we used a framework that organizes these concepts based on descriptive validity (what is reported as seen and heard), interpretive validity (the researchers’ understanding of the participant’s perspective), and theoretical validity
(meaning is explained through concepts and their relation) (Maxwell, 2012). For concerns about the descriptive validity of our study, we relied on audio recordings of all interviews and checked all transcripts against the original audio recordings. For concerns about the interpretive validity the lead author and sole interviewer made repeat visits to the farms for interviewing and report meetings to establish rapport with the participants, employed repeat interviews that helped confirm respondents’ answers to questions, used multiple researchers to analyze the data to minimize researcher bias, and maintained an ongoing log of notes documenting the research process. For concerns with theoretical validity, we used an established theory to frame our data collection and analysis and used an analytic framework to develop our themes (from codes to categories, and finally themes) based on Miles et al. (2014).

4.3 Results

Three major themes emerged during data analysis explaining how the provision of information about calf performance and peer comparison in benchmark reports influenced farmer decision-making. Collectively the responses suggest benchmarking motivated farmers to improve calf management because of the intrinsic and instrumental value of having access to data and peer comparisons. Additionally, farmer values about their calves emerged as a key feature in how access to data and peer comparison motivated them to improve calf management. Finally, benchmarking calf management shifted the subjective norms among farmers around calf management. The themes are organized to show farmers’ perceptions of their calves, their calf management, and their peers before and after they had access to data on their calves and peer comparison.
4.3.1 Theme 1: Improved farmer confidence

Access to data on their calves and peer comparison had intrinsic value (i.e. value in itself) for farmers because it instilled a sense of confidence in their assessment of their calves and calf management. Before access to the benchmark reports, farmers’ perceptions of success were based on methods of assessment that did not rely on data. Once they received their benchmark data, the reports improved farmer confidence because it provided an additional measure of success.

4.3.1.1 Before benchmark reports

During the first set of interviews, before recurring benchmark reports, farmers expressed both confidence and ambivalence about managing their calves. Farmers described a range of factors related to confidence in their ability to manage calves. For example, low mortality for pre-weaned calves was perceived as an indicator of success, “I think it's going excellent right now… There's very little calf loss” (Farmer 15). Another outcome of success was breeding age for heifers. For example, when describing why they felt their calf program was going well, the following two participants both from Farm 4 included breeding milestones and growth, “We’re able to raise our calves bigger, quicker” (Farmer 4A) and, “We were breeding them (heifers) at 13 months; we’ve changed a couple little things, now we’re breeding them at 12 months” (Farmer 4B).

Confidence in successful calf management also included the ability to identify sick calves based on visual assessment. Farmers relied on a range of behavioral indicators to assess the physical health of their calves. Farmer 5 described their observations as follows,
…if the calf’s not drinking or slow-drinking, just look if it’s got a bit of a snotty nose or droopy ears or it’s got scours. It’s usually maybe a touch of pneumonia… And (it is) just usually those two things, if you assess that pretty quick, I don’t think we lose a calf a year.

Activities related to calf management were also linked to confidence, including the use of vaccine schedules and hygiene protocols, and colostrum management. For example, when describing how well their calves were doing, Farmer 1 reported, “I think we’ve thought it out pretty well. We do a good job with cleanliness and tidiness, capitalizing on things that need to be capitalized on.”

We also noted a degree of ambivalence about assessing and managing calves, often based upon the lack of relevant data to support assessments. For example, Farmer 11 commented on the lack of data for assessing failure of passive transfer of immunity,

I never had my calves tested… So, have I had problems with sick calves before? Yes. Have I pinpointed it to my colostrum management? No. So, to say that, I don't really know if I've had problems with my colostrum management before. ...Kind of been like, ‘we're okay’. But have I had a lot of research to back up that 'think we're okay,’ no.

Having data on calves was anticipated to address ambivalence. Farmer 13 indicated the value of data in providing reassurance, “…it would just be a good relief to know you’re raising good heifers.”

Ambivalence was also expressed in terms of questioning routine practices that were not supported with relevant data. Farmer 10 expressed mixed feelings about the quality of colostrum fed to calves given that quality was not tested, stating:

If I have a healthy cow through a healthy transition period that had a healthy far-off period, (she) should have a healthy first, second feeding for its baby. And I just trust that. Should I trust that? Well that’s probably just me with my blinders on.
The anticipated value in having data on their calves was linked with personal values farmers expressed. For example, Farmer 11 described the value of having data on their calves in relation to identity,

I want to be a good farmer… I want to do well at everything I do, so if I see a benchmark that I'm not doing well, then I want to figure out a way within economic reason to do a better job… if I can change little things to do better, then I absolutely will do that.

The calf’s intrinsic value was also linked with an anticipated value in collecting data. Farmer 10 explained the link between using data to improve calf management and the value placed on the calf, “…it’s a living, breathing animal in my care… That’s why I do the best I can at the beginning.”

4.3.1.2 After benchmark reports

Once the participants received their benchmark reports, access to data on calves was either confirmatory or surprising for participants. For example, Farmer 1 commented how the report validated their perceptions regarding calf growth, “…I’d already noticed… just visually and on a day-to-day basis…They’re …just bigger, healthier, stronger looking calves… it being on paper, obviously, it seals the deal.”

The influence of the peer comparison had similar effects on the farmers’ perceptions. Farmer 17 described the peer comparison as beneficial because, “… it just gave you confidence that you’re doing something right.” Comparing calf outcomes gave farmers a reference point for interpreting their own performance. As explained by Farmer 15, “…your numbers aren’t that valuable if you don’t have anything to put it against.” Peer comparison also motivated farmers based on a sense of pride in doing well. As Farmer 12 explained,
I guess it put a little bit of a level of competition. Maybe a little spark under your butt to make sure what you’re doing—knowing where I am … keep it up or try to improve a little bit… You don’t want to be on the bottom end of the scale… there is a sense of pride to be on the higher end of that.

In some cases, information in the benchmark reports came as a surprise to farmers and challenged perceptions about their calves. Despite this surprise, a favorable view of the information emerged. For example, Farmer 5 explained the benefit of having data to estimate immunoglobulin (IG) transfer from colostrum,

Well, you know, the first round surprised me, the low (blood serum levels) … I think it (the blood serum data) was definitely advantageous… I think it was very good, especially the colostrum thing was a good eye opener.

This favorable view of information was echoed when describing the influence of peer comparison when farmers’ perception of their own performance did not align with their expectations. Farmer 13 described their own assessment of their calves in relation to the other farmers,

… we thought the calves were doing better than what they were… so after the first report (when) we got all that data, it was, like, ‘okay, there’s other farms doing better. And we’re doing pretty good, but we could be doing better’.

In some cases, making changes based on access to data in the first report led to expectations that there would be improvements, and if these were unrealized following the delivery of the second report, there was a sense of ambivalence regarding the reports. As indicated by Farmer 6 when they failed to see improved growth after increasing milk allowance for their calves based on recommendations from the benchmarking study, “… I just didn't see the results that I thought I would see.”

Reports instilled a sense of ambivalence when they conveyed inconsistent findings. Farmer 15 discussed the data regarding colostrum management, “I was surprised the second time
we were low on (blood serum levels). But I was overly surprised the first time on how well we had done on colostrum. Which was the fluke? I don’t know.”

4.3.2 Theme 2: The instrumental value of access to data and peer comparison

Access to data and peer comparison also had instrumental value (i.e. value as a process) for farmers because it provided them with examples of ways to address problems on their farm and that improved outcomes were achievable. Before receiving their reports, farmers anticipated using the data to improve calf management practices. Once they had their reports, farmers used them to inform their decision-making.

4.3.2.1 Before benchmark reports

Before receiving the benchmark reports, the participants conveyed their anticipation on how the data would enhance calf management. In the words of Farmer 18, having data on calves was a learning opportunity, “Well, I think if you monitor something you can learn something and if you can learn something you can do something better.” Farmer 13 commented specifically about the value of these data for monitoring calf growth and milk feeding decisions, “Well, I think it’s a great benefit. First of all, to see how your calves are growing, if there’s room for improvement. You know if you’ve got to feed them more aggressively….”

The anticipated value of the data was linked with the calf’s future role as a productive cow as referenced by Farmer 12, “... I do see the value. Well, they’re the future of the herd. My goal is to get a really young herd, so that’s where we’re headed.” Farmer 10 explicitly linked collecting data on calves with the duality of their own welfare and that of their calves, “I’m very curious by nature. I’ve got to know everything that I don’t know. And I think that’s what makes
me a stand above farmer. …I’m either bettering the cows and my calves for my benefit, or for theirs.”

Farmers also discussed how making changes in their management was often seen as requiring some consensus with others working on the farm, and before receiving their benchmark reports, farmers discussed challenges in doing so. For example, Farmer 10 described the challenge of working with others that have different farm management priorities with respect to calves, “... it can be a little difficult to get everybody else on board because… they’re not really cow people, they’re equipment people...” At other times, determining how to approach others for support in making changes in management was a challenge. Farmer 15 described learning how to best approach a family member to increase the likelihood of acceptance, “In some ways we were butting heads about different things, and then I kind of would just start saying little things here and there … and he would eventually think these ideas were all his own...”

When farmers discussed benchmarking calf management, they linked the process of peer comparison with usefulness of knowing what other farmers are doing. As Farmer 12 explained, an anticipated benefit to benchmarking was broadening horizons about their own performance, because if you don’t (benchmark)—especially if you’ve got your head in your own farm, you never leave your yard, you don’t know... But it could be that much better, … you find out your neighbor is doing it that way, and he’s getting much more out of something...

For others, the value of benchmarking was that it connected them to other farms for the purposes of identifying practices that may be beneficial. Farmer 16 explained the value in comparing peers on calf growth, “If you know your calves are not heavy enough or they are not calving in at a proper height … it gives me an idea of what… other people are doing, and where I stand.”
At times, the anonymity of the benchmark process was problematic for farmers when they anticipated comparing their performance with their peers and in relation to the feasibility of adopting particular practices on their own farms. This limitation was evident in participant concerns about the benefits of making changes based on how other farmers manage their calves. As Farmer 5 explained, “… we don’t know who we’re up against… in business, sometimes that’s the most important thing, is not to chase something you don’t know about.”

Concerns about adjusting management systems to include data collection were also expressed. These concerns were related to the type of indicator measured and means of data capture. For example, Farmer 4 explained, “…you got to collect data … you got to record data, … majority of farmers aren’t pencil pushers, you know, so you need a system that’s relatively easy and something that farmers are going to keep up.”

4.3.2.2 After benchmark reports

Once farmers had access to the data in their benchmark reports, they tended to use the data to identify aspects of calf management that needed attention, and thus could better focus their efforts. This increased their sense of having control over the outcomes.

With access to data on their calves, farmers identified deficits in calf management that enabled improvements. For example, Farmer 16 explained how data on passive transfer of immunity helped them notice problems in colostrum management,

I was going through it (the benchmark report) …saw the times that I was away and the times that I was around, because I was interested to see what the change would be. And that’s (where it) was noticeable. So, I learned something there right away. … it was a pattern. … it’s one of those things that you find a hole in
your program and it gives you the ability to patch it up … and having this study really helped.

Having access to data also allowed farmers to better link calf outcomes with managerial and environmental features. For example, Farmer 15 used the report to evaluate specific environmental factors affecting calf performance, “it did help me reflect upon (that) certain pens grow better, certain spots in the calf shack. … we don’t use some pens now because of that.”

Benchmarking also helped shift expectations of what could happen when making changes in calf management. Farmer 7 explained how benchmarking changed their outlook on increasing milk allowance for the calves,

…we knew there were problems here, but it was just kind of ‘that’s always how it had been’… nobody really thought of thinking outside the box of how we could improve this. Because before … if you feed too much milk, they’re going to get sick and die and that’s just kind of the mentality (of) how it is, you’re in a rut and you just think it’s normal. But now you can see like, ‘wow, like no, that’s not normal’.

Having the ability to make changes based on access to data also provided an opportunity for farmers to address concerns that they had not yet acted upon. Farmer 10 described making changes related to calf nutrition,

…things that maybe were in the back of my head, that maybe we should be doing this or not. Giving water right off the bat, free choice. I didn’t think a calf needed water. But in my head, I’m thinking, ‘well, I’ve always wondered at seven days old when it’s 30° out, would it want water? Would it drink it?’

Once farmers received their benchmark reports, they often used these data to negotiate changes in practice with others on the farm. The data were used to persuade others that the changes made were beneficial, or that further changes were now required.

In making changes because of poor performance, Farmer 7 described the process of instituting change with subordinates,
… we sat down with (the calf feeders, and said,) ‘we got problems here, calves used to be the bottom priority, now they’re the top priority… do the calves first and do them properly first.’ And so now …(I) kind of stay on them, like ‘did they all drink?’

For others, access to data facilitated navigating inter-generational conflict, as the data supported their efforts to enact change and strengthened their role as a decision-maker. For example, Farmer 14 used the reports to help convince a family member that increased milk allowance would be beneficial,

I knew that we had to make some improvements with our newborn calf care… when you’re working with someone who’s very old school in his approach, you need to kind of have some backup to it. And it (benchmark data) helped… it helped change his focus.

Peer comparison provided a reference to gauge if changes were required. As Farmer 15 indicated,

…We saw other people that were doing worse, but we saw also people that were doing better… although we haven’t been on everybody else’s farms, we feel like we do a pretty good job of everything, so we should be able to get that gain that they’re getting.

Peer comparison had less value if participants believed that the performance differences were related to different strategies at work on the different farms. For Farmer 11, perceived differences in goals related to calf growth limited the usefulness of peer comparison,

…Our heifers are bred at a year old. They’re bred young, and they’re all going to calve these small calves…it’s on purpose…. They have to be taken care of a little bit differently than guys who have these monster cows… If all your calves are like that, then your numbers are going to be, like, ‘oh wow, this guy’s an amazing farmer.’ It’s, like, ‘yeah, because he’s got big calves’…
For other farmers, calf performance had to be seen within the limitations for that farm. As Farmer 8 explained, “... people are given different resources... you have to kind of work within your constraints and try and make the best animal that you can make.”

4.3.3 Theme 3: Shifting subjective norms around managing calves

Access to data and peer performance on calves helped shift the subjective norms associated with calf management. Before receiving benchmark reports, farmers indicated that calf management was not typically discussed among farmers. Access to data and peer performance encouraged a shift towards calf management as a topic for farmers to include in their interactions with other farmers.

4.3.4 Before benchmark reports

A range of reasons emerged for why calf management was not commonly discussed among farmers. For Farmer 7, discussing calves with other farmers rested on the perception of problems with calf management, “If you had problems with your calves, it would be a more common topic... if I had a lot of problems, then I guarantee it would be more of a topic of conversation.”

For Farmer 11, linking calf feeding and childhood tasks contributed to calves not being commonly discussed,

Because it’s something that everyone’s always done... everyone’s always remembered doing it as a little kid so it’s just always something, a simple thing, even though it’s not really... But there’s a lot more to it that we just don’t really talk about.

Autonomy was also expressed in relation to how farmers viewed peer comparisons. As Farmer 5 explained,
I’m not saying I don’t value what other (farmers) do… it might work really well for them, but to make it work, you might have to change everything. So, everyone’s got to work with what they have and the systems and the barns they have. … you have to run your own programs.

Distinguishing oneself as progressive in adopting new management practices was also expressed in relation to peer comparison. As Farmer 4 explained when describing the value in collecting data on calves, doing what was best was linked with doing things differently from previous generations,

We’re the younger generation right. The younger generation always wants to change things quicker. The older guys keep things the same… We’re always going to try something that’s a little bit more maintenance but better for the calf.

4.3.4.1 After benchmark reports

After receiving their reports, how much farmers reported the influence of other farmers varied. For some, a lack of influence from other farmers after receiving data comparing farms was linked with an overall lack of discussing calves in general. As Farmer 3 explained, “Well, to be honest with you, I probably never talk to anybody about calves.” For others, such as Farmer 17, the peer comparison prompted minor change, “There’s a couple of other farms that we knew that were on the study and (we) kind of compared notes a little bit.” Others, such as Farmer 13, saw this influence in context with the specific requirements of their own farm,

I think for us the changes that we made (with feeding milk) … some (farmers) were doing that. And there’s evidence out there supporting that (feeding more milk) does help the growth, so that’s what we basically made the decision on.

Some farmers purposely tapped into existing social networks to discuss specific changes to calf management such as increasing the amount of milk fed to their calves. Farmer 11 offered,

Well, I talked to one farmer down the road… and he went through the same study… I’ve asked him questions about certain things…he’s the one … that told us … they feed three times a day.
For other farmers, such as Farmer 1, discussing calves with other farmers was a benefit, “It’s good to circulate ideas with other farmers… I think it’s definitely a good idea to get together or talk about it or compare ideas or systems that they’re actually running on their farm …”

4.4 Discussion

Researchers have used the theory of planned behavior to understand how farmers intend to improve dairy cattle lameness (Bruijnis et al., 2013) and disease prevention (Brennan et al., 2016), sow housing (de Lauwere et al., 2012), and animal welfare in general (Kauppinen et al., 2010). Apart from Brennan et al. (2016), these studies used this theory to quantify farmers’ intentions to behave.

In the current study, the theory of planned behavior provided structure for developing the interview guide and during the initial stages of data analyses. The theory of planned behavior determines motivation via intention to behave (Ajzen, 1997), therefore, using the theoretical constructs (i.e. attitudes, subjective norms, and perceived behavioral control) allowed us to ground our work in a well-tested and supported theory for predicting intention to behave (Armitage and Connor, 2001). However, during the analysis, it became clear that coding data solely for these theoretical constructs did not fully allow us to answer the question about how benchmarking motivated farmers to improve calf management. As described, all transcripts were first coded according to the focused theoretical constructs for attitudes, subjective norms, and perceived behavioral control. However, limiting the reporting of results to these analytical themes did not capture the totality of what farmers were sharing during the interviews. We opted
to continue a second round of coding in an open-coding strategy based on the patterns we observed during the initial phase leading to the development of categories from which to build the themes that better capture farmer motivation to improve calf management based. Below, we further discuss the theory of planned behavior, how it was embedded in the design and analysis, and how the reported subthemes and themes were built upon this theory.

We also modified our approach in accordance with Bruijnis et al. (2013) and included topics of values in the data collection and analysis phases. This approach provided additional insights into the complexities of farmer decision-making which include personal and normative values (Burton, 2004). Critiques of focusing on correcting knowledge deficits to address on-farm problems have suggested that a more nuanced approach is needed with approaching farmers to make changes in management (Kristensen and Jakobsen, 2011b). Our study contributes to this approach, illustrating how motivation to improve calf management is associated with access to information and peer comparisons and the value farmers placed on their calves.

The benchmarking process provided farmers with information on how their calves were doing, and with how they compared to other farms, challenging them to rethink their calf management. In his work on benchmarking theory, Moriarty (2011) described a process of learning about “the state of affairs” as a critical component of a benchmark because it provides participants with an understanding of their own operations. In our study, seeing their own data in relation to other farms was linked to farmers’ feelings of confidence in knowing how well they were managing their calves. de Lauwere et al. (2012) reported that confidence in good outcomes was a key difference between farmers that made welfare-focused changes in sow housing compared with farmers that made no changes. Vaarst and Sörensen (2009) identified confidence
in managing calf mortality as key to farmers reporting a sense of control over their ability to manage future problems.

The ambivalence noted by some of the farmers in how they felt about calf management was linked with being unsure about their assessments of their calves before receiving reports, and inconsistencies with calf outcomes between the reports causing a sense of confusion. Te Velde et al. (2002) suggested that farmers’ sense of ambivalence towards their animals is addressed through coping mechanisms that ultimately justify maintaining the status quo. This does not explain our findings; ambivalence was not linked with defending the status quo but rather introspection regarding their own calves. Moreover, feelings of ambivalence are to be expected when farmers received conflicting reports that do not align with farmer expectations (i.e. when farmers made changes to improve calf outcomes and the report indicated poorer than expected performance), as they could not verify the effectiveness of their management. These farms in particular may have benefited from an ongoing process with multiple reporting periods allowing them to assess the consistency of their results.

Attitudes towards using data from benchmarking were mostly positive both before and after receiving the reports. For example, farmers expressed their appreciation of having the reports regardless of how well they performed. Brennan et al. (2016) noted that dairy farmers were motivated to improve disease status on their farms once they became aware of a problem. Similarly, Jansen et al. (2009) noted that farmers acted to improve mastitis once they considered it a problem. The results presented in our companion paper (Atkinson et al., 2017) showed that farmers made changes to their calf management when they became aware of issues with their calves (e.g. poor transfer of immunity or poor perceived growth) following delivery of the benchmark reports. Here we have described how farmers specifically commented on their ability
to use data to inform decision-making. They described a process of refinement, targeting specific parts of their calf management based on the data identifying where issues existed.

Perceived behavioral control is important in motivating behavior (Armitage and Conner, 2001). We suggest that perceived behavioral control explains how the provision of data motivated farmers to improve management. For instance, farmers anticipated using the data to improve calf management practices (before benchmark reports), and again referred to it when they described the changes they made after the reports were delivered. This sense of anticipating and experiencing positive outcomes associated with access to data was also present when farmers discussed navigating changes with family members and staff. Others have also described the importance of control. Vaarst and Sørensen (2009) reported that on dairy farms with low calf mortality, perceptions of control were linked with a perceived ability to make appropriate decisions with regards to calf health. Farmers likely feel empowered when they can make informed decisions that target problems with a solution.

In our study, farmers expressed a range of values attached to their calves. They placed instrumental value on them as future members in the lactating herd, and inherent value on them as living beings. They also linked their calves’ welfare with their own identity as a good farmer. Our study provides some indication that farmers decisions about the value of using benchmarking as a tool to improve management is associated with the values they attach to calves and with their identity as a farmer. This more robust view of decision-making has been noted in other studies (Burton 2004; Kristensen and Jakobsen, 2011b; de Lauwere et al., 2012). Kauppinen et al. (2010) found that instrumental and intrinsic values of animals were not mutually exclusive, a finding also reflected in the current study. Farmers held multiple values
regarding their calves, and consistent with other studies (e.g. Leach et al., 2010b), did not limit their decisions about improving calf management to economics.

Before benchmarking, calves appeared to be a low priority topic for discussions with other farmers. Jansen et al. (2010b) found that how farmers feel about turning to fellow farmers for information was linked with the degree of trust they put in information from external sources. What may be the best explanation of the reported lack of influence of other farmers is the recurring expression of autonomy in managing a farm. Burton (2004) has argued that underestimation of the influence of other farmers is related to the independence characteristic of farming.

After receiving the benchmark reports, participants expressed more interest in comparing practices with peers. Because we had promised to maintain confidentiality we never identified participants, but through their own initiative some participants identified and reached out to others with whom they had established relationships. Given this interest, and the potential benefits of these direct interactions, we encourage future studies to adopt a focus group format that facilitates peer sharing and allows a better understanding of the specific constraints and opportunities of others in the peer group.

There is conflicting information about the degree to which external influences motivate farmers to improve practices (Jansen et al., 2010b; Main et al., 2012; Bruijnis et al., 2013; Russell and Bewley, 2013). Valeeva et al. (2007) found that Dutch dairy farmers were more motivated by internal factors than esteem from their colleagues. In contrast, Swinkels et al. (2015) found that approval by their peers influenced Dutch dairy farmers’ decisions to reduce mastitis. Similar to Jansen et al. (2010b), farmers in our study varied in the extent that peers were
used as an information source on calf management, suggesting benchmarking may encourage some but not others to reach out to peers.

In a survey of Kentucky dairy farmers, Russell and Bewley (2013) found that peer influence was less important to decision-making compared to financial performance and employee satisfaction. However, these authors elsewhere suggested that lack of exposure to peer influence, such as benchmarking, may affect farmer opinions of its importance (Russell and Bewley, 2011). Considering our study’s finding of favorable attitudes towards benchmarking, and the positive reception to the data, we conclude that benchmarking can be useful in facilitating a more data-driven approach to farm management.

More work is needed to determine the optimal number and frequency of reports needed to motivate and sustain positive changes. One potential problem with providing many reports is that this may leave some farmers feeling overwhelmed with data. This concern was not voiced by participants in the current study, suggesting that further reports could have been of benefit. Indeed, given the number and complexity of factors affecting both the success of colostrum feeding and calf growth, we suggest that farmers might especially benefit from routine reporting that allows them to track success and identify problems at an early stage.

A key feature of our study design was the cooperation of the herd veterinarian to deliver the reports. The relationship between the farmer and the herd veterinarian likely plays an important role in determining how animals are cared for on farm. This issue is addressed in Chapter 5.

Moriarty (2011) argued that competitive survival is the key motivator for why participants improve through benchmarking. In our study, benchmarking was more related to pride in performance rather than outperforming competitors. The extent to which benchmarking
can motivate farmers will likely depend on their perception of the relevance of the indicators benchmarked. For some, benchmarking can be used to introduce farmers to new outcomes of interest. For others, if they do not identify practices as fitting their management strategies, then the value of benchmarking these practices is diminished (Moriarty, 2011); this was evident in the current study for farmers who did not view high growth rates for calves as a goal for their farm. As noted in Theme 2, there was also a concern with adopting management practices based on benchmark performance without knowing if one’s own farm is comparable to the other farms. One suggestion for follow up research would be to ask farmers to specify their goals in advance (allowing them to benchmark performance against their own goals), and to provide an opportunity for the different farms to meet with one another (allowing them to compare results and to better understand the context and specific procedures used on the different farms).

Mee (2013) argued that poor outcomes for dairy calves are due in part to the low priority given to them. However, the participants in our study indicated that the calves were valued, suggesting that problems in calf health and growth may reflect poor assessment methods rather than a lack of interest. Before participating in this study none of the farms routinely assessed passive transfer of colostral antibodies or calf growth. That farmers do not routinely collect key performance indicators on calves stands in contrast with the other data-driven features characteristic of modern dairy farming, such as reproduction (LeBlanc et al., 2006). Our work suggests that providing routine access to data on calves would be welcomed by many farmers and integrated into decision-making practices. Integrating more data-driven approaches into calf management should consider that farmers routinely assess calves with qualitative methods. For example, all farmers in our study relied on behavioral or physical indicators to assess the health of their calves (e.g. droopy ears, snotty noses). We do not suggest these qualitative techniques
are inappropriate for making decisions about calf management; we do suggest that data-based practices should complement these current practices so that farmers’ own understanding of their calves is enhanced by the use of data. More work exploring the extent that farmers’ knowledge about their calves is integrated into a data-driven benchmark study could provide insight into farmers commitment to participating in benchmarking.

4.5 Interpreting this study

Context is key to the critical realist approach (Maxwell, 2012), therefore the specific context within which farmers made changes to their calf management should be considered when interpreting these research findings. For example, in this study there was no fee associated with data collection or report delivery; results may have differed if farmers were required to pay for this service.

Social desirability response bias, or the projection of a positive self-image, is inherent in social science research, in particular if respondents are not comfortable sharing their feelings and thoughts with the interviewer (Polkinghorne, 2007). We acknowledge that this bias is a risk in the current work but argue that the use of multiple visits to establish a rapport, repeated interviews to corroborate information, and the time between interviews to allow for participant reflection all helped to minimize bias (Polkinghorne, 2007).

We used a qualitative approach to gain a deeper understanding of farmers’ experiences during a benchmark study and identified phenomena that explain farmer motivation to improve calf management. Our results provide needed description and insight into farmer decisions that can inform future studies and extension efforts; farmer decisions about calf care are complex, involving economic and personal values, and pragmatism in evaluating a new technology, and
require in-depth exploration of how these all manifest in decision-making. Our results are based on a convenience sample of participants and as such do not seek to represent the views of all dairy farmers, even within our study region. Future studies, using other methods such as surveys, may provide a better understanding of how representative these phenomena are in larger populations of farmers. Additionally, future work that pairs qualitative and quantitative methods can add strength to claims about farmer experiences by using multiple sources of data and analytic frames that can capitalize on the complexity of decision making (Kristensen and Jakobsen, 2011b).

Willingness to try novel ways of managing calves may be the most salient shared characteristic of our study participants; we anticipate that benchmarking may be a useful tool to promote improvements for farmers interested in data-driven approaches to calf management. Our rich description of the context of our study, use of first-hand accounts to demonstrate the farmers’ point of view about benchmarking calves, and transparency in research methods all enhance the transferability of our study results (see Houghton et al., 2012) to similar groups of farmers (see Atkinson et al., 2017 for farmer characteristics). However, consideration of the context is required in understanding how others might respond to benchmarking calf management. The current study considered farmers as diverse individuals and demonstrates the value of this approach for future on-farm studies. We encourage the use qualitative methods to better understand how attempts to promote management changes on farm may succeed and fail.
4.6 Conclusion

Access to data has intrinsic and instrumental value for farmers and is linked with the overall value farmers place on their calves. Benchmarking helps shift subjective norms around calf management and tap into social networks to identify ways of improving calf care.
Chapter 5: How Benchmarking Promotes Cooperation to Improve Calf Welfare

5.1 Introduction

Dairy calf welfare issues in the early stages of life are often linked to health and physical development. Calves are at risk of higher morbidity and mortality because of poor colostrum management (Windeyer et al., 2014). Calves are also at risk of poor growth because of underfeeding with milk before weaning (Khan et al., 2011). In dairy farming, the farmer and farm employees are the primary care providers, so it is logical that they are the focus of efforts to motivate changes (i.e. adoption of management practices) that improve calf welfare. In a recent study our research group provided benchmarking reports with information on how well pre-weaned calves acquired passive immunity from colostrum and how well calves were growing. 83% of farmers in this study made changes in calf management that led to improvements in calf outcomes (e.g. improved passive transfer of immunity and average daily gains; Atkinson et al., 2017). These farmers were also interviewed to determine how access to information presented in the benchmarking reports motivated changes in calf management (Sumner et al., 2018; Chapter 4 of this thesis).

Providing information is one technique to promote behavior change. However, provision of information can also fail to achieve a desired change, particularly when behavior is also influenced by other factors including the expectations of other people (Bicchieri, 2017). This influence of others is referred to as a subjective norm; i.e. when a person engages in a behavior they believe they are expected to perform. Some recent work has described these social
influences on farmer decision making. For example, Ellis-Iversen et al. (2010) found that farmers were more likely to make changes in management related to disease management when motivated by a trusted advisor.

The theory of planned behavior postulates that subjective norms influence a person’s intention to act (Ajzen, 1991). In other words, people whose perspectives matter to us influence how we believe we should behave in a particular way. Dairy farmers consider their veterinarian to be an influential advisor for welfare (Kauppinen et al., 2010; Pothmann et al., 2014; Wolf et al., 2016). Some studies have identified the veterinarian as an important influencer of social norms for decisions related to mastitis control (Swinkels et al., 2015; Jansen et al., 2010b). These studies on mastitis control focus on the adult lactating cow, which on many farms is the focus of systematic data collection (e.g. milk yield, fertility) and the primary focus of the dairy veterinarian (LeBlanc, 2006). It is not clear to what extent farmers consider their veterinarian an important social influence for other animals, such as the pre-weaned calf, that are not typically the focus of systematic data collection.

Previously we described how access to data and peer comparisons influenced farmer perspectives on calf management (i.e. Chapter 4 in this thesis). During this study the veterinarian played a central role in discussing the benchmark reports with the farmers. Learning about farmer experiences during this process could help us understand if and how improving communication between farmers and veterinarians can promote the veterinarian as a social influence for calf management, thus identifying one way that veterinarians can motivate farmers to improve calf welfare. Thus, the goal of the current study was to understand if and how dairy farmer and veterinarian cooperation during a benchmarking study on calf immune system
development and growth influenced farmer perspectives of their herd veterinarian as an advisor for calf management.

5.2 Materials and methods

This study was approved by the University of British Columbia (UBC) Behavioural Research Ethics Board under # H14-03196. All participants provided written consent.

5.2.1 Study design

For the current study, we were interested in understanding how benchmarking calf immune system development and growth with their veterinarian influenced the farmer’s perspective about their herd veterinarian as an advisor in calf management. This emphasis on context and understanding meaning are consistent with a critical realist approach (Maxwell, 2012).

The participants in this study are the same as those described in Chapter 4 of this thesis. Details of the sampling rationale and recruitment process are provided in Chapter 4. Briefly, we conveniently recruited from 18 commercial dairy farms in the lower Fraser Valley of British Columbia and interviewed farm staff involved in calf management including owners, herd managers, and calf managers (see Sumner et al., 2018 for a fuller description of sampling rationale; and Chapter 4 in this thesis). Participants in this study were recruited through their herd veterinarian. Some veterinarians assisted in collecting biological data during the study period and all veterinarians presented both benchmarking reports to their client participants. In addition to the farm’s own data, relevant information was also discussed at the meeting (e.g. on the effects of increasing milk ration on calf growth) and when needed, props (e.g. a
colostrometer for testing colostrum quality) were used to facilitate the discussion. UBC researchers participated in the meetings to provide support to veterinarians on report content or relevant supporting information.

During the study, each farm received two reports, separated by 10 weeks. These reports described serum total protein from individual calf blood samples, average daily gains (as estimated from heart-girth tapings) and information on management practices employed on the study farms. Examples of the contents on these reports can be found in Chapter 4 of this thesis.

5.2.2 Interview guide, data collection, and participants

The current study was designed in conjunction with the study described in Chapter 4. For the research question that is the focus of this chapter, we wanted to answer the question of how cooperation to improve calf management influenced how farmers view their veterinarian as an advisor for calf management. To answer this question, we used the theory of planned behavior to develop semi-structured interview questions based on the theoretical construct of subjective norms. Subjective norms are the perceived social expectation a person feels to perform a behavior (Ajzen, 1991). We specifically focused on the veterinarian as a reinforcer of subjective norms since they helped deliver the reports to the farmers during the benchmark study. Additionally, the extent of involvement that veterinarians had in calf management in this study was novel; therefore, we wanted to learn how this interaction changed the farmer’s perception of the veterinarians reinforcing a subjective norm for calf management. Based on the subjective norms, we asked the sub-research question: How does veterinarian involvement with their calf management change how farmers think about managing their calves?

The interview guide including the interview questions and probes for this study is in Table 5.1
This table is organized by the sub-research question listed at the top of each section. The pre and post interview and probing questions are also listed.

<table>
<thead>
<tr>
<th>Pre-report questions</th>
<th>Pre-report probes</th>
<th>Post-report questions</th>
<th>Post-report probes</th>
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<tr>
<td>Who influences the way you manage your calves?</td>
<td>Does your veterinarian have an influence on how you manage your calves?</td>
<td>Have there been any changes in who influences your calf program?</td>
<td>Has the veterinarian's involvement in the benchmarking influenced the way you manage your calves?</td>
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<td>Do you ask the veterinarian questions about your calves?</td>
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<td>Does your veterinarian ask you questions about your calves?</td>
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<td>Do you think benchmarking report sessions with your veterinarian are useful?</td>
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Table 5.1 Interview guide for interviews with farmers on working with veterinarian during benchmark study

We interviewed farmers before and after (approximately 34 weeks apart) they received their benchmark reports from their veterinarian (Sumner et al., 2018; see Chapter 4 in this thesis for more detail on the interview guide and complete list of questions). Before farmers discussed
their benchmark reports with their veterinarian, they were asked if their veterinarian influenced their calf management. Probing questions included: 1) Do you approach your veterinarian to talk about calves; 2) Does your veterinarian approach you to talk about calves; and, 3) Do you ask the veterinarian about your calves' health? After farmers discussed both benchmarking reports with their veterinarian, farmers were asked if the veterinarian’s involvement in the benchmarking influenced the way they managed their calves. Probing questions included: 1) Were there changes in the amount you discussed calves with your veterinarian? and, 2) Did you find these discussions beneficial or not? All interviews were audiotaped and conducted by the first author on the participant’s own farms.

5.2.3 Data analyses

Interview audio files were transcribed by a contracted professional transcription service, and transcripts were compared to the original audio files to ensure fidelity. We used QSR’s Nvivo (version 10.2.2) for data analysis. We analyzed the data in two separate rounds of coding. Consistent with our analysis in Chapter 4, the first round of coding relied on the theory of planned behavior and the second round focused on coding patterns that emerged from the first round of analysis. For the first round of coding, we used the construct of subjective norms from the theory of planned behavior and coded for phenomena related to veterinarians. The lead author and another trained individual helped to develop a list of code definitions related to subjective norms that were then used to code a subset of transcripts from before and after benchmark reports that included the largest range of codes; discrepancies on how data were coded were discussed until consensus was reached. The lead author then coded the remaining interviews.
In the subsequent step of coding, the subset of data coded as the subjective norms related to the veterinarians was then further coded using applied thematic analysis (see Guest et al., 2014). During this step, emergent themes and initial codes were first described after a read-through of the data and organized into a codebook based on themes and related code labels and definitions. Another trained individual coded a subset of the data using the codebook. The lead author and this individual met to discuss how the data were coded and resolve discrepancies. Modifications to the codebook were included in the final version based on this meeting. Quotes were selected to represent examples of a given category within each theme; we specifically identified statements reflective of many responses and that more clearly expressed a given concept. Quotes have been modified for length and clarity: ellipses indicate where text was omitted to reduce quote length, and parentheses indicate the authors’ addition to the text in cases where clarification was warranted. Participant numbers assigned during data collection and gendered pronouns have been altered in this manuscript to further protect anonymity.

5.3 Results

We present two major themes that emerged from the analyses of the participant responses indicating how benchmarking influenced dairy farmers’ perceptions about their veterinarian as an advisor for calf management. First, benchmarking provided an opportunity for veterinarians to demonstrate their expertise on topics related to calf management. Second, benchmarking increased interaction between farmers and veterinarians on issues of calf management. The themes are organized chronologically starting with farmer perspectives on their relationship with their veterinarian before benchmarking and then describing changes in these perspectives after benchmarking.
5.3.1 Theme 1: Perception of the veterinarian as an advisor

Before receiving the benchmark reports, farmers saw their veterinarian as a source of information and training, with expertise to provide guidance on topics related to disease and pain management. After meeting with their veterinarians to discuss the benchmark reports, veterinarians were recognized for their ability to address other issues related to calf management, including milk allowance and colostrum management.

5.3.1.1 Before benchmark reports

Farmers described their veterinarians as educators on topics of calf management including taking an active role in educating farmers about new calf management techniques. For example, Farmer 16 reported: “… the clinic that I’m with, are very proactive in educating people.” Veterinarians were described as teaching farmers through different means such as in-clinic seminars or through use of protocols and procedures for dehorning, colostrum management, treating health-related problems such as diarrhea and dehydration. Veterinarians were also described as training new farm staff on using protocols for calves:

…when somebody starts out, (the veterinarian) kind of explains what the protocol is… when I first started (taking care of calves), we talked about it a lot, and (the veterinarian) showed me different things, how to do this and that (Farmer 4).

Veterinarian expertise on topics of calf management emerged as a feature of how farmers described their veterinarian capacities to advise on calf management. Veterinarian expertise was considered an extension of their background because, “(they) did go to school for that many years” (Farmer 13), “they have a little more science backing them” (Farmer 11), and “because (they) see more research than I do” (Farmer 6). Farmers considered their veterinarian to be a
source of information on health concerns such as respiratory disease and diarrhea and managing pain during dehorning. Some farmers considered their veterinarian a source of information on topics of nutrition (i.e. feeding grain, hay, and water), calf growth and weaning.

Farmers used their veterinarian’s knowledge of calf management topics to confirm opinions they had encountered from other sources including research studies:

…with treating (calves)… I’ll do my own research, but I’ll also ask them, have their opinion. …they’re the ones that I would turn to if I’m having an issue with certain things that I couldn’t figure out, right? (Farmer 13).

Veterinarian expertise was also seen as more reliable than other sources of available information from other people (i.e. nutritionist or other farmers) or from print and online sources. As Farmer 14 explained, when making changes to calf management, they sought advice from, “...mainly… the vet, not so much other people”. Placing value in learning from veterinarians was based on farmers valuing multiple opinions and views about calf management: “… they do know what they’re talking about, and it’s just another idea and opinion pooled in with ours, right? …the more heads and brains …I think it’s a good idea” (Farmer 13). However, some farmers did not view their veterinarian as having expertise on calves, thus undermining the perceived usefulness of veterinarian advise: “He has some influence, but he isn't a calf specialist” (Farmer 9).

Farmers trusted their veterinarian as an advisor for calf management, as an extension of their trust in advice related to the lactating herd, “…we have a personal relationship with him, and we’re going to trust what he says” (Farmer 13). The veterinarian’s familiarity with the farm also engendered a sense of trust, as Farmer 3 described the benefit of having the veterinarian involved in calf management, “…because he understands what I'm doing here.”
Trust was also associated with the veterinarian’s position of linking farmers with other farmers in the area, thereby bringing relevant knowledge from other farms. The veterinarian’s familiarity with other farms was seen as an asset and farmers described this link with other farmers as beneficial for their calf management because the veterinarians: “… see more farms, more varieties, and they see a little better what works and what doesn’t work…” (Farmer 15). Sharing ideas about other farmers’ management practices was seen relevant to their own farm and useful in thinking through ways to address problems, “… if you have a problem (the veterinarian) might start to say, ‘Well, these are some other problems that other (farmers) have.’ … and you can sort of help each other along with it” (Farmer 7). Farmers placed value on their veterinarians as a social link because it helped promote new ways of managing the farm: “I like to listen to what (other farmers) are doing and see why they do it the way they do it. So, that’s why it’s nice to have other people, like the vet, coming and saying this is what (other farmers) are doing” (Farmer 11). Veterinarians also promoted farmers meeting each other to discuss calf rearing practices, including arranging introductions between clients and farm visits:

… (my veterinarian) has in (their) head of a great calf-rearing system. …. And if (they) know the other farmer, … (they) would have no problem offering me (their phone number)—and there are some farms (they) say, “go talk to so and so, and go have a look at their facility (Farmer 16).

5.3.2 After benchmark reports

After meeting to discuss the benchmark reports, farmers noted that their veterinarian displayed knowledge on calf topics that they had not previously discussed. Farmer 2 explained that although they had discussed calf health issues with their veterinarian, colostrum and milk allowance had never been mentioned: “Whenever we have any health issues, if we have any, you know, any outbreak of sickness or disease, then, yeah, (the veterinarian is) in the calf barn… it
was new for us to discuss (colostrum and milk allowance)”. Discussing weight gain was also a new topic for farmers and veterinarians. The benchmark study monitored calf growth during the study, and provided an opportunity for the veterinarian to contextualize this performance:

…to be honest I wouldn’t even know what to say what an average daily gain would be for a calf. … I was the highest but, I mean, other than that, I couldn’t tell you is it good or is it bad. How does it compare with other studies? … Well, the vet gave some answers in that aspect (Farmer 7).

Additionally, after the benchmark farmers described their veterinarian’s role in developing protocols for topics related to the benchmark such as nutrition:

…we work with (our veterinarian) as well with how we’re managing any scouring or any health problems that we’ve had in our calves, and just developing more of a protocol and being more consistent in our approach to feeding our calves” (Farmer 2).

Having diverse opinions on topics related to the benchmark reports was noted as valuable because of perceived veterinarian expertise, “I think they were crucial conversations to have and involve him. Or any vet, or any educated person above me” (Farmer 16). Veterinarian expertise was noted as contributing to farmers’ ongoing efforts to identify and solve problems.

Veterinarians confirmed ongoing concerns farmers had about their calves that were directly related to the benchmark study such as continuing to improve milk feeding to promote greater calf weight gains: “…there’s room to improve on the daily gains… (my veterinarian) and I have talked about that because that really bugs me. I want to get that up” (Farmer 12). Veterinarians also confirmed farmers concerns for calf management practices not directly addressed in the benchmark study such as addressing disease in the weaning pens. Contrasting opinions were also noted regarding veterinarian’s expertise on some issues such as feeding hay to pre-weaned calves,
…I had heard that hay was actually detrimental to growth because it took up room in their rumen when it wasn’t necessarily ready to go. I mean you talk about disagreeing … when we were talking with (our veterinarian). I disagree with putting hay in front of them at any kind of amount any earlier than what we’re doing… (Farmer 18).

Some farmers reported no change in how they viewed their veterinarian’s capacity to advise on calf management after the reports. For some like Farmer 13, they still recognized the veterinarian’s perspective, however, the benchmark did not promote a change in their perception of their veterinarian’s expertise on decision-making for calves: “I think it’s the same, to be honest… I think he has a lot of valid opinions and everything. …. I mean, it’s nice having an extra voice. …But it wasn’t like his opinion was the deciding factor.” Another reason for a lack of change was because farmers already considered their veterinarian’s expertise when making decisions about their calf management. Farmer 16 explained they anticipated their good performance on the colostrum management because they relied on their veterinarian’s expertise: “Being [near] the top, I kind of had in my head we’d be there somewhere … that’s something that didn’t surprise me, where we landed, just because … I’m very in tuned with what (my veterinary clinic) is up to with calves.”

5.3.3 Theme 2: Benchmarking strengthened veterinarian social influence in calf management

Benchmarking calf immune system development and growth provided farmers and their veterinarians space to discuss new topics and adopt new practices related to calf management. Before farmers received their benchmark reports, the farmer-veterinarian relationship regarding calf management was based primarily on reacting to health-related problems. Most farmers reported they had a cooperative relationship with their veterinarian that was focused on solving
problems with calf management and sometimes consulting in future planning for calf management. After discussing the benchmark reports with their veterinarians, farmers described changes in the relationship related to feeling motivated to improve calf management based on the discussions and the increased interaction with their veterinarians.

5.3.3.1 Before benchmark reports

The farmers’ descriptions of their own actions and those of their veterinarians indicate that before the benchmark, many worked together to solve problems related to calf management. They engaged in interactive discussion, with both parties bringing up the topic of calves. For example, Farmer 15 described a mutual interest in calves: “If we have any questions we’ll talk to them. If they see something that can be improved, or something comes through a study or whatever and that’s of interest, they’ll let us know.” However, when to act rested on perceptions of what was considered a problem, usually related to the health of the calves: “…I don’t think in calf management they’re usually involved unless there’s a whole bunch of calves dying… Until they’re losing percentages” (Farmer 10). Some farmers had a more comprehensive relationship and described their veterinarian as having a central role in developing their calf management program, including planning for future changes in calf management. A common feature of this type of relationship was that farmers relied on their veterinarian’s advice on calf housing: “We talked to (our veterinarian) a little while ago about if we built a (calf) barn, …” (Farmer 15).

Veterinarians approached their clients mainly about health-related topics such as vaccination protocols and running diagnostics, keeping records for birth, mortality, and colostrum management. Veterinarians also played a role in encouraging farmers to improve dehorning practices and this advocacy to improve dehorning was viewed as improving calf
welfare. Farmer 18 described the benefits for the calf and himself by using pain relief during dehorning: “…to take the pain out of the picture is huge, if you care at all about the animal. Otherwise it’s just, you know, barbaric. But that’s the way things have been done for a long time. And people have to change that mindset.” Following veterinarian advice was linked in some cases to whether were able to follow veterinarian advice in the face of other constraints such as time or financial cost. A deciding factor determining whether the advice was followed by some farmers was whether it was perceived as practical: “Like, if they give me an idea that’s easy enough to do and might help, then yeah. But if they give me an idea that I’m going to end up spending four hours a day with my calves, well, no” (Farmer 5). For others, following veterinarian advice for calf management was linked with the veterinarian’s ability to improve the productivity of the herd, “… (he’ll) just tell me what’s going to make the farm better in the end, make us more money…” (Farmer 12). Deciding to follow the veterinarian’s advice for managing calves was also based on the status of calves compared to other aspects of the farm. Some farmers considered calves a lower priority on the farm, and others linked this priority to the importance farmers placed on the welfare of the calf, as Farmer 16 explained why some farmers did not take the veterinarian’s advice to use pain relief during dehorning: “… it’s hard to get people to adopt humane things… Dehorning with painkillers and putting the calf to sleep, that investment is only humane”.

Farmers varied in the extent that they contacted the veterinarian regarding calf health problems. Some farmers reported not calling their veterinarian for sick calves while others reported only calling when major disease-related outbreaks occurred. Some farmers acknowledged that the veterinarian rarely visited the farm solely for calves but would still discuss calf issues during routine visits for the lactating herd health: “Oh, you know, our vet will
look at our calves maybe a couple of times a year in reality. But between my brother and I, we do
the herd health. So, we talk about everything during that time” (Farmer 18). Relying on routine
visits for the lactating herd to discuss calves reinforced the limited interaction between farmers
and veterinarians for addressing non-routine calf problems. For at least one farmer, the exclusion
of calves from routine herd health visits was problematic: “First, I have to throw it by (the
owner), because (he) doesn’t want the vet time to be spent with calves; (imitating the owner)
‘(Veterinarians), do the herd health, you know?’ But a calf is herd health too, in my opinion”
(Farmer 1). Some farmers thought their veterinarians should have a more active role in calf
management, identifying themselves as being responsible for not involving their veterinarian in
calf management. For example, Farmer 3 stated that the limited veterinarian involvement was:
“… probably my fault for not involving him.”

Farmers described the relationship with their veterinarian as involving shared
accountability for managing calves. Farmers acknowledged the veterinarian helped ensure
accountability to meet industry-based requirements for using pain relief during dehorning:
“Yeah, our veterinarian was the one who tried to get us to (use pain relief during dehorning).
And he said, ‘You guys have to do this because we’re going to have to do it eventually, like,
legally. So, you guys are going to have to do it now.’” (Farmer 11). Farmers also were keenly
aware of the negative sanctions from other groups such as the public. For example, they felt that
pain relief for dehorning was an important management practice and acknowledged their
veterinarian’s influence in meeting public expectations:

I think a bit of it is a snowball effect, you know. You take [pain relief for]
dehorning…it was just a little ball. You know, half a dozen farmers did it. It was
just a little ball. But vets always had to push it, they were pushing it, pushing it,
pushing it. But once that ball got to be big enough, it kind of just started rolling on
its own. And through other farmers talking about, to vets maybe talking about it,
to reading about it, to hearing comments from people outside of the industry saying how they don’t like [the lack of pain treatment], you just kind of get hit from all areas of your senses, and areas of your social, and the areas of your peers. That speeds that snowball effect (Farmer 16).

Avoiding negative feedback from veterinarians was a reason why some farmers may have refrained from involving them in calf management: “I think it’s more to do with the farmers not, you know, maybe wanting to change… if he’s going to get mad at you for your calf management” (Farmer 10). In contrast, veterinarian praise was considered a positive outcome of veterinarians taking a more active role in calf management as described by two farmers on Farm 10:

Participant 2: … when you have a vet … wandering around (and saying), ‘Oh your calves look really good.’
Participant 1: He encourages you, right?
Participant 2: That probably means that you’re better than average, right? …you get the tone of what he’s saying...

5.3.4 After benchmark reports

After receiving their benchmark reports, farmers that described changes in how they interacted with their veterinarian described the value of a more interactive relationship. The most common change in the farmer-veterinarian relationship was increased discussion about calf management topics. This was valued during routine herd visits:

If we’re having issues or we think something’s not right, I don’t have a problem spending (more time)—or even if it’s just, ‘how are your calves? Oh, let’s go look at them’, right, and then get a bit of a visual, talk about them for five minutes. That’s fine (Farmer 8).

Talking to veterinarians about calves was motivating for improving management practices. Farmer 7 described the influence of discussing talking to the veterinarian on their willingness to make changes in calf management,
Any time you talk about things you sort of get motivated to do it even better, you become more conscious of it, you know, you pick up stuff. … I think you become more conscious of doing a good colostrum management. I mean feeding more milk, or a denser ration, to a younger calf.

Farmers indicated that discussion with their veterinarians about the benchmark reports improved their understanding of the information: “Now, if they’re actually handed to you and explained to you – just like at school … Then you actually absorb it. You think about it” (Farmer 13).

In addition to increased discussion about calves, farmers reported other interactions indicating that the veterinarian’s more active role in calf management during the benchmark study helped improve calf management. Farmer 15 described how their veterinarian approached them with new products such as using larger bottles for colostrum and daily milk allowance: “… we’re giving the newborn calves, a lot more colostrum right off the bat, the biggest bottles you can buy. … I couldn’t really find anything that would at least fit our hutches (for feeding more milk). … But then (our veterinarian) all of a sudden out of the blue found these bottles…” The benchmark reports prompted increased interactions between veterinarians and farmers through use of ongoing diagnostics to determine the quality of colostrum that was fed to calves. Farmer 7 described how this testing motivated them to continue to improve managing colostrum: “…we did a bunch of colostrum (quality) tests. … a lot of them failed … those are some things you sort of question… it would be interesting to look into that, and I would think delve into that more…”

Farmers also valued their veterinarian being more aware of the problems on their farm, with specific reference made to the calves: “It was helpful to have (the veterinarian) here. I’m glad they were involved. … And it’s good for them to know if I’m not doing a great job. … they
can help me with that” (Farmer 3). Additionally, farmers noted that the veterinarian’s appraisal of their calves during the benchmark study affected the morale on the farm:

He’ll just go walking by, ‘they’ve grown’ or whatever. …. and those kids hear that and stuff and the feedback that they hear like, ‘oh wow, like so what we’re doing obviously is helping’ and I think that’s just kind of – it’s now rewarding for them too, in a sense” (Farmer 4).

When farmers reported no change in their interactions with their veterinarians regarding calf management after benchmarking, it centered on reasons of economics: “I don’t know if I want to pay him for it. That’s the downside of getting a vet to do all these things” (Farmer 8). Concerns about personal autonomy in decision-making also prevented change in the farmer-veterinarian relationship: “I’m not influenced … I still know what’s best for our farm.” (Farmer 13). Additionally, farmers that already had a comprehensive relationship before the benchmark study reported that there was no change in the relationship after the benchmark. As Farmer 12 explained about the extent to which their veterinarian was involved in calf management:

“….that’s never changed. … (The veterinarian) develops our vaccine protocols, everything. So, he keeps an eye on the calves, makes sure that’s all working…”

5.4 Discussion

Our results indicate that involvement in benchmarking can enhance the perceived value of veterinarians as advisors in calf management and can promote interactions between farmers and veterinarians on calf management. As discussed in Chapter 4, the theory of planned behavior was instrumental in developing the interview guide and with the first round of coding during analysis. The data for the current study was collected with the expectation that discussing calves with their veterinarian would influence how farmers viewed this relationship, including their
normative beliefs about the veterinarian as a motivator for changing calf management. This study assumes that the theory of planned behavior can provide guidance on understanding farmer motivation to improve calf management, in part, because of the veterinarian may reinforce subjective norms. We found that farmers’ stories about their relationship with their veterinarians on the topic of calf management did not necessarily include a subjective norm interpretation (e.g. pressure to conform to their advice; see Rimal and Real, 2003); much of the discussion was on describing the farmer’s perspective of the capacities of and interactions with their veterinarian. The following section discusses both the descriptive and normative influence of the herd veterinarian on calf management.

### 5.4.1 Increased veterinarian capacity to advise on calf management

Based on the farmer experiences with their veterinarians in our study, benchmarking calf growth and colostrum management played a key role in increasing the veterinarian’s value and influence as an advisor for calf management. Recognition of capacity development has also been identified as a benefit for participants in health interventions (Wathen and MacMillan, 2018). Additionally, Triste et al. (2018) identified the importance of dairy farmer advisors serving as technical advisors in farming communities. In our study, farmer recognition of the influence of veterinarians appears to relate to their perceived capability to advise on calf management. Cialdini and Goldstein (2004) described this type of social influence as relying upon soft tactics that are internal to the person in power rather than hard tactics that rely on social structures to enforce compliance.

The recognition by farmers that the veterinarian plays a role in education on calf management topics is consistent with Oreszeyn et al.’s (2010) description of individuals who
negotiate boundaries that distinguish a farming community. In our study, many farmers described a demarcation between the farms and the research community on issues related to calf management and the veterinarian’s role in bridging these two communities. Farmers in our study valued their veterinarian as a source of information particularly in terms of interpreting scientific material, confirming ideas presented in other sources, and providing alternative or contrasting views. The veterinarians served an important role facilitating farmers “staying up to date with a kaleidoscope of perspectives on farming practice” (Sligo and Massey, 2007, p.76).

The ability of an expert to exert social influence and the acceptability of their information relies on the recipient acknowledging that the person has expertise (French and Raven, 1959). Although farmer recognition of the veterinarian’s expertise on calf management varied, the benchmark study did provide an opportunity for veterinarians to demonstrate their knowledge; an important step given that the veterinarian’s capacity to advise is reliant on the farmer’s perception of their expertise. This is notable when veterinarians are perceived to lack expertise on specific management systems such as treating cattle disease in organic herds (Vaarst et al., 2003; Duval et al., 2017). Benchmarking most likely will not be a universal tool to promote farmer-veterinarian cooperation. For some farmers in our study, despite the increased engagement with their veterinarian on topics of calf management, the veterinarian was still not viewed as an influential advisor. For farmers that indicated their veterinarians were a trusted source of information on calves, the advice given was viewed to be more reliable than that provided by other farm advisors. One exception was on the topic of providing hay to pre-weaned calves; on this issue, farmers seemed to place greater weight on advice from their nutritionist. This example suggests that better cooperation between different farm advisors (including veterinarians and nutritionists) could be helpful. Perception of risk and the degree of
trustworthiness can influence the extent that farmers seek out information from advisors (Sligo and Massey, 2007). Future work on farmer perceptions of risk on other calf management practices and may inform efforts to promote cooperation between farmers and various farm advisors.

The calf benchmark also increased the veterinarian’s role as a social link between farmers, indicating that veterinarians can play a supportive role in sharing ideas about calves and facilitating face-to-face communication among farmers. Sumner et al. (2018) (i.e. Chapter 4 in this thesis) noted variation in how farmers described their relationship with other farmers for calf management. The results of the current study illustrate the veterinarian’s role in linking farms and in indirectly sharing ideas; this insider knowledge of multiple farms was described as a valued capacity.

5.4.2 Strengthened social influence of the veterinarian in calf management

The benchmarking process increased interaction between farmers and veterinarians, in some cases solidifying the current relationship, and in others stimulating a more proactive approach to calf management. Our study demonstrates that farmers consider the veterinarian a social influence for calf management and that benchmarking can increase this influence.

The current study showed that some farmers and veterinarians were already interacting about calf management. For these farms benchmarking did not change the relationship per se, but rather served to introduce new topics of engagement. The process also provided additional breadth to the topics discussed, including topics that were unrelated to the benchmark. These results are consistent with Triste et al. (2018), indicating that farmers valued talking to their veterinarians about calf management, in particular the veterinarian’s interpretation of the reports
added value to how the farmer understood the information presented. These reports also generated discussion about other concerns not included in the benchmark. Farmers valuing discussion about calves has been noted in other studies. Vasseur et al. (2010) noted that one challenge with the feasibility of an advisory tool on calf management was that the time needed to conduct on-farm visits was lengthened by farmers wanting to discuss issues. Increased discussion also has benefits beyond the immediate concern. Wathen and MacMillan (2018) argue that increased interaction is a basis for building and maintaining trusting partnerships.

Our study provides evidence that some calf management practices are social norms. In general, norms are behaviors that most people of an identified group believe others should conform to (Bicchieri, 2017). Norms are contingent on their acceptance by a group of people and are used to hold one another accountable for shared values (Southwood and Eriksson, 2011). We cannot definitively conclude that calf management practices were social norms, since this study did not seek to measure this. However, we suggest that farmers’ understanding of how they are expected to care for calves on dairy farms may vary with the specific practice. In our study, the potential for social norms is most clear when farmers described the negative sanctions imposed by their veterinarian, other farmers, and the public about not using pain relief during dehorning, thus illustrating they felt an expectation to relieve pain during dehorning.

It is important to identify key actors who are social referents when it comes to studying social norms (Bicchieri, 2017). Additionally, both positive and negative sanctions based on social norms indicate how a group thinks something should be done (see Rimal and Lapinski, 2015 for their discussion of injunctive norms; Bicchieri, 2017). Some evidence exists that veterinarians can have positive and negative social influences on dairy farmers for mastitis reduction (Swinkels et al., 2015). Our study found that veterinarians also had both positive and
negative normative influences on calf management. For example, farmers reported wanting to avoid negative sanctions from their veterinarians such as criticism and appreciating positive sanctions such as praise for how they reared calves. Dehorning is an example where farmers acknowledged their veterinarian’s help in changing farm practice linked with negative sanctions. Additionally, moral influence is a function of social distance; the closer the relationship, the stronger the influence (Haidt, 2001). It is thus to be expected that the veterinarian had a social influence.

Farmers are also concerned about the public perceptions (de Rooij et al., 2010), and open to influence from veterinarians on matters that relate to perceived public concerns. The practices we benchmarked may be less subject to social norms, such as how much milk farmers feed their calves and how well they manage colostrum. However, some veterinarians consider milk allowance as having an ethical dimension due to concerns about calf hunger (see also Chapter 3) although it remains unknown the extent to which farmers share this value. The suggestion that calf milk allowance is emerging as a social norm suggests that veterinarians may adopt approaches that encourage increased milk allowance for calves and promote farmer deliberation about this topic (see Bicchieri, 2017).

Although we found many examples of the veterinarian’s social influence on calf management, some farmers did not consider their herd veterinarian in this manner. Burton (2004) has argued that farmers reporting not being influenced by others was related to their values of independence. There is the possibility that specifically asking about the influence of others may actually promote assertions about independence (Burton, 2004). We found that farmer’s expressed value in being able to make their own decisions for matters of calf management, and that this autonomy was related to how they considered their veterinarian’s
influence. Autonomy in decision-making has been noted when farmers described other farmers as having no influence on their decision-making about calves (Sumner et al., 2018; i.e. Chapter 4 in this thesis). This may be related to what some have argued is a “do-it-yourself” attitude towards decision-making (Jansen et al., 2010b). Others have argued it is incumbent on the veterinarian to adjust their approach to their clients so that they are recognized as a potential advisor (Bard et al., 2017; Duval et al., 2017); whereas other have argued it is also the responsibility of the farmer to take an open-minded stance on recognizing their veterinarian as a trusted advisor (Vaarst et al. 2003).

5.5 Interpreting this study

As noted in the description of the study design, context has a central role in how this study should be interpreted. We sampled participants with no intention of representing the views of all dairy farmers, even within our study region. As noted in the companion paper (Chapter 4 in this thesis), farmers in this study were willing to try new ways to manage calves including spending more time with their veterinarians discussing calves and this shared characteristic is an important contextual feature of this study. Farmers in this study were also willing to engage in an in-depth discussion regarding calves with their veterinarians. These findings may not transfer to farmers unwilling to spend this time on this topic. Additionally, farmers did not financially compensate the veterinarians during this study and results may have differed if this was required. It remains to be seen if farmers will pay their veterinarian for the services described in this study.

We acknowledge that concerns about respondents favorably projecting their self-image can create tensions on how to interpret social science research. However, we feel that our study
design helped reduce this risk by repeat visits to farms and multiple interviews. See Chapter 4 of this thesis for a fuller discussion of these concerns.

5.6 Conclusion

Benchmarking calf management practices related to growth and colostrum management positively influenced farmer perceptions of the veterinarian as having capacity to advise on calf management and promoted interactions over calf management. Benchmarking can motivate farmers to consider their veterinarian a social referent for calf management.
Chapter 6: General Discussion and Future Research

6.1 Overview

Dairy calves face many welfare challenges, and one logical place to encourage welfare improvements is with the two stakeholders that have the most direct influence on calf welfare: the farmer and veterinarian. However, challenges remain with understanding how farmers and veterinarians conceptualize calf welfare, leading to a poor understanding of how to motivate changes in calf management on farms. I used a qualitative approach to learn more about this problem, seeking an in-depth understanding of farmer and veterinarian motivating factors related to calf welfare. The primary outcome of the research described in this thesis is that cooperation promotes the development of shared goals and improved communication across differences in dairy farmer and veterinarian perspectives.

In a review of the current literature on dairy farmer and veterinarian perspectives on cattle welfare I identified the following: 1) little is known about dairy farmer concerns about welfare and even less on veterinarian concerns, but improved cooperation between these two key stakeholders may help identify shared goals on how to improve welfare; 2) dairy farmers and veterinarians vary in their beliefs and capacities and this can create barriers to understanding the extent of welfare problems on farms, but cooperation can frame their distinct skills and knowledge as complementary towards improving welfare; and 3) poor communication can lead to misunderstandings of farmer goals and values towards welfare, but cooperation can reduce communication barriers that stifle welfare improvements. The work described in this thesis builds upon this reviewed work and provides a deeper understanding of how dairy farmer-
veterinarian cooperation can improve calf welfare on dairy farms by understanding the underlying motivating factors to improve calf welfare.

Chapter 3 presented results from a focus group study with Canadian dairy cattle veterinarians and found that veterinarians felt that there is a gap between what they think they should do to improve calf welfare, and what they currently do. They believe calves experience a range of welfare issues beyond health concerns and primarily saw themselves as educators helping their clients respond to pressures to improve calf welfare from within and outside of the dairy industry. The veterinarians also felt morally and professionally obligated to take a more active role in improving calf welfare. This research indicates that veterinarians can play an important role as champions of improving calf welfare on farms, a finding not well-reported in the previous literature. Identifying the diverse attitudes, values, and norms that inform how veterinarians think about calf welfare, may allow for the development of better methods to engage veterinarians on this topic.

Chapters 4 and 5 presented results from an interview study with commercial dairy farmers in the Fraser Valley, British Columbia. This study set out to understand how benchmark reports with information on passive transfer of immunity and calf growth motivated farmers to improve calf welfare. The reports included how their own farms’ results compared to other farms in this study. Veterinarians cooperated with farmers during this study by delivering benchmark reports in a sit-down discussion.

In Chapter 4, I examined how provision of information in the benchmark reports motivated farmers to improve calf management. I found that the information in the reports (both on their calves and comparison with their peer farmers) improved farmer confidence in their assessment of their calves, based on changes in their attitudes and increased perceived control
over identifying problems with their calf management. Benchmarking shifted norms around calf management leading to increased attention and discussion among dairy farmers. Additionally, I identified that farmers place both intrinsic and instrumental value on their calves and that this is linked with their own values of autonomy in decision-making and identity as a farmer. The study provides insight into how information based on biological data can motivate farmers to rethink their calf management and make efforts to improve.

In Chapter 5, I examined how cooperation on the benchmarking study influenced farmer perceptions of their herd veterinarian as an advisor on calf management. I found that benchmarking increased the perceived capacity of the veterinarian as an advisor and created space for discussion on new topics about calves. Overall, cooperation led to improved communication and promoted veterinarians as a reference for social norms for calf management. This study provides insight into how promoting cooperation between farmers and veterinarians on topics not often discussed such as calf management, can lead to more interactive relationships between these two stakeholders.

My thesis work has identified the value in promoting dairy farmer and veterinarian cooperation in improving calf welfare. The following sections discuss the strengths and limitations of this thesis and opportunities for adapting this type of work to other welfare topics. I also discuss the merits of various methodological approaches, and contextual factors that may help improve farmer-veterinarian cooperation with respect to animal welfare.
6.2 Strengths and limitations of this thesis

6.2.1 Broadening the range of topics

The focus on pain and disease in the farm animal literature is understandable as both issues are important to farmers and veterinarians. However, little research to date has considered more generally what these stakeholders believe is important for animal welfare. In particular, relatively little is known about naturalness as a welfare concern. We also know little about farmer and veterinarian perspectives on dairy calves beyond disbudding and dehorning and to lesser extent, disease and mortality (Vaarst and Sørensen, 2009; Vasseur et al., 2012). For issues of naturalness and calves, Vaarst et al. (2001) discussed balancing calf welfare and organic goals regarding group housing and outdoor access, noting that there was little information on these topics. Some more recent work has added to this conversation, including work on veterinarian concerns about poor nutrition and impacts on calf welfare in organic herds (Ellingsen et al., 2012).

Certain practices such as early separation of the cow and calf after birth are viewed as welfare trade-offs, however, there are few studies providing insight into these concerns. When discussing this contentious issue, Ventura et al. (2013) found that North American farmers and veterinarians supported early separation because of perceived health concerns with keeping them together. However, this issue was also raised in another study that identified farmer concerns about the extent they are able to meet the goals of naturalness in organic calf-rearing systems with early separation of the cow and calf (Vetouli et al., 2012). In addition to early separation from the cow, more work on calves is needed to understand farmer and veterinarian perspectives on other welfare issues such as colostrum management (Windeyer et al., 2014), hunger
associated with restricted milk allowances (reviewed by Kahn et al., 2011), group housing (reviewed by Costa et al., 2016), and the fate of surplus male calves (Renaud et al., 2017). My thesis provides an understanding of how farmers and veterinarians conceptualize calf welfare and their views on improving calf welfare. Chapter 3 demonstrated that cattle veterinarian views on calf welfare are diverse and deserve attention because they help establish where this key actor stands on concerns about calf welfare both pragmatically and morally which then informs how to motivate this stakeholder to cooperate with farmers to improve calf welfare. Chapter 4 demonstrated that dairy farmers have diverse values concerning their calves including economic value, personal pride, and respect for the calf as a living being. One limitation with the work described in this thesis is that I did not specifically set out to learn how farmers conceptualize calf welfare to the same extent that I did with veterinarians; rather my focus with the farmers was on specific features of calf management that improve important aspects of calf welfare - colostrum management and nutrition. Although discussions about calf welfare emerged during the interviews with farmers, a more explicit inquiry on how farmers view calf welfare could provide greater insights into this topic and a description of where their values overlap with veterinarians. Using methods such as focus groups, where farmers are asked to engage in conversations with their peers or with other social actors, might better capture the range of values farmers have related to welfare. This approach would also likely capture perceived norms related to calf welfare and how these norms are negotiated among participants (see Kristiansen and Grønkær, 2018).
6.2.2 Diversifying methodological approaches

Much of the literature on dairy farmer and veterinarian perspectives on animal welfare is based on surveys. These studies describe how farmers or veterinarians may act in a hypothetical situation (i.e. intention to improve lameness Bruijnis et al., 2013), identify correlations between perspectives and behaviors (e.g. the relations between attitudes towards pain and the use of pain relief; Fajt et al. 2011), or describe frequencies of different perspectives (e.g. beliefs about biosecurity measures; O’Hagan et al., 2016). These survey-based studies provide important information about the prevalence of attitudes and practices (e.g. farmers or veterinarian perspectives on pain) and how these change with time (Misch et al., 2007; Winder et al., 2016b). Additionally, these studies can provide evidence of the degree of agreement among different stakeholders.

It is, however, important to recognize the limitations to survey-based work. For example, low response rates can lead to unrepresentative samples (Derks et al., 2014). Offering response options in certain ways can lead to an overestimation of the value placed on the option (e.g. ranking of importance for items listed alphabetically; Bauman et al., 2016). Social desirability can also bias the responses (see Hansson and Lagerkvist, 2016). Some have also argued that the methodological rigor applied to measuring attitudes is problematic. For instance, Hansson and Lagerkvist (2014) argue that researchers are often not sufficiently clear about the theoretical premises for how they measure attitudes, and that the direction of causality of attitude is vague and unreliable. Finally, the process of how the sample of respondents was identified and their responses captured should be considered when interpreting the results of a survey. Gottardo et al. (2011) used multiple interviewers possibly biasing the consistency in how questions were asked in their survey on farmer opinions and practices about dehorning. Use of on-line sampling (e.g.
Robbins et al., 2015; Winder et al., 2016b) can bias a respondent pool towards people with internet access. Studies such as those by Huxley and Whay (2006) and Raekallio et al. (2003), that used pharmaceutical company databases for sampling, may bias the respondents towards veterinarians more interested in pain relief. Even with a random sampling strategy, Misch et al. (2007) cautioned that studies on the topic of pain may have a biased pool of respondents who are interested in managing pain.

Qualitative research can provide a nuanced description of what welfare improvements mean to farmers and veterinarians. Unlike the survey work mentioned above, qualitative studies are designed to provide a rich description of a phenomenon, but often use relatively small and highly contextualized groups of participants. These studies are not designed to make claims that extend to a larger population, and thus require caution in interpretation for audiences more oriented towards quantitative work. Qualitative methods (and quantitative methods) can also introduce a range of biases, so a careful description of the methods and analysis is critical when interpreting the results. Unfortunately, some previous studies have provided limited description of their methods, leaving readers to wonder how the authors arrived at the results and conclusions. For example, Vetouli et al. (2012) only stated that responses were coded but failed to provide a description of the coding process in their data analysis. Te Velde et al. (2002) offered a description of how their interview questions were developed but failed to provide a description of their analysis. There is need to understand the author’s research approach, typically described in theoretical terms, for the reader to interpret the results and conclusions of the study. For instance some studies couch their approach with an a priori theoretical grounding such as the theory of planned behavior (Hötzel and Sneddon, 2013; Brennan et al., 2016), or an a posteriori approach such as grounded theory (Vaarst and Sørensen, 2009; Ritter et al., 2016), but
this is not always the case. For example, both Horseman et al. (2014) and Ruston et al. (2016) argued for the importance of using social science methods to understand farmer treatment of lame cows and veterinarian perceptions about their profession. However, Horseman et al. (2014) grounded their approach by explaining the rationale in learning about the participants’ daily experiences with the phenomenon, whereas Ruston et al. (2016) failed to provide description of their research approach beyond a justification for their methods.

Burton (2004) provides a more in-depth critique of the failure of agricultural studies to define a theoretical position, arguing that a lack of grounding the work within an established theoretical framework limits the strength of the claims and the ability to inform other research. Further, Panter-Brick et al. (2006) argue that failure to ground research in theory limits the ability for others to learn from the study. When the relevant theory is not made explicit, it may limit replication because the theoretical assumptions for why a study such as an intervention may or may not have succeeded are not clear. To understand farmer motivation to improve calf management described in Chapters 4 and 5, I used the theory of planned behavior to help develop the research question and interview guide, indicating to the reader why I asked questions about attitudes, subjective norms, and self-efficacy and how these theoretical constructs were related to behavior change. It should be recognized that a limitation with this particular theoretical approach is the over-reliance on internally motivating factors, and not considering external factors such as the environment, mental and physical health, and the economy (Sniehotta, 2014). A further limitation to our work is the exclusive reliance on narrative accounts that may emphasize this rationality (see Atkinson and Silverman, 1997).

To help minimize this limitation when applying the theory of planned behavior, I included questions about values and I provided additional clarification that our analytic approach
was exploratory in nature, allowing key phenomenon such as farmer identity, autonomy, and their values about calves to emerge during the analysis. This approach provides additional support to claims that motivation is not solely based on rational constructs, such as perceived behavioral control, and that personal values such as pride in doing a good job influence farmer motivation. Additionally, the work in these two chapters provides an example of how to use a theory, such as the theory of planned behavior, to help create a conceptual framework for a study, and when needed, how to integrate different theoretical approaches into the existing framework. Chapters 4 and 5 also contribute to benchmark theory by providing an example of studies that distinguish phenomenon that are benchmarkable as distinct from phenomenon that can be effectively benchmarked (see Moriarty, 2011). Moriarty (2011) argues that identifying what is benchmarkable must be established before determining how to benchmark a phenomenon. As discussed in Chapter 4, improving colostrum management may better fit across diverse farmer values, in contrast to improving average daily gains. Additionally, Chapter 5 indicates that benchmarking can influence social norms when there is an emphasis on cooperation between stakeholders. This contributes to benchmark theory in that it recognizes social influences beyond peer comparison. Finally, this work contributes to ongoing efforts to understand how to motivate behavior change to improve calf welfare. For example, Chapter 3 provides needed baseline understanding of where veterinarians positions themselves related to this calf welfare, and that their perspective includes a diversity of moral and professional values that inform their attitudes and beliefs. This work can further inform intervention studies that tap into these diverse landscapes to engage veterinarians to improve the welfare of calves and perhaps that of other marginalized animals.
Future research should consider mixed methods approaches, combining quantitative and qualitative research to understanding farmer and veterinarian perspectives. Kristensen and Jakobsen (2011b) argued that a mixed-methods approach to understanding the farmer-veterinarian relationship mirrors the need to understand the dairy farm as an integrated system, with the perspectives of farmers and veterinarians seen in the context of conditions on the farm. Scientists studying animal welfare have used different approaches when employing mixed methodologies. For instance, Kauppinen et al.'s (2010) exploration of dairy and pig farmer attitudes towards animal welfare and Friedman et al.'s (2007) study on dairy farmer attitude towards antibiotic use, are examples of using qualitative interviews to help develop quantitative surveys. The strength of this approach is using a survey more explicitly grounded in farmer perspectives. Other examples of mixed methods are quantifying qualitative data through processes such as Q-methodology (Kristensen and Enevoldsen, 2008; Kristensen and Jakobsen, 2011a) or content analysis (Ventura et al., 2016a, 2016b). Other studies use qualitative data to support quantitative data analysis, such as Robbins et al. (2015) and Ventura et al. (2013) who qualitatively explored the reasons participants provided to explain their views on pain relief during dehorning and cow-calf separation, respectively. Sandelowski (1996) argues using qualitative approaches when engaging in intervention studies can help overcome problems such as the disconnect between the intended plan of the study and the actual experience of the participants during the study. Chapters 4 and 5 of this thesis provide examples of how qualitative research allows the researcher to learn the experience of the participants during the intervention. These chapters provide insights into how farmers experienced the benchmark process and cooperated with their veterinarian during the quantitative (biological data collection) portion of this study (see Atkinson et al., 2017). An accounting of farmer experiences provided insight into
their views on the intervention, such as factors that motivated changes in calf management and working with their veterinarian to improve calf welfare.

This thesis relied exclusively on interviews and focus groups where the primary goal was to characterize and distinguish farmer and veterinarian motivating factors related to dairy calf welfare. Our research question was to learn how dairy farmer and veterinarian motivating factors and roles intersect to influence calf management recommendations and practices. I used interviews with farmers during the benchmark study because I wanted to learn more about the “how” and “why” of these stakeholders’ perspectives on calf management and welfare to inform how this can motivate these stakeholders to cooperate to improve calf welfare. Answering how and why questions reveals the underlying values, attitudes, and normative influences on motivation. These methods allowed for an in-depth exploration of what something means to someone because there were open-ended questions, with room for follow-up questions during the discussions, and flexibility in how questions were presented to the participant. In particular, Chapters 4 and 5 relied on repeat interviews to collect data. In addition to helping answer the research question by identifying how farmer experience during a benchmark study influenced motivating factors to improve calf welfare before and after the benchmark reports, repeat interviews helped build rapport between the interviewer and interviewee during a long-term intervention where we asked participants to alter their daily routines. The interviews provided space for the participants to voice their thoughts about the intervention and ask questions of the researchers. This approach provided them an outlet to participate on their own terms, possibly reducing the power asymmetries inherent in interview-based research where the topic of discussion is determined by the interviewer (Brinkman and Kvale, 2005). The interview method
also encouraged multiple opportunities to provide feedback to the farmers each time there was a visit to the farm.

Atkinson and Silverman (1997) argued that an inherent challenge with using interviews is the assumption that “the subject can ‘open up’ to the interviewer” (p. 310). People may not be prepared to discuss parts of their lives that potentially have not been verbalized before, especially if these are of the moral nature (Haidt, 2001). Reflecting on my own work, when participants did not have an answer to a question they may have simply needed more time to think about it. I asked them to discuss things they may not have spent much time talking about prior to the benchmark study; as indicated in Chapter 4, calves were not a common topic for farmers to discuss. I was likely able to minimize this effect to some degree by making use of repeat interviews for Chapters 4 and 5; the follow-up interview questions were related to the questions asked in the first interview and prompted participants to reflect on the benchmark study. The time in between the interviews also allowed farmers time to think about the topic.

How people respond to interview questions can have much to do with how the questions are asked. Early on in the interview process for Chapters 4 and 5, I realized that asking participants about who influenced them most for calf management elicited responses indicating no one. Burton (2004) argued that farmers are independent in nature, and as discussed in Chapter 4 of this thesis, asking about social influences can invoke responses asserting autonomy. However, Burton (2004) also critiques that how this question is asked can provoke uncertainty about the extent that farmers are influenced by others. Ajzen (1991) refers to this as ensuring compatibility between the questions asked and the specific phenomenon of interest; asking questions more specific to the topic will elicit more accurate answers. However, I found that the specificity was not the problem in how I asked about social influence (i.e. I specifically asked
about other farmer and veterinarian influence on calf management); rather the word “influence” was problematic. I learned to ask different questions that avoided the use of the term “influence” such as who did farmers talk to about their calves and if other farmers visited their farms to see their calves.

The use of focus groups to collect data provides a medium to encourage discussion and gather a range of diverse views on topics not well understood or explored (Stewart et al., 2011). The use of focus groups in Chapter 3 was based on several motivations. I wanted to answer the question about how veterinarian responsibility to improve calf welfare aligned with their concerns and actions related to calf welfare. Focus groups helped determine the range of views that veterinarians had, including where they agreed and disagreed, and the normative beliefs and values underlying their views. Additionally, to capture the full range of views, I did not aim for consensus with this approach. This topic is underexplored in the literature and anecdotally, underexplored in the veterinary profession. My personal experience with this topic was with veterinarians who felt a professional responsibility to improve calf management, despite little involvement with calves on their clients’ farms. By identifying the range of views, this study can help inform future research into this topic, and also inform future applied approaches towards improving the alignment between what veterinarians currently do to improve calf welfare and what they think they should do.

Using focus groups also has limitations. Focus groups can reinforce social dynamics in a group, lead to the dominant voices controlling the discussion, and potentially lead to consensus too early on a topic (Stewart et al., 2011). I did my best to manage these concerns by balancing tables with people from different regions and making sure the moderator explained that we were not looking for consensus (e.g. by letting participants know they were welcome to disagree and
were encouraged to share their opinions and experiences; see Appendix A). As discussed in the methods section of Chapter 3, I made the decision to allow a farmer to participate in one of the group discussions. I acknowledge that there are ethical implications of not including this person’s utterances in the analysis when they have contributed to the discussion. However, allowing them to participate in the discussion provided a positive opportunity to engage with others on the topic of calf welfare. This person’s presence may have influenced the other contributions to the discussion, potentially reinforcing social dynamics that naturally occur between veterinarians and farmers in farm settings. I did not analyze this data based on interactions, limiting my ability to capture these social dynamics.

Focus groups can suffer from time management concerns during the data collection; too many questions in too little time can impede participants’ ability to provide in-depth answers, thus affecting the quality of the data (Krueger and Casey, 2015). Moderators kept the group on track, limiting discussion to one hour. Five questions were asked, which falls within the recommended number of questions for the time allotted for the session (Krueger and Casey, 2015). Based on the resulting transcripts, I am confident that participants were able to engage in in-depth conversations related to the questions asked. One potential issue was that Questions 3 and 4 used similar wording (see page 42 of this thesis; asking participants what they currently did to address calf welfare and what they would change, if given the opportunity); at least one group answered the latter question while discussing the former. Thus, when the moderator asked Question 4, some participants may have viewed it as a waste of time.

Finally, a methodological limitation within the current body of work includes a lack of sustained observations on material aspects of dairy calf management for both farmers and veterinarians. For example, long-term, empirical observations on how farmers (or farm staff)
interact with their calves and veterinarians would provide an additional dimension to understanding the full context of how benchmarking motivated farmers to improve calf welfare. The use of additional observation methods in the future would help in further understanding farmer and veterinarian perspectives on calf welfare and how this might be improved.

6.2.3 Recognizing context

Measuring attitudes is a common feature of studies on farmer and veterinarian perspectives on animal welfare (Jansen et al., 2009), but there has been relatively little study of other considerations such as farm and community culture that can affect farmer and veterinarian views and their ability to make improvements in animal welfare (Burton, 2004). Burton et al.'s (2012) study describes the importance of recognizing the material culture of the dairy farm (i.e. barn design) in how dairy farmers handle their cows. This study relied on observations of dairy workers to identify that how facility design impacts human behavior towards animals, a phenomenon that may not have emerged in a study of attitudes.

Some researchers have attempted to address the limitations of relying solely on psycho-social variables, such as attitudes. Brennan et al. (2016) explicitly state that the theory of planned behavior framework is limiting because it assumes rational behavior; whereas, decision-making often includes a strong emotional component. Bruijnis et al. (2013) included farmer values in their theoretical framework based on the theory of planned behavior when looking at farmer intention to improve lameness. Although farmer personal values about animal welfare did not provide additional insights as to their intention to improve welfare, the authors argue that recognizing the role of personal values provided a better understanding of what influences farmer attitudes.
There are contextual elements missing from the literature related to the nexus of change. Burton (2004) argues that traditionally research on farmers and animal welfare has treated the phenomenon as an attitudinal construct, and not a cultural process, and that there is a need to combine both approaches. Others have critiqued research on farmer and veterinarian perspectives for treating these stakeholders as individuals making decisions isolated from other contextual factors, including community, society, and personal knowledge or skills (Shortall et al., 2016). Shortall et al. (2016) used a social-ecological design for their interview study and found that veterinarian descriptions of challenges in motivating farmers to adopt biosecurity measures varied when analyzing these challenges within the context of the farmer acting alone or within a social context that included the veterinarian. This contextual shift also influenced how veterinarians thought about moving forward with farm improvements. Ellis-Iversen et al.’s (2010) adaptation of the social ecology model identified community and society and also capacity (i.e. knowledge) factors that influenced farmers’ intention to adopt biosecurity measures. Their approach combines the behavioral intention model of the theory of planned behavior with extrinsic circumstances such as community, culture, and knowledge, skills, and abilities (Ellis-Iversen et al., 2010). Ritter et al. (2015) used a similar approach to understand farmer willingness to participate in a Johne’s disease prevention program and found that willingness to participate was largely due to extrinsic factors such as time needed, cost, and awareness of the implementation program.

With the importance of context in mind, the work described in this thesis draws from critical realism and from others who self-identify as “pragmatic realists” (see Miles et al., 2014, p. 7). Realism embraces the concrete reality in which humans operate (Manicas, 2006; Maxwell, 2012). Chapter 3 of this thesis explores veterinarian perceptions of calf welfare and provides
insights as to how they are inextricably linked to their lived experiences as veterinarians on commercial dairy farms. In short, their views on calf welfare cannot be divorced from their daily experiences with farmers and calves. Consistent with the focus of a realism approach is that the social interactions of people are embedded with this context. Chapters 4 is an explicit inquiry into the lived experiences of the farmers participating in a study. Chapter 5 explored the specific relationship dairy farmers have with their veterinarians to better understand how this influenced their daily reality of managing calves. These chapters provided reasons for how participation in the study caused farmers to act in particular ways (i.e. how benchmarking calf immune system development and growth together with their veterinarian motivated farmers to improve calf welfare), aligning with realist assertions about context because “… explanation is most at home in contexts where the explanation of the event is what is aimed at” (Manicas, 2006, p. 11).

6.3 Future research directions and applications

6.3.1 Working within the existing culture of dairy farming

Management decisions that improve calf welfare do not happen in a vacuum. As noted above, one critique of the commonly used theories (including the theory of planned behavior) is that it positions farmers as independent decision-makers (Shortall et al., 2016). However, I found in the work described in both Chapters 4 and 5, farmers consider social referents (e.g. other farmers, veterinarians) in their decision-making about calves. Future research that can explore this process may provide more insight into how these relationships can lead to or hinder improvements in calf welfare. This thesis explored the topics of milk allowance and colostrum
management; however, other issues of calf welfare need attention including bull calf management, social opportunities for young calves, and weaning.

Future research that focuses on the developing interventions that are rooted in the existing culture of the farms may lead to increased adoption of practices that improve calf welfare. Panter-Brick et al. (2006) described these types of interventions as culturally compelling and argued that these interventions tap into the existing social processes. As described in Chapter 3 and 5, farmers and veterinarians interact about calf management in different ways. In addition to on-farm discussions, farmers attend seminars hosted by their veterinarians, meet other farmers through their veterinarian’s network of clients, and some convene with other farmers in group discussions. Tapping into these existing means of communication to promote cooperation may increase the speed at which changes occur on farms and also identify new areas that may lead to further improvements in calf welfare. One particularly interesting avenue to pursue would be through the use of focus groups to engage farmers in explicit conversations about calf welfare to promote learning among peers (see also Vaarst et al., 2007).

Future research should also focus on identifying the types of concerns farmers have about managing calves to better focus on culturally relevant topics for interventions. In the work described in Chapter 4, the topic of weaning calves emerged as an interest of farmers and veterinarians, indicating that topic in particular has potential as a future intervention study. Focus groups with farmers would be beneficial for eliciting data as there is a dearth of information available about calf welfare concerns and priorities of dairy farmers; group discussions are a good method to use for topics where little is known (Powell and Single, 1996). Additionally, focus groups are multifunctional; in addition to meeting the needs of the research, focus groups convene groups of people to learn about topics and to inspire change (Kamberelis and
Dimitriadis, 2011). Thus, convening farmers on topics of calf welfare can help the scientific community better understand where concerns exist, drive peer to peer learning on ways to improve calf welfare, and inspire more focus on calf welfare and group efforts to promote improvements from within the dairy industry.

6.4 Potential applications for farmer-veterinarian cooperation

There is value in learning about how people within the dairy industry conceptualize topics of animal welfare and explore ways they can improve. In keeping with the goals of an applied animal biology program, I propose the following suggestions for applying the work described in this thesis to the daily world outside of the academy. First, I suggest Chapter 3 demonstrates that it is worth exploring the inclusion of animal welfare education and training in veterinary school curriculum. Veterinarians in this study who had been in practice for longer periods of time identified differences in the training they received on animal welfare compared to more recent graduates. They also linked this difference to changes in how the clinic promoted practices that improved welfare on farms (e.g. use of pain relief during dehorning). When coupled with the moral and professional obligations, a more intentional effort towards animal welfare education and training not only seems logical (i.e. this is a stakeholder who has direct impact on this practice), it enables veterinarians to live up to their own expectations of what they should do to improve calf welfare on farms. Additionally, based on descriptions of farmers’ receptivity to their veterinarian taking a more active role in calf management described in Chapter 4, it is worthwhile for veterinarians to consider taking a stronger stance on their position about improving calf welfare on farms. Morgan and MacDonald (2007) argue that veterinarians must be clear as to where the boundaries exist for what they will and will not do as professionals.
With this in mind, the work summarized in this thesis provides impetus for veterinarians to be more forthright in what they are willing to do or not do when it comes to calf welfare.

Second, this thesis presents evidence that farmers can be receptive to change when they consider something is a problem (also see Jansen et al., 2009; Sorge et al., 2010) and that the proposed solutions make sense on their farm. The work described in Chapter 4 provides evidence that engaging farmers in different ways of knowing about their calves (i.e. routine biological data collection) can motivate change. However, this work also demonstrated that adoption of new management practices should enhance the current farm management for example, coupling data collection on passive transfer of immunity with farmer observations of calf behavior. Chapter 5 demonstrated that tapping into the farmer-veterinarian relationship can motivate farmers to strive for improvements in calf welfare. Future efforts to encourage farmers to make changes in management should complement what they are already doing on farms and their relationships with advisors rather than compete with current practice.

6.5 Conclusion

I set out to understand how farmers and veterinarians conceptualize calf welfare and the implications this has on motivating behavior change that improves calf welfare. In doing so, I learned that exploring the influence of access to information, peer comparison, and social influence of veterinarians can motivate farmers and veterinarians to take a more active role towards improving calf welfare. The inclusion of the moral and normative aspects of how Canadian dairy farmers and veterinarians conceptualize calf welfare provides insight into their willingness to improve and how those improvements may be best approached. By acknowledging the contextual diversity across farms and existing relationships, farmer-
veterinarian cooperation can improve calf welfare. There is no universal approach that will lead to improvements, and this is not unique to dairy calf welfare. What is needed in addition to understanding the technical information about what needs to be improved, is also an understanding about what these improvements mean to those I hope to convince to improve. Making sense of animal welfare requires an understanding of different aspects of the what animals want and need, and often, scientists working on animal welfare issues frame this through three overlapping yet distinct domains that consider the animal’s affective, biological, and natural experiences (see Fraser et al., 1997). However, those who work with animals may see things differently; their lives are intimately linked with the animal, as is their own welfare. Therefore, if we are to understand how to improve the extent that farmers and veterinarians use research findings about animal welfare, then we must do more to understand how this information fits into their daily lives.
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Appendices

Appendix A  Guided discussion script for Chapter 3 study

Vet Views Focus Group: Moderator Guide

(1) Consent Forms, Introduction

(A) Consent forms will be collected when the participants enter the room. This will allow us to seat veterinarians accordingly:

- Seat together veterinarians from diverse areas (i.e. space out the veterinarians from the same Provinces)
- Provide an assigned identifier with table assignment (e.g. Table 1/Vet1, Table 5/Vet2)
- Seat any veterinarians who do not consent at a table with no audio-recorder

(B) Prior to the discussion beginning,

- C. Sumner will ask if there are any questions and briefly explain the process (Consent, audio-tape, length of session, break at 45 minutes).
- Ask participants to turn off cell phones

(2) Welcome, Ground Rules, Questions (*italics indicate what the moderator says*)

(A) Welcome everyone! Thank you all for agreeing to participate.

- I am going to ask you a series of questions about dairy calves. We’d like to hear your thoughts and have you discuss these openly with each other. Keep in mind that we want your own opinions and encourage you to share examples from your own experiences.
- To start, I’d like to have everyone introduce themselves and if you like, tell us why you’re here. I’ll start: my name is _________, [small bit about yourself]

(B) Quick rules of discussion:

- Listen to what others are saying, even if you disagree! We are gathered here from different perspectives with different experiences, and that’s great: we are here to have a (respectful) conversation. If someone has not voiced something that you feel is important, please do so.
- Please try not to talk over each other, refrain from side discussions.
- We ask that you try to say your ID before you say something; it helps with recording. Don’t worry. Your name will not be included in the transcription.
- Before we begin are there any questions? If you don’t understand something just ask me to clarify at any time.

(3) Discussion Begins
(A) TURN ON RECORDERS

(B) Questions:

• Let’s begin. I have 5 questions to ask you for this session. If you need any clarification of a question, then please feel free to ask.

Q1. *What sorts of things do you think are a part of dairy calf welfare?*

• If group is silent, ask:
  o “For example, do you think the health of the calf should be included?”
  o “Should issues of pain or hunger be included?”
  o “Should issues of social housing be included?”
  o “Should bull calves be included?”

Q2. *What responsibility do you think you have in addressing dairy calf welfare?*

• If group is silent, ask:
  o “For example, do you discuss calves with farmers?”
  o “Do you discuss calves with other veterinarians?”
  o “Do you engage in research that addresses these welfare issues?”

**10 Minute Break (We should be at the 45 minute point by this time)**

Q3a. *What are you currently doing to address these calf welfare issues?*

Q3b. *If given the opportunity, what would you change about what you do to address calf welfare?*

*Thank you all for your great comments so far. This is the last question for today:*

Q4. *Put yourself in the shoes of the public, what concerns do you think they would have about the life of a calf on a dairy farm?*

Final:

Q5. *Does anyone have any final comments they’d like to make?*

(4) Wrap Up, Thank you

(1) That concludes the focus group. I want to thank you again for your participation in discussing calf welfare on dairy farms! We have an optional feedback form to fill out.

(2) Hand out feedback forms and invite participants to share their email to contact with any questions or for copies of published study.

(3) C. Sumner will debrief group by reviewing goal of discussion.