ANIMALS AND DEVELOPMENT:

A CASE STUDY OF THE CANADIAN INTERNATIONAL FOOD SECURITY RESEARCH FUND

DANIELLE LEGAULT

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Abstract

Food animals such as cattle, chickens, goats, fish and bees are central to Canada's international development initiatives which are attempting to eradicate global poverty, hunger, and foster sustainable development. Yet, despite the economic and social prevalence of these programs globally, the animals in these projects are often only counted as economic units; their relationships with the people and environment they interact with, and their welfare are left invisible and unaccounted for. This research centres the animals at the heart of Canadian international development interventions. Through a mixed methods approach, this research documents the historic roles of animals in Canadian development interventions, both domestically and globally; the actors, roles and representations of animals through a contemporary case study of the Canadian International Food Security Research Fund (CIFSRF); and looks to the future of animals in development by interrogating the synergies and tensions of the implementation of animal welfare paradigms such as the One Welfare framework. This interdisciplinary research unites animal geographies and development studies to provide scholarly insights on global animal-human relationships, animal welfare, and global well-being to inform future animal-human practices in development.

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Chapter 1: Introduction

As the looming climate crisis puts all life on this planet in harm's way, the United Nations encourages developed and developing countries to look to the 2030 Sustainable Development Goals to work together to end poverty, prompt economic growth, and protect the environment - all at the same time. Nestled within each of these goals are real lives - human and animal, interconnected through relationships and everyday encounters. Animal lives are especially interconnected to these socio-ecological processes, with animal farming being one of the most environmentally destructive practices taking place on this Earth.

The multi-billion-dollar international development industry shapes realities for millions of people (and surprisingly, animals) globally. In the 2021-2022 year, the Canadian state invested $7.5 billion dollars in official development assistance to improve human lives across the world (Global Affairs Canada, 2023b). Animals are part of these projects, involved in farm-animal vaccination programs, as food provisions in humanitarian crises, and part of long-term agricultural-based poverty alleviation programs. Food animals such as cattle, chickens, pigs, goats, bees and fish are thus core to Canada's international development agenda in eradicating global poverty and fostering sustainable development. However, despite the globally vast economic and social prevalence of these programs, scholars have found that the animals in these projects are only counted as economic units; their histories and lives, relationships with the people and environment they interact with, and their welfare are left invisible and unaccounted for (Buller et al., 2018; Kelly, 2016; Verniers, 2021; Visseren-Hamakers, 2020).

Thus, the problem is two-fold: 1) international development, in theory and practice, is inherently human-centric - centered completely on improving human wellbeing and economic outcomes - and while sustainable development frameworks include the 'environment', this anthropocentric approach exploits non-human life (Srinivasan, 2022), and 2) as a consequence, the animals entwined in this complex, multi-billion-dollar international system of aid have their lives, contributions, and welfare made invisible in the process. To address these concerns, my research centres the animals at the heart of Canadian international development policy and practice to document their historic roles, their global relationships, and their potential futures. I employ a case-study approach of the Canadian International Food Security Research Fund (CIFSRF) to illustrate the current roles of animals in sustainable development practices in addition to the future roles that Canada envisions for them. My research challenges the human-centric nature of development, by centering animals as actors of global socio-economic change.

The aim of this research is to explore and untangle the animal-human relationships in Canada's international development initiatives, and this is organized through the following three objectives:

> **Objective 1:** Explore food animals in Canadian international development initiatives over the past 70 years (1950s to 2020s).
>
> **Objective 2:** Identify the actors, roles, and significance of food animals in a case study of the Canadian International Food Security Research Fund (CIFSRF) to contextualize Canada's contemporary use of food animals in international development.
>
> **Objective 3:** Investigate the tensions and/or synergies that exist between international development and animal welfare paradigms.

Each of these objectives have a corresponding methodological approach: Goal 1, historicizing the animal in development, is addressed in the grey literature review conducted in the context section of this chapter: *1.2.2. History of Animals in Canadian International Development*. Goal 2 is addressed through a Case Study approach and Qualitative Content Analysis, and the findings detailed in Chapter 4. And finally, goal 3 is explored through semi-structured key-informant interviews and the research findings, detailed in Chapter 4, but extrapolated in the Discussion in Chapter 5.

The thesis is organized in the following manner: the remainder of this Introduction chapter will provide contextual information to frame the research. I begin by justifying my use of the word 'food animal'. This is followed by a section on animal histories in Canadian development, first looking inwards to Canada's colonial foundations, then outwards to Canada's emergence as a global donor. Then the case study employed in this research, the Canadian International Food Security Research Fund is explored. The Introduction is concluded with a section defining animal welfare, detailing how contemporary understandings of animal welfare have come to be, the movements that have erupted to create global animal welfare frameworks and bodies, as well as information on the One Welfare framework.

Chapter 2 is a scholarly literature review detailing how animals in development are made visible, or invisible, in academic work. This chapter begins by looking at the role of animal geographies as a globally focused discipline which interrogates social and cultural aspects of animal-human relationships. Afterwards, literature is drawn from development studies to investigate how animals do and do not fit into core theoretical frameworks of the discipline. Finally, animal geographies and development studies are united through an exploration of animal welfare.

Chapter 3, the Methodology chapter, details the methodological approach of this research. I provide context and justify my decision-making to the design of this research, which is grounded in

animal geographies. I employ three methodological approaches, a literature review of scholarly and grey media, a case study, and key-informant interviews. Each of these approaches is detailed, justified, and limitations are provided.

Chapter 4 presents the findings of the CIFSRF case study. This chapter responds to my second objective, to investigate the role and representation of food animals in Canadian development. This chapter details the animal actors involved in CIFSRF, how they are represented throughout the project, as well as the roles that animals in development are enrolled in. Additionally, this chapter provides the findings which prelude Objective 3, by presenting how animal welfare was included and excluded from CIFSRF. While findings from the key-informant interviews inform the entire body of this research, this chapter demonstrates their findings specific to animal welfare. This information provides a springboard for which to commence the discussion in Chapter 5 about the potential futures of animal welfare in global development initiatives.

Chapter 5 presents a discussion on the significance of animals in development, as per objective 2, as well as explores animal welfare in projects in response to objective 3. This chapter begins by detailing how animals in development have been enrolled as changemakers - collective bringers of good to human life. While being an animal changemaker can improve outcomes for animals, it also embroils them as agents of social norm change and enshrines their bodies as machines and sites of production and productivity. The second half of this chapter presents a discussion on the tensions and synergies that animal welfare paradigms in international development presents.

Finally, Chapter 6 concludes my research findings. I provide a summary of the key findings, and demonstrate my contributions to academic and practical applications to Canada's use of animals in international development interventions.

1.2 Context

In this section I provide context to several key themes and topics in this thesis to situate my research. I begin by detailing my use of the word 'food animal'. This is followed by a history of animals in Canadian international development. Afterwards I present details on my case study, the Canadian International Food Security Research Fund. Finally, information on animal welfare is provided.

1.2.1 Food Animals

Globally, definitions of what an animal is, and which animals are edible to humans, has varied across time and place. Take insects, for example; archaeologists have found evidence of insects in human diets as far back as 7,000 years ago (Tang et al., 2019). Throughout history, and sustained to today, edible

insects have been and are collected, farmed, and eaten by communities predominantly in Asia, Africa and Oceania (Tagawa et al., 2022). Simultaneously, insect-eating has been condemned and ostracized by other communities, such as in Europe and North America, but is now gaining popularity as a 'climate-positive' alternative to livestock-farming (Slater, 2022). There are numerous examples of animal-eating cultural taboos: Canadian activists frequently condemn and rescue dogs from the Yulin Dog Meat Festival in China (Elysha, 2016; Kohut, 2016); in India eating beef is political, with violence erupting between Hindus and beef-eating Muslims and low caste Dalit groups, resulting in human deaths (BBC, 2012; Doshi, 2023; Lakshmi, 2015); and while animal blood is enjoyed by people on nearly every continent, including in its raw form, it is forbidden across Abrahamic faiths (Meyer-Rochow, 2009), demonstrating that animals and which of their body parts are edible, is contingent on social and temporal factors.

While some Canadian development projects have specialized in animals that are considered taboo to the palates of Canadians, most human feeding development projects rely on more traditionally farmed animals – like cattle, pigs, and chickens. Why then, would this research not just use the term 'livestock'? Livestock is a term riddled with different connotations, which includes some animals and excludes others. Looking globally to the Food and Agriculture Organization of the United Nations, livestock is defined as "domesticated terrestrial animals that are raised to provide a diverse array of goods and services such as traction, meat, milk, eggs, hides, fibers and feathers" (FAO, 2022). The words *domesticated* and *terrestrial* make this definition restrictive and exclusionary of animals like fish and bees that are also raised by humans with the intention of consuming them, or their bodily products (like eggs, honey, and milk), and are frequently part of development projects. Even within Canada, definitions of 'livestock' vary municipally, provincially, and federally. Federally, Statistics Canada states that "while Canadian livestock and poultry often consist of more traditional animals such as cattle, pigs, sheep, chickens and turkeys, Canadian farms raise a host of other livestock and poultry" (S. C. Government of Canada, 2017). Animals in the 'other' categories include horses, llamas, goats, rabbits, and ducks – animals which, while 'un-traditionally' farmed to be eaten in Canada, are each considered traditionally farmed to be eaten somewhere else in the world. While looking municipally, in the city of Niagara Falls in Ontario, their 2019 by-law states that "'animal' means any member of the animal kingdom but excluding fish"; demonstrating that global definitions of animals and livestock vary greatly.

Therefore, for this research I use the term 'food animal', which I define as *any animal whose bodies or bodily productions are consumed by humans (like eggs, milk, honey, but also leather)*. I am not the first to use the term 'food animal', it has been used in animal and veterinary science publications (such as Radostits et al., 1994; Uddin et al., 2023), as well as by animal geographers (in Buller & Roe,

2018; Neo, 2017). However, it is not a commonly used term, with Web of Science resulting in only 1662 articles containing the term, in contrast to over eighty-thousand results for 'livestock'. In thinking back to our earlier example of edible insects, 'food animal' incorporates all creatures in the Kingdom Animalia, allowing for a wide breadth of inclusion – from lobsters, to honeybees, to chickens, to cattle, and all animals in between.

1.2.2 History of Animals in Canadian International Development

Global development, as a process and discipline, cannot be viewed in insolation from its colonial origins (Goldsmith, 2002; Ziai, 2015). As a settler state, Canada is entangled in both colonial histories and continued legacies, shaping the very formation of the state and lived experiences of all life within its borders. The Canadian state was created by European settlers to benefit their progeny. These settlers changed the landscape physically (with extractivism), spiritually (by supplanting Indigenous ontologies), economically (through commodification), and legally (through imperial assertions of laws and their enforcement) (Kanji, 2017; Montford & Taylor, 2020). They arrived with economic and religious ideologies which they used to justify their claim to all life and land on the continent. This was further propelled by the social stratification of racial hierarchies, with European settlers identifying as highest on the strata, and thus not animals, and labelling colonized peoples as less-than, as "animalized sites of tragedy, marginality, poverty, and primitivism"; a rationale used to justify colonial domination and violence (Belcourt, 2015, p. 5). Dehumanizing Indigenous peoples by viewing them as more animal than human was a deliberate act of violence: "influential religious leaders advised governors to use dogs to pursue Native Americans as 'they act like wolves and are to be dealt with as wolves'" (Anderson, 2000; Belcourt, 2015; Montford & Taylor, 2020, p. 3). Animals were entangled in the entirety of the colonial process: beavers, an 'official symbol' of Canada, were feverishly exploited by fur traders who exported the pelts to Europe to meet the latest fashion crazes (Smalley, 2017). Cod, overfished in the Atlantic. Bison, a keystone species on the prairies, were completely exterminated to make way for settler agriculture. While livestock animals, such as cattle, horses, pigs, and chickens were imported from Europe to feed the introduced agriculture systems (Smalley, 2017).

Montford and Taylor (2021) argue that "the use of animals and the institution of speciesism have been integral to colonization, with humans continuing to deploy animals to achieve colonial ends" (p.3). With this thinking, as a structure, settler colonialism continues to permeate all of the relationships the Canadian state partakes in, especially in its relationships to animals. Looking to Global Affairs Canada - Canada's acting agency in charge of international development and foreign affairs – the body has conflicting messaging about its history: Global Affairs Canada's websites says, "As Canada shed its

colonial legacy, the department grew apace, periodically transforming itself to reflect the changing international context and the country's evolving foreign-policy priorities" (Global Affairs Canada, 2018), marking that Canada is no longer a colonial space. While simultaneously saying that "Global Affairs Canada is committed to applying a reconciliation lens across its diplomacy and advocacy, trade and investment, security, international assistance, and consular and management affairs" (Global Affairs Canada, 2021a). Nevertheless, the Canadian state's colonial origins and continuities as a settler state shape its relationships with development shape it's perspective of the role of animals and agriculture.

While international assistance has taken many forms, Official Development Assistance (ODA) is long considered the global standard of aid (OECD, 2021). ODA is the transfer of capital (grants or soft loans) and technical assistance (such as people and knowledge) by the Canadian government to another state or operating charities that seeks to improve global human welfare and economic development outcomes (Morrison, 1998; OECD, 2021). David Morrison (Morrison, 1998), in his book *Aid and Ebb Tide: a History of CIDA and Canadian Development Assistance* describes ODA as the following:

> What became known as official development assistance resembled colonial development and welfare programs initiated by some European imperial powers in their overseas territories before, during, and after World War II. While both involved concessional resource transfers (that is, grants and subsidized loans) for infrastructural projects, and various forms of budgetary support, ODA is distinguished by the modifier in the more generic term "foreign aid." The transfers occur between sovereign states, in some cases mediated by international agencies that are creatures of sovereign states (p. 3).

Canada's interest and funding in international development assistance has varied over the past 70 years, mirroring both global challenges and trends, as well as domestic opinions and policies. In 1968, under the Lester B. Pearson government, the federally operated Canadian International Development Agency (CIDA) was created. CIDA was responsible for up to three-quarters of all Canadian ODA, with the remainder channelled through other government agencies[1], crown-corporations, and non-governmental organizations (Morrison, 1998). This was until CIDA was merged in 2013, under the Stephen Harper government, with the Department of Foreign Affairs and International Trade into today's Global Affairs Canada (GAC). Up until the point of CIDA's creation, development goals did not operate through one

[1] Agriculture Canada and Fisheries and Oceans Canada were two key government offices that received CIDA funding for implementing their own development projects overseas (Morrison, 1998; Thomson, 1980).

cohesive agency, and only a few years prior, in 1965, did the first NGO (CUSO) receive funding from the government of Canada for international development programming (Morrison, 1998).

Canadian development financing and aid delivery is complex and contains many national and international actors. The Canadian government participates in both bilateral aid, the direct funding from Canada to another state to target specific needs, as well as multilateral aid, which includes Canada's contributions to international organizations and multinational organizations such as the World Bank and United Nations programs. Today, Canadian NGOs such as CUSO, receive funding from private donors and the government of Canada, in addition to other multinational organizations and governments.[2]

Canadian international assistance is further complicated by the role of the International Development Research Centre (IDRC), which was established by Parliament in 1970 as a Crown corporation to "assist the global South in developing scientific and technological skills" (Muirhead & Harpelle, 2010). As a research organization, IDRC invests in high-quality and progressive applied-based development research, and its status as a Crown corporation has provided it with the "freedom to pursue its own lines of enquiry not fettered by government direction" (Muirhead & Harpelle, 2010, p. 2). While existing separately from CIDA (and now GAC), IDRC and CIDA can be seen as existing in tandem, with a 1987 article describing their relationship in the following manner: "The support provided by CIDA and IDRC can therefore be seen as complementary, one agency providing direct technical assistance [IDRC] and the other agency providing funds to maximize technical assistance at the local level [CIDA]" (Blair, 1987, p. 1561).

Within all these avenues of Canadian international assistance, animals are especially visible in two intervention channels: humanitarian assistance and development assistance. This next section will provide evidence of how animals have participated in both forms of aid from the 1950s onwards. This is not a comprehensive analysis of all animal projects that have taken place over Canada's history of international assistance, but rather trends that have emerged in the research.

Humanitarian Assistance – The Animals behind Canada's Food Aid

Humanitarian assistance is the short-term response to political and environmental crises. The following are examples of how animals are present in Canadian-funded multi-lateral aid in humanitarian contexts.

In times of crises Canada actively participates in providing 'food aid' – where in addition to financial donations used to purchase food, Canadian-grown and processed food commodities are

[2] For example, a CUSO 2022 project in the Democratic Republic of the Congo was funded by both Global Affairs Canada and the Swedish International Development Cooperation Agency (CUSO, 2022).

shipped internationally to where they are needed. Canadian animals, farmers, and domestic policies have been entangled in this process since the 1950s (Morrison, 1998). While there is undoubtedly a level of altruism and compassion to the provision of Canadian food aid, until 2008 all Canadian food aid had to be produced within Canada (S. Brown, 2012), demonstrating that food aid has historically been intended to be mutually beneficial to Canadians. This comes as no surprise; during the early years of CIDA, the organization stressed the importance of "mutual interests": improving global outcomes while simultaneously benefitting Canadians. During the 1970s, roughly "60 percent of Canada's total aid budged [was] spent [within] Canada for goods and services", and according to then president of CIDA, Michel Dupuy, "bilateral aid programs provide[d] foreign markets for key Canadian industries" (Thomson, 1980, p. 34). Canada's embarkment on the global stage through aid and development opened doors to global cooperation, benefitted Canadian businesses, and enriched young Canadian lives with international experiences - but especially benefited Canadian farmers, fishers and food processors through the production and provision of food aid (S. Brown, 2012; Morrison, 1998; Thomson, 1980). Canadian farmers and fishers sold the animals they reared or caught, and the processing plants transformed the animals and animal products into shelf-stable food items that could survive transport and delivery to wherever the crisis response is (Charlton, 1992). Animal commodities in Canada's contribution to world food programs have included items such as skim milk powder (Cohn, 1978), canned beef and powdered eggs, (Morrison, 1998), canned turkey (Charlton, 1992), and fish (Hanna, 1985), in addition to non-animal items like canola and wheat. During the 1970s CIDA was contributing four times more to food aid than to agriculture and fisheries development projects (Thomson, 1980).

Domestic policies and lobbyists have targeted Canada's international food aid programs to benefit Canadian farmers and the food processing industries. In 1974 a successful "lobbying campaign led by the Dairy Farmers of Canada led to a quadrupling of skim milk aid" (Morrison, 1998, p. 127). On the ground, the Canadian economy had a chronic oversupply of skim milk powder which CIDA bought at Canadian-market price (Charlton, 1992). However, a high world stock of the powder, coupled with low world prices, low cultural relevancy of the food, and the world food aid programs refusing the product created the perfect storm: CIDA was left struggling to distribute the product globally (Charlton, 1992). A similar scenario happened with Canadian canned beef: falling calf prices in the 1970s caused fears of mass "herd liquidations", prompting the National Farmers Union to pressure the government to purchase the animals to include in food aid baskets. Eugene Whalen, Minister of Agriculture at the time responded to the union in a telegraph: "India and Bangladesh are the two countries that most urgently need food aid today. Yet, there is no use sending them canned beef. It is against their religion to eat beef

... Canada has twice put beef into a food aid program before. You may know what happened. We couldn't even give it away." (Charlton, 1992, p. 98). But the Union's pressure succeeded, and 5 million dollars (out of the 10 million requested by the union) of canned beef were sent to the World Food Programme in 1975 to 1976 (Charlton, 1992).

Canada has also actively been involved in 'fish aid' – harvesting wild Atlantic fish, such as herring, sardines, and mackerel, canning or salting them, and providing them to the World Food Programme. In the 1980s Fisheries and Oceans Canada sought to diversify Canadian fish markets – and thus 'fish aid' was born (Charlton, 1992). A 1985 Fisheries and Oceans Canada report from Newfoundland states that "An increase in fish aid should be a result of a realized need for fish; it should not be supply driven" while also saying that "An aggressive marketing effort is required to increase the fish component of the food aid basket" (Hanna, 1985). This approach was successful, and by 1989 fish aid increased to a valued contribution of $37 million, up from $5.9 million in 1981 (Charlton, 1992). By the 1990s CIDA estimated that they were purchasing enough fish to keep the equivalent of two fish-processing plants open in the Maritimes (Charlton, 1992).

Canada also sent non-humanitarian assistance food aid, with food sent to low-income countries. Critics of non-crisis food aid have seen it as "an inherent threat to building a viable agriculture sector in developing countries" (Thomson, 1980, p. 39).

Development Aid

Development aid is long term assistance to a region promoting social and economic growth and wellbeing. It can exist separately from humanitarian aid but can also be the continuation of aid provisions after the immediacy of a crisis. Within development aid, agriculture has long been seen as a key intervention to improve inequality, reduce poverty, and eliminate hunger (Lowder et al., 2016).

Over the past 70 years, since Canada has begun participating in development assistance, global approaches to agriculture and access to animal meat and products has changed drastically. The scientific advancements of the Green Revolution of the 1960s improved plant production, feeding both people and animals, while a similarly coined 'livestock revolution' has resulted in the intensification of animal production (Ramankutty et al., 2018). Globally, food animals live on 62% less land now than they did in the 1960s, and the global population of poultry is estimated to have increased from approximately 5 billion in 1960 to 23.4 billion in 2014 – a 234% increase in 54 years (Delgado et al., 2001). While agricultural trends do not impact all regions in the same way, between 1970 and 1990 "combined per capita consumption of meat, eggs, and milk in developing countries grew by about 50 per cent" as a

result of rising incomes, urbanization, changing food norms, and increased access to meat, eggs, and milk (Delgado et al., 2001).

Behind both the Green and livestock revolutions is a similar goal: to increase the productivity of agricultural outputs as efficiently as possible to feed the world's ever-growing human population. Canada's contribution to this goal has included an intense focus on cattle to meet (and influence) growing global demands for milk and meat. Let's dive into a Canadian cattle case study to demonstrate this example:

Figure 2

First air shipment of Holstein cattle from Canada to Latin America, Calgary, Alberta

Note: (CU1213375) by Unknown. Courtesy of Glenbow Library and Archives Collection, Libraries and Cultural Resources Digital Collections, University of Calgary. Image retrieved from the University of Calgary's digital commons (Unknown, 1946)**.**

The year is 1946 – the Second World War finished just months prior, and global actors are embarking on a new international era. The voice of a news anchor with a transatlantic accent booms over colourless footage "air transport breaks new ground with the first ever shipment of purebred Canadian cattle to Cuba…these aristocrats' rebel in something the mere human can't get: a priority passage by air"("Cattle Flown by Plane to Cuba," 1946). Black and white Holstein cattle from Alberta are clothed in lettered blankets and paraded in a line by their handlers as they board a state-of-the-art aircraft. Around them is a sea of spectators celebrating their departure and unknown adventures to a foreign land. While I cannot confirm these cattle can officially be considered Canada's first cattle

development project, or even technically development assistance, these cows were purchased from Harry Hays, an influential Albertan rancher, and the future Minister of Agriculture under Lester B. Pearson, and thus these cattle do mark the beginning of 'Canada's cattle for development' strategies.

In the 1960s CIDA shipped 1400 Holstein cattle to South Korea to establish a dairy industry (Sanger, 1969),[3] and 500 Friesian cattle were sent by CIDA to Uganda in the 1970s purchased through a development loan ("Letters," 1977)[4]. The Malawi-Canada Dairy Cattle Development Project (MCDCDP) saw the construction of three dairy farms in the country to house 400 Holstein heifer calves and 50 Jersey calves which were airlifted from the Canadian Maritimes (Bedard, 1987). In addition to producing milk, these cattle were intended to interbreed with local zebu cows to "develop a higher producing cow with the hardiness and disease resistance…necessary to survive under village conditions" (Bedard, 1987, p. 460). And in 1974, 45 Canadian Holstein-Freisen cattle were airlifted to Ghana in order to create another dairy industry (Kabuga & Agyemang, 1984). The cattle in Ghana underwent several feeding regime experiments to see how their milk production was impacted by the new and unfamiliar warm climate of the region (Kabuga & Agyemang, 1984). The majority of these cattle programs can be seen as supporting large-scale intensive milk production, rather than supporting small-scale subsistence farmers.[5]

Improving animal production through the introduction of exotic and 'superior' Canadian animal breeds was never limited to just cattle. In the 1980s semen from Canadian purebred pigs was sent through CIDA to China after they requested technical assistance in modernizing their pork production (O'Brien, 2000). And in the 1970s, CIDA provided technical assistance to Jamaica in developing a

[3] Critics of CIDA cattle shipments emerged early-on: Canadian journalist Clyde Sanger book *Half a Loaf: Canada's Semi-Role Among Developing Countries* wrote of his visit to the project in South Korea where he discovered that the Canadian development project was actually benefiting the wealthy. He (1969) explains: "In Yangsan County, for instance, the Holsteins are being sold to the wealthiest farmers -1100 dollars a head, was the price quoted to me- and ordinary people just do not drink milk…. It was sad to see Canadian aid going to enrich an elite: her cows' milk will go to dealers, and almost certainly on to luxury places like tea-house" (pg. 117). Sanger (1969) also spoke of how the CIDA cattle project contrasted to a 1969 Canadian Save the Children cattle project: "CanSave would help both with sponsorship funds and the gift of a calf. This ambitious venture into rural development seemed more relevant to the country's needs than CIDA's shipment of Canadian Holstein cattle. For these Korean calves would cost a hundred dollars rather than eleven hundred dollars, will be beef rather than dairy cattle and thus be work-animals around a small farm; and they will go to· some of the neediest families, rather than to an elite" (p. 120).

[4] The New York Times addressed (supposedly false) international rumors that these cattle were all barbequed by the military ("Letters," 1977)

[5] These cattle projects are classified under "technical assistance" with Canadian 'expertise' shared as development interventions, and the aim of "technical assistance packages was to increase agricultural productivity, and thereby the output of the commodities in question" (Jackson, 1992, p. 86).

'technologically sound' pig industry by "upgrading the genetic base of the existing stock" (Jackson, 1992, p. 87).

These are but just a few examples of one form of Canadian international development via animals; by exporting live animals with high quality pedigrees, or their genetic material (such as semen), from Canada to a recipient nation as aid. This is done to 1) improve the genetic stock with the 'superior' production genetics of the Canadian animals, or 2) to introduce new animal breeds to spur an animal industry (like dairy) that may not currently exist in the recipient country or is not currently meeting local demands. However, by the 1980s the International Development Research Centre's Animal Sciences Program was already questioning this process, stating that "research on native and well-adapted animal breeds that survive and thrive more successfully than exotic animals is of special interest" (IDRC, 1981, p. 17), indicating a lack of thriving and survivability in these imported animals. Canada was never alone in exporting live animals for development, and it was founded on opinions that improved animal genetics resulted in greater human food outcome. Evidence of Canadian cattle exports for development dwindle after the 1980s, and while other animals like the pig examples in Cuba and Jamaica exist, little to no evidence could be found regarding the live export of Canadian poultry (chickens, turkeys, eggs), sheep or goats for development assistance.

Table 1

CIDA Animal Projects circa 1980

Country	Project	Animal Centered in Project*	Period
Sri Lanka	Honey Production	Bees	1976-81
Thailand	National Inland Fisheries Institute	Fish	1971-79
Ghana	Animal Production	Unknown	1973-80
Kenya	Bee Keeping	Bees	1970-78
Malawi	Fisheries Expert	Fish	1973-76
Ethiopia	Rinderpest Control	Hoofed Mammals	1972-76
Tunisia	Poultry Farming	Poultry	1972-76
Tunisia	Milk Production	Cattle	1974-79
Tunisia	Ranching Project	Cattle	1978-83
Senegal	Fisheries	Fish	1972-77
Trinidad	Cane Feed Demonstration	Ruminants	1977-80
St. Lucia	Fisheries	Fish	1977-79
Peru	Fisheries Research	Fish	1977-79

Cuba	Animal Health Research	Unknown	1975-78
Bangladesh	Proshika	Silkworm, fish, duck, goat	1977-90

Note: Animal project data retrieved from Dr. Suteera Thomson's 1980 findings of the then-current 50 CIDA development projects, which she had confirmed through key informant interviews with CIDA officials. This table displays the wide-breadth of animals involved in projects. This table corresponds with Table 1.1 (Thomson, 1980, p. 27).

***** Other than the "Proshika" project in Bangladesh, Thomson (1980) does not provide further indication as to which animals were centered in the projects beyond the titles of the project. Thus, using the title name, an educated conjecture was made about animals enrolled in the projects.*

Suteera Thomson's (Thomson, 1980) discussion paper "Food for the Poor: The Role of CIDA in Agricultural, Fisheries, and Rural Development" provides an excellent snapshot into CIDA's first decade of programming. Through key informant interviews, she identified 50 CIDA-involved development projects, of which I have provided 15 in Table 1 to highlight the range of animals involved in programming at the time: cattle are highly prevalent, as are fish. But other animals emerged too - such as goats, poultry, honeybees, and silkworms – highlighting the already diverse range of animal actors present in development projects.[6]

Fish, or rather fishing and aquaculture, appear to have always been front and centre in Canadian development interventions. At the end of IDRC's first decade of existence (1970-1981), they had already implemented 42 fisheries projects across 20 countries, with interest in fish like tilapia and carp, as well as shellfish production like oysters (IDRC, 1981). While CIDA's fish-projects were supported by the Department of Fisheries and Oceans "which supplie[d] expertise for CIDA's fisheries work overseas" (Fisheries and Oceans Canada, 1984, p. 4). In 1984, CIDA was sponsoring 30 ongoing fisheries projects across 16 countries in response to the FAOs urgent request to assist developing countries in meeting their nutritional needs, promising that "Canada will continue to assist Third World countries in the exploitation of their fisheries resources" (Fisheries and Oceans Canada, 1984, p. 4). At the time, CIDA's fishery aims tended towards industrial, large-scale focused, and included creating infrastructure for fish

[6] This table demonstrates how difficult it can be to locate information on animals in historic development projects. When animals are centered in the project, their species name is often included in the project title. But when animal-based initiatives are included as secondary goals to the project they are all but invisible. Chapter 4 presents, through the CIFSRF technical reports, how projects often implicate more animals than just the animals-centered in the projects.

processing (like refrigeration and packaging), fisheries management (such as fleet patrol training), and creating market-based approaches to improve livelihoods (Fisheries and Oceans Canada, 1984).

Across Canada's 70 years participating in international development, food animals have been tied to their ability to feed human populations, while increased productivity has been cited as a goal of Canada's various animal development projects. For instance: "A recent FAO study has shown that to keep pace with increasing demand of a rapidly expanding population, and at the same time make a reasonable improvement in nutritional status of the world's poor, the numbers of livestock, and even more importantly the productivity per animal must be increased substantially" (Blair, 1987, p. 1565)[7]. Following the Green Revolution, productivity encompassed all aspects of development –as made visible in the aim of IDRC's Agriculture, Food and Nutrition Sciences (AFNS) Division, which sought to benefit the global poor by increasing the "productivity of lands and water, food crops, terrestrial and aquatic animals, and trees and other vegetation" (IDRC, 1981, p. 10).

> "Maximising food production in the developing countries assumes, in concept, that all domestic animals of value to man will be fully exploited. This concept is consistent with the search for efficiency in the utilisation of the available resources, notably feeds and animals, and the need for self-reliance" (Devendra, 1988, p. 2).

Animal-feeding projects at IDRC were a common intervention to increase animal productivity, in particular feeding animals plant 'by-products' (Blair, 1987), which looked to feed animals inedible (to humans) or of low nutritional value plants, under the premise that "efficiency in the utilisation of the available feed resources is an important prerequisite for maximising animal production." (Devendra, 1988, p. 2). As well as in an effort to address animal feeding deficits and gaps, especially in arid and semi-arid climates. Projects in this category at IDRC have often been experimental, and include: feeding pigs and poultry cassava feeds, and sugarcane by-products in cattle feed supplements for cattle in Mexico (IDRC, 1977). Sometime in the 1980-90s, IDRC's lexicon appears to slowly move away from using 'by-products' to feed animals, towards more 'holistic feed systems' – such as a 'forage system' in Indonesia where combinations of grasses, native legumes and fodder trees are planted to reduce erosion *in addition to* feeding cattle (IDRC, 1992).

During this same period, in the 1980s moving into the 90s, development assistance began being rethought; international criticism of aid effectiveness was rising, and CIDA's industrial approach to agriculture and fisheries were being viewed less favorably than support for small-scale subsistence

[7] This quote was cited in reference to a 1985 IDRC report.

farmers (Morrison, 1998). Neoliberal reforms were also unfurling, increasing the emphasis on market-based approaches, private sector involvement, and movements towards results-based aid. By 1989 "deficit-cutting agenda took hold", and Canadian development assistance was cut more than any other federal program (Morrison, 1998, p. 17). By 2000, an Oxfam Canada representative[8] spoke before the Standing Committee on Foreign Affairs and International Trade in the House of Commons, vocalizing the development community's crisis of CIDA and urging Canada to act:

> "The green revolution's reliance on intensive inputs has become a weighty burden on the ecosystem and public health…. Agricultural development, as practised by donor agencies, has tended to discount such know-how [traditional agriculture knowledge] and to assume the superiority of modern solutions from outside the local community. Virtually all CIDA's support has gone to the promotion of modern industrial agriculture…. While too much of CIDA's agricultural development work has taken a top-down industrial agriculture approach, perhaps more damaging has been CIDA's turn away from agriculture altogether. According to CIDA's own figures, allocation to agriculture, food, and nutrition programming declined by 58% over the 1990s. This alarming trend must be reversed and reversed fast…. Canada can and must do more" (*Standing Committee on Foreign Affairs and International Trade*, 2000).

In 2013, right before CIDA's merge, buzzwords like 'local', 'small holder' and 'sustainable' dutifully prefaced descriptions of their agriculture programs. While this section does not provide an exhaustive historic account of all animals in Canadian international development initiatives (such as animal health projects), it lays the groundwork for what is to come in the rest of this research. These findings prompt reflection on how Canada's approach to animal agriculture programs in development is both shaped by the pushes of international trends and the pulls of national actors. These histories demonstrate that Canadian animals, through their lives, bodies, travels, and bodily products, have contributed greatly to Canada's current understandings of development practice. Concluding this section, the following takeaways are important to reflect on as we move forward: firstly, as long as Canada has been engaging in development, animals have been implicated in the process – both domestically in the state-building of Canada, but also in Canada's pursuits of global human improvement. Secondly, the animals actors enrolled throughout Canada's history of development have tended to be domesticated food animals,

[8] This was said by Rieky Stuart.

such as cattle, goats, pigs, and chickens, but have also included other diverse actors, such as silkworms, fish, and bees. Thirdly, the focus on small-scale and industrial animal production has ebbed and flowed throughout the course of development interventions, but have been heavily impacted by ideas of modernization, neoliberalism, and the technological advancements of the green and livestock revolutions. Fourthly, while some animals may have been celebrated in the process, such as the beavers who have become national icons, and the flying cattle who are immortalized in video, most animals in Canada's development initiatives are extremely difficult to trace. Evidence of their participation comes from singular photos, references in project title names, and report foot notes. Finally, while I have been able to extract the animal's stories, by and large the biggest takeaway is that Canada's development initiatives have always been human-centered, with animals employed to meet desired human outcomes.

1.2.3 Canadian International Food Security Research Fund (CIFSRF)

This research employs a case study of the Canadian International Food Security Research Fund (CIFSRF) which took place between 2009 and 2018. CIFSRF was jointly funded by Global Affairs Canada (GAC) and the International Development Research Centre (IDRC). Quoting Prime Minister Justin Trudeau, Diane Jacovella, GAC's Deputy Minister of International Development, described CIFSRF as "an example of what it means to 'make Canada a leader in development innovation and effectiveness": (IDRC, 2018a, p. 4). The fund invested $124 million dollars in research-oriented development initiatives to address global hunger and promote "food production, raise income for farming families, and improve nutrition throughout the Global South"(IDRC, 2023a). CIFSRF was Canada's development response to the 2007-2008 global food price crisis, and Goal 2 of the United Nations Sustainable Development Goals, 'Zero Hunger', to end global hunger and all forms of malnutrition (IDRC, 2018a).

The fund was large in scope and reach: funding a total of 39 projects across 25 countries and reached an impressive 78 million people. Following in line with IDRCs values of international cooperation in research, CIFSRF brought together 20 Canadian institutions and 40 in-country institutions (institutions referring to universities, research centres, and civil society organizations across private and public sectors), and 406 graduate students (IDRC, 2018a). By 2018, CIFSRF projects had produced "471 peer-reviewed articles (published or submitted), 72 policy briefs, 87 books or book chapters, 375 theses, and 146 films and videos" (IDRC, 2018a, p. 101). CIFSRF took place over 2 phases (Phase 1: 2009-2015; Phase 2: 2015-2018). The first phase was premised on three objectives: 1) to increase food security by funding research 2) build partnerships between Canada and organizations in the Global South, and 3) for research results to inform future food security programs and policies (IDRC, 2018a, p. 9). The second phase identified the innovations which were most successful and scaled them, such as by increasing

geographic reach or the number of human participants in the project. Guiding CIFSRF were IDRC's approaches to environmental sustainability and gender, becoming an early contributor to GAC's Feminist International Assistance Policy, which was unveiled in 2017.

CIFSRF projects themselves varied in approaches to food security. They include, but are not limited to, projects such as: plant-based projects looking to improve fruit, vegetable and grain production (like Ugás & Van den Eeckhout, 2014); technology innovations to limit food waste and spoilage (such as Subramanian et al., 2018); market-based approaches and value-added processing (Carolsfeld et al., 2018); animal health programs, including vaccine development (Babiuk & Wallace, 2014); and human micronutrient supports (Talukder & Green, 2014). CIFSRF's projects are diverse in approach, geographic scope, and in outcomes. Notably, while CIFSRF involves animals, it isn't a food animal-specific initiative. CIFSRF's goal was to address global human food security, not animal food security.

IDRC standards are meticulous, and a wide range of project data is freely accessible on their project database. By employing CIFSRF as a case study I am able to unearth how animals exist within a range of development projects, not just projects that are entirely about animals. And, as an applied research project with the *goal of informing future Canadian food interventions and shaping global policies* CIFSRF provides the unique opportunity to evaluate how Canada envisions the future of food animals within their international development agenda.[9]

1.2.4 Animal Welfare and One Welfare

This research investigates the role and possibilities of animal welfare in international development. This section defines animal welfare, how animal welfare is measured, and finally, it presents the One Welfare framework. Animal welfare is both a science, used to measure an animal's quality of life at a given moment in time (Broom, 2011), and an outcome of human-animal relationships symbolised through care, and lack thereof (violence). Animal welfare, also referred to as animal wellbeing interchangeably, is multifaceted, "involving scientific, ethical, economic, cultural, social,

[9] I find it important to address that while CIFSRF was a joint IDRC and GAC initiative, it does not mean that CIFSRF is purely representative of the Canadian state's role in development. While stated earlier that the two institutions can be seen in tandem, this does not mean that they are one-in-the-same. When speaking with a CIFSRF representative at IDRC they stated that "CIFSRF is representative of IDRC research, in that IDRC is a unique institution that doesn't look to just conduct research, but to support research by Southern organizations to find solutions to the problems that they face. When we developed CIFSRF it was a bit of an anomaly, by now it is much more prevalent, in that we partnered with Global Affairs Canada. Their mandate was to fund Canadians. Our mandate was to fund Southern organizations." Thus, CIFSRF is a unique example of collaboration between the GAC and IDRC, a federal and crown corporation collaboration representing both the interests of Canada, as well as the progressive development perspectives of IDRC.

religious, and political dimensions" (Pinillos, 2018, p. xvii). Animal welfare is not static, and understandings differ by "individual, region and culture" (Pinillos, 2018, p. xvii). As Donald Broom (2011), in his book *A History of Animal Welfare Science* demonstrates, conceptions of animal welfare have evolved across time and place: "animals have always had welfare but what humans know of it has become modified over time, especially recently" (p.122). Human conceptions of animal welfare have been shaped and informed by worldviews influencing humanity's relationships to the Earth, and other living beings, in addition to perspectives of morality, formed by society and faith, of what is right or wrong (Broom, 2011; Szűcs et al., 2012). Additionally, philosophical debates on 'sentience' – the ability for an animal to perceive or feel pain - have been used to justify providing or ignoring an animal's wellbeing (Stamp Dawkins, 2021; Szűcs et al., 2012).

Today, animal welfare seeks to provide animals, especially animals in human care, with their fundamental biological needs, good health, and happiness (Stamp Dawkins, 2021). Conceptualizations of animal welfare have and continue to evolve from being focused on alleviating suffering, to emphasizing "animal thriving and autonomy" (Gruen, 2018, p. 436). While multiple perspectives of what good animal welfare looks like has formed over the past several decades, the Five Freedoms framework has emerged as a universal standard to measure good animal welfare (Broom, 2011; Carenzi & Verga, 2009). Developed in 1965, the framework includes the following aims to measure welfare in animal-care settings (such as agriculture, pets, and zoos): freedom from thirst, hunger and malnutrition; freedom from discomfort; freedom from pain, injury, and disease; freedom to express normal behaviour; and freedom from fear and distress (Carenzi & Verga, 2009). Still, nestled within animal welfare is the assumption and legitimization that animals are and can be used for human-purposes, such as by providing meat or labour (Gruen, 2018) Animal rights and abolitionist perspectives however, tend to disagree with animal welfare and view it as utilitarian and legitimizing of exploitative animal relationships. (Gruen, 2018).

While animal welfare as an act to improve and care for animal wellbeing has occurred across time and place (Szűcs et al., 2012), contemporary understandings of animal welfare emerged in the United Kingdom and are often attributed to Ruth Harrison's seminal work, *Animal Machines* (1964) in response to the (mis)treatment of animals in industrial farming systems. In the 20th century, agriculture in industrialized nations changed drastically; from predominately subsistence-based family farming, to industrial, mechanized operations. Advancements in technologies and medicine allowed livestock producers to keep more and more animals in smaller spaces. This recent change in farm animal-human relationships not only spatially confined animals, but "solidified corporate control over the livestock

industry thereby changing the structure of livestock rearing from one of the local control to a more integrated and homogenized system" (Urbanik, 2012, p. 109). And this relationship is the norm: "in the developed world, almost all farm animals raised for food are produced by intensive operations involving several hundred to thousands of animals confined either in a building or on feed lots", with approximately "95% of all land-based farm animal production" in industrialized countries resulting from these intensive agriculture systems (Goldberg, 2016). Industrial farming practices are notoriously cruel and profit-oriented, and have cemented a relationship of violence, domination and harm in food systems (Bobier, 2019; Halteman, 2011; Purcell, 2011). However, while industrial farm animal production is the norm in the Global North, animal production and care methods are not universal; a factory farm in Ontario and its animals looks very different from a subsistence farm in Cambodia.

Thus, the politics of *whose interpretation of animal welfare standards are centered originates in response to industrial animal production systems and relationships in the Global North.* Simply, "the loudest voices about animal welfare, both in mass and volume, come from Western cultures and nations, especially Northern Europe and North America". (Garcia & McGlone, 2022, p. 4). However, countries in these regions, even after five decades of debates, have never been able to come up with a consensus on how to define, enact, and enforce animal welfare standards (Garcia & McGlone, 2022). Animal welfare varies wildly region to region, person to person. Currently, there exists no global legal understanding of animal welfare (White, 2013). Interpretation of animal sentiency and welfare is typically left to regional or country-specific interpretation (Parlasca et al., 2023; White, 2013).[10] While within the Global North, changes to animal welfare regulations have been attributed to the work of NGOs increasing public opinion and awareness of farm animal conditions (market-based approach) (Hårstad, 2023).

This is not to say that animal welfare concerns and progress does not exist in the Global South, but rather that scholarly and public attention to animal welfare is less frequently emphasized to the same capacity as it is in the Global North (Parlasca et al., 2023; Sinclair & Phillips, 2018). A multiplicity of reasons are hypothesized for this occurrence, from minimal public demand for animal welfare due to a coupling of lower incomes and demand for animal-derived foods (Parlasca et al., 2023); government fatigue in the face of human social development issues, such as water access and maternal health (Abdulhaleem, 2022; Sinclair & Phillips, 2018); or the reality that industrial-style livestock farming operations have not been as prevalent (though they are increasing in number across low and middle income countries) (Parlasca et al., 2023). The reality is that animal welfare concerns on small-holder and

[10] In Canada, animal welfare laws are primarily provincial and territorial, but the federal government enforces criminalizes animal cruelty (C. F. I. A. Government of Canada, 2022).

subsistence farms are different than concerns impacting animals living in industrial farming systems, in addition to every society having their own interpretation of what animal welfare should look like (Garcia & McGlone, 2022). For example, a major challenge to animal welfare on the African continent is resource provision (ensuring animals have enough food to eat) (Molomo & Mumba, 2014; Qekwana et al., 2019; Rault et al., 2022); in Latin America, researchers have found that market-based approaches to animal welfare (as is common in North America) are met with strong ethical requirements to pair improvements to animal life with empathetic approaches to farmers (Estévez-Moreno et al., 2022); while researchers in India have found that everyday proximity to animals, in addition to cultural perceptions of animal-human relationships, results in sentiments such as "animals and human welfare is the same" (Sinclair et al., 2019).

In terms of creating universal welfare strategies, awareness and implementation, the World Organization for Animal Health (WOAH, but formally OIE) has been the global leader. WOAH, who is headquartered in Paris, has historically focused on animal health, first adopted animal welfare approaches in their Strategic Plan of 2001-2005 (Otter et al., 2012). Since then, they have made advancements for global animal welfare standards, such as through their creation of the Regional Animal Welfare Strategy (RAWS) assisting governments in creating their own animal welfare standards (Otter et al., 2012). Otter et al. (2012) argue that the WOAH is "the most likely intergovernmental organization through which an international animal protection agreement will be achieved" (p.65).

The One Welfare framework emerged on the international scene in 2015 as a tool to assist policymakers, governments, and organizations in holistically mainstreaming global and local animal welfare concerns. One Welfare, which has been supported by WOAH, is "a collaborative approach for integrating animal welfare, human wellbeing, and the environment with an end point of improving global welfare and achieving gains in development" (Pinillos, 2018, p. 12). Speaking generally, conceptual frameworks are structures intended to assist decision-making by providing knowledge to complex, multi-dimensional aspects of our world. One Welfare builds on several key frameworks employed in development, such as One Health, One Medicine, and Eco Health, to emphasize the significance of *wellbeing* rather than health (which was the targeted concern in these foundational frameworks). These previous frameworks demonstrate that animal health has long been a targeted goal, in particular to prevent the spread of diseases from animals to people (Woods et al., 2017). While some features overlap between the frameworks, One Welfare builds on One Health by addressing the framework's welfare gap, stating that: "health is an important part of welfare; improving health always improves welfare, and improving welfare can often result in improvements to health" (Pinillos, 2018, p. 7). By

providing space for “non-disease focused” interventions, welfare-centered approaches to animal programs provide more holistic interventions (Pinillos, 2018, p. 11). Importantly, One Welfare acknowledges that their systems-approach is not new and is already being practiced by some communities and organizations globally. The framework does, however, create a pathway for communities, organizations, and governments that do not embody this inter-species approach to do so.

Figure 1

The One Welfare Framework

Note: Figure retrieved from One Welfare: A Framework to Improve Animal Welfare and Human Wellbeing, Rebeca García Pinillos, 2018, p.14

The One Welfare Framework (2018) is composed of 5 sections, visualized in Figure 1. Section 1 of the framework, *The connections between animal & human abuse & neglect,* demonstrates the relationship between inter-personal violence and violence committed to animals, and the need for global cross-sectoral collaboration (including veterinarians, health care practitioners, and law enforcement) to address the issue. Section 2, *The social implications of animal welfare* articulates the relationship between animal welfare and socio-economic issues. Looking at both individual and community relationships to animals, Section 2 shows how improving animal wellbeing can, in turn, improve human wellbeing. They (2018) provide the example of Brooke East Africa, an international animal welfare organization working to improving the lives of working equids. In Meru, Kenya, Brooke East Africa’s One Welfare approach was a massive success: they implemented a mixed-methods

approach including improved animal health care access, implementing animal welfare by-laws at the community level, community garbage cleanups to make streets safer, and animal husbandry training. This resulted in 1) healthier and happier donkeys able to work more and requiring less days off due to sickness or injury; 2) a cleaner environment that was safer for people and animals alike; and 3) realized human benefits of improved income and social connections. At large, section 2 demonstrates how working on both animal-owner and community levels to target animal welfare issues can ultimately improve both animal and human outcomes.

The third section underpinning the One Welfare framework is *Animal health and welfare, human wellbeing, food security and sustainability.* This section is focused on "farming and food producing livestock" and connects animal welfare to the wider global issues of food security, climate change, and sustainability. It is well established that poor animal welfare in livestock production results in increased risk of animal stress, and thus disease – resulting in animal illness and deaths, poor meat quality, and human food safety risks (Pinillos, 2018). This section demonstrates that farmers who are more highly skilled tend to have higher animal welfare outcomes, and thus higher social and mental outcomes for the farmer; acknowledging that "positive farmer-livestock bond[s]" matter (Pinillos, 2018, p. 53). In addition to seeing improved animal welfare as a pathway to improved farming sustainability, this section also advocates for "i) reduced human consumption of animal products; and (ii) radical changes to animal production that reduce the use for livestock feed components that compete with direct human food" (Pinillos, 2018, p. 57).[11]

Section 4, *Assisted interventions involving animals, humans, and the environment* explores the role of *human-animal interactions (HAI)* and *human-animal bonds (HAB).* In particular, they (2018) unearth when interventions are needed to improve outcomes for animals, the environment, and people. While this section primarily focuses on the impact of companion animals (pets), it also makes space for unearthing the role of all animals in creating mutually beneficial relationships. Finally, section 5, *Sustainability: Connections between biodiversity, the environment, animal welfare and human wellbeing* untangles wild animal-human-environmental interactions. They (2018) acknowledge the role of history and culture in conservation, and the ethical implications of land use that arises. Ultimately, climate change, pollution, habitat loss, and biodiversity loss implicate all living creatures on Earth and holistic systems like One Welfare provide a pathway to navigate these relationships.

[11] Importantly, outside of One Welfare, there exists a growing body of literature amassing surrounding the role animal welfare in contributing to greater global sustainable development and sustainability in the food animal production (see Broom, 2019; Buller et al., 2018; Verniers, 2021; Visseren-Hamakers, 2020).

While this context section on One Welfare has been largely descriptive, it has done so to establish a foundation of the framework. I expand on the politics of One Welfare, and how and if it should be applied to development programming in Chapter 5. At large, this context chapter has established the important key themes employed across this research - from food animals to the history of animals in Canadian development initiatives, to animal welfare and One Welfare. In the next chapter I introduce the scholarly conversations that are taking place regarding animals and development.

Chapter 2: Scholarly Literature Review

This chapter builds on the contributions of the context section of Chapter 1 by presenting the key discussions and arguments taking place regarding animals in development. This research is rooted in two schools of thought: Animal geographies and Development studies. Animal geographies is a relatively new subdiscipline in Geography that critiques human exceptionalism and interrogates the relationships between animals and humans across space, identity, culture, politics, and ecological processes (A. J. Hovorka, 2020). Animal geographies politicizes the animal, centering them as subjects in debates of agency, power, and wellbeing (A. Hovorka, 2019; Wolch & Emel, 1998). Like animal geographies, Development studies is also concerned with these same conversations, but takes a staunchly human-centered approach (Sen, 2000; Srinivasan & Kasturirangan, 2016). At its core, Development studies is interested in processes of change and human wellbeing, particularly in "low- and middle-income parts of the world, with particular reference to structures and institutions" (Clark, 2006). This chapter presents the existing scholarly literature surrounding animals in development in Animal geographies, Development studies, and finally, it looks to how Animal Welfare has the potential to unite these two schools of thought.

2.1 Animal Geographies and Development

Animal geographies is already entangled in a network of global scholarship actively contemplating the international intersections that exist between animals, people, and the environment (A. J. Hovorka, 2017; Urbanik, 2012). Reflecting on my use of the term "food animals" instead of livestock, animal geographies sheds light on the cultural convergences and tensions surrounding which animals are considered edible. The types of animals farmed or consumed "depends on our cultural location in space and time and on our ability to perceive these animals in and of themselves" (Urbanik, 2012, p. 130). Animals like canines, equids, and insects, or certain animal body parts like organs, or blood are examples of how food animals are in fact cultural, and not global truths (Urbanik, 2012; Wolch & Emel, 1998). In practice, development projects respond to, and are shaped by global food animal norms, including religious practices (Young, 2012). In India, the development of an industrial dairy industry created separate cow castes, where Pahari cows are spiritually pure and their milk more nutritious, and imported Jerseys are denied sacredness and their milk reserved for humans of lower social standings - showing how cultural relationships with food animals impact relationships between animals of the same species (Govindrajan, 2018; Parikh & Miller, 2019). The tensions between cultural food norms across development, conservation, wildlife and bushmeat are also prevalent in animal geographies (Bennett et

al., 2007; Nelson, 2017; Neo, 2017), including the role of gender and racialization in shaping and influencing global food norms and relationships with food animals (A. J. Hovorka, 2012; Wolch & Emel, 1998).

Animal geographers view the entanglement of animals and development across space and time and emphasize that animals are agents of social change across landscapes. Alice Hovorka (A. Hovorka, 2008) demonstrates the role of chickens in shaping urban life in Botswana, while Thomas White (T. White, 2020) looks at how Bactrian camels physically embody a changing political and territorial landscape in rural Mongolia in the face of Chinese development. Buller et al. (2018) examine the intersections between sustainability, welfare, and the global intensification of industrial farming, especially in the Global South. While geographer Benjamin Gardner (2009) reviews the impacts of neoliberal development policies and practices in shaping livestock outcomes in Latin America and Africa. Gardner (2009) demonstrates the "importance of understanding livestock production not simply as an instance of commodity production in general but as located within particular historical geographies of production and reproduction" (p.782).

The landscape of animal geographies also reverses the gaze to examine the relationships between animals and development in the Global North, such as Zoe Todd (Todd, 2014) who explores the connections across Indigenous relationships to fish, politics and economic development in Canada. Also in a Canadian context, scholars Azeezah Kanji (Kanji, 2017) as well as Kelly Struthers Montford and Chloë Taylor (Montford & Taylor, 2020) complicate the relationships between settler colonialism, animals, and development in Canadian state formation. European understandings of "nature" dramatically changed the landscape both physically (with extractivism), spiritually (by supplanting of Indigenous ontologies), economically (through commodification), legally (through imperial assertions) and through biodiversity (as some animal species, like bison, were decimated to make way for European food animals) (Kanji, 2017; Montford & Taylor, 2021). As a structure, these authors articulate that settler colonialism continues to permeate all relationships that the Canadian state partakes in today, especially in its relationships to animals. Montford and Taylor (2021) argue that "the use of animals and the institution of speciesism have been integral to colonization, with humans continuing to deploy animals to achieve colonial ends" (p.3).

While not strictly development-focused, but important to this research, animal studies scholars investigate animal-care; looking at which humans care for animals, and how in return, animals care for

humans. Radhika Govindrajan's (2018) book *Animal Intimacies* is an ethnographic account[12] of her research in Uttarakhand, India. She details the everyday entanglements of animal-human lives through what she refers to as *animal intimacies,* which are the reciprocal and intimate acts of love and care between animals and their people. She demonstrates that for people who live lives entangled in multispecies interrelatedness, love is not always ethical and can exist within acts of violence (such as a ritual goat slaughter where the women raised the goats like their own children). Animal intimacies demonstrate the kinship that exists between animals and the people who live alongside them.

Animal scientists also contribute greatly to understandings of animal roles in development. Liveness Jessica Banda and Jonathan Tanganyika's (2021) provide one of the most thorough examples of the animal actors and their roles in development that I have encountered. They reassert the significance of livestock in their ability to feed people while also emphasizing that importance of animals in development *as more than just food* by exploring the diversity of non-food roles of animals, such as in biomedical research, leisure and labour, as well as the importance of sociocultural impacts on livestock, like gender, and ritual sacrifice. They articulate that the roles of livestock in development have been largely ignored by academia, and that there "is a need for specific research aimed at a better understanding of the role of livestock, especially non-food roles, which are mostly ignored, in the livelihoods of rural communities in the developing world" (Banda & Tanganyika, 2021, p. 12).

In sum, animal geographies centres the animal as a subject and actor in development. It provides a core understanding of how animals intersect across dynamics of culture, race, gender, spatiality, and intimacy.

2.2 Development Studies and Animals

In contrast, how does development studies engage with animals? In essence, animals in development studies are most often viewed as a means to an end to improve human well-being. This is not to say animals are non-existent in development studies, they most certainly exist, but their lives are viewed only as significant as their contributions to human outcomes. Individual animal actors in development projects are, at most, made visible to international communities through images and media used to advertise specific charity projects, often in the company of smiling children (Dogra, 2007). The majority of animals participating in development are not photographed, but rather are referenced in terms of their ability to feed humans and ensure food security (World Bank, 2001; E. M. Young, 2012); their

[12] Radhika Govindrajan describes herself as an Anthropologist, not a Geographer, but I have included her reference because of her contribution to my scholarly understanding to animal intimacies, care and love.

presence in poverty alleviation programs (Ferguson, 1994; Kelly, 2016; Sargison, 2020); as units in large-scale industrial agriculture initiatives (Reardon & Barrett, 2000); as vectors of transmissible diseases (Perry & Grace, 2009); and their role in climate change and environmental degradation (Thornton & Gerber, 2010).

Some development studies articles investigate the outcomes of animal-themed development projects: including investigating projects on cattle (Chakravarti, 1985; Mkenda-Mugittu, 2003), goats (Devendra, 2013; Rewe et al., 2002), and chickens (Mack et al., 2005). While others focus on different animal-approaches to poverty-alleviation, including apiculture (beekeeping) (Hinton et al., 2020; Pocol & McDonough, 2015; Schouten & Lloyd, 2019), aquaculture (Brugere et al., 2021; Gopal et al., 2020; Smith, 2019), mixed crop livestock systems (Lal, 2020; Tarawali et al., 2011), and animal husbandry (Kreutzmann, 2012; J. R. Young et al., 2013). While these examples feature animals, they are framed through development studies approaches, and not animal geographies, and therefore do not investigate the significance of the animals in question, nor do they view them as social agents.

However, food animals are acknowledged as integral to peasant agrarian systems (smallholder farming), in their ability to employ, and to feed the world's global poor in promoting food security and contributing to healthy diets; "livestock[13] represents an important asset of the poor, and plays a vital role in employment generation and in economic growth in the developing world" (Randolph et al., 2007, p. 2788). The impact of changing global norms and agriculturization is also examined, including the experiences of pastoralists and animal herders (Catley et al., 2013; Scoones, 2021).

Across development theory, food animals are tied to their roles in agriculture, aquaculture, and as market commodities. Modernization theory, a foundational and antiquated theory of development studies, sees development as a process from peasant subsistence farming (underdevelopment), to systems of industrialized and globalized agriculture (Bernstein, 1971). Within this process, animal geographers Jennifer Wolch and Jody Emel (Wolch & Emel, 1998) articulate that "animals were never part of the modernist ideology of progress…except as commodities" (p.xii), resulting in the animal holding no intrinsic value, instead seen only as factors of economic production (Hardeman & Jochemsen, 2012). Political theorist Timothy Mitchell (Mitchell, 2019) builds on the role of modernity, in particular as a symptom of capitalism through the lens of the mosquito. By unpacking the multi-scalar relationships between the construction of the Aswan dam in Egypt, increased fertilizer usage, elite land ownership,

[13] Use of the term "livestock" is very prominent in development studies literature, and while some studies define their interpretation of the term, such as Carlson-Bremmer et al. (2018): "'Livestock' will be interpreted broadly and will include aquaculture and apiculture, in addition to more traditional species such as poultry, goats, rabbits, and cattle", interpretation of which animals are included under the term vary widely across publications.

and malaria, Mitchell (Mitchell, 2019) demonstrates the complicated intersections between modernity (development), capitalism, and animals. Postdevelopment theorist Aníbal Quijano (2007) critiques modernity theory by untangling the European colonial norms (commodification of nature, intensification of agriculture) intrinsic to development through *coloniality*. Along similar lines, Arturo Escobar (2019) articulates that European colonialism has enacted a hegemonic world view, which was expanded by neoliberalism, viewing the world as a set of singular truths, hierarchies, and binaries (nature/human, domesticated/wild). Escobar (2019) demonstrates that development has been a process of ontological domination that must be challenged, or altogether replaced. This is possible by centering and learning from Indigenous ontologies, in what he refers to as the *Pluriverse,* in seeing the "Earth [as] a communion of subjects, not a collection of objects" through relationality and reciprocity (Escobar, 2019, p. 28).

While another critical development scholar, James Ferguson (1994) examined the failure of development through the "bovine mystique"; demonstrating that Canadian international development cattle programs in Lesotho did not take local relationships with cows into consideration in their project design - effectively repeating behaviors previously enforced by British colonial rule (Ferguson, 1994). The failures, and successes, of livestock-centered development projects are, however, centred in development. Writing of similar findings to James Ferguson, Hans Jahnke (Jahnke, 1983) wrote a decade prior about development's focus on introducing technical innovations to pastoral societies in sub-Saharan Africa, stating that "livestock development projects [have] been generally disappointing," with "the primary cause of failure in most cases [being] the lack of adequate understanding of relationships between the biological, economic and social components of each production system" (p.VI). Similar findings have been made by other scholars, such as Ashley et al. (1999), who found that development projects over-emphasised cattle projects, which in turn worsened gender and environmental outcomes. In addition, that "livestock development projects tended not to be targeted at poverty alleviation, but rather at other national priorities such as raising production, export promotion, or control of specific diseases" (Wanyoike & Baker, 2013, p. 890).

Francis Wanyoike and Derek Baker's (2013) article "Pro-Poor Development Performance of Livestock Projects: Analysis And Lessons From Projects' Documentation" builds on Ashley et al.'s (1999) study, and presented pathways to determine best practices in future livestock project designs. Their study investigated 60 livestock projects, which were submitted for analysis by various funding agencies. Interestingly, they found that the funding agencies themselves had difficulty determining which of their projects had "livestock content". In sum, they discovered that their findings mirrored previous studies, determining that 60% of their sample livestock projects were "not successful". They found that the

greatest differences between successful and unsuccessful projects “relate to projects' impacts on husbandry and productivity, market participation, and sustainability” (Wanyoike & Baker, 2013, p. 905).

Other critical development scholars, such as Birgit Boogaard (Boogaard, 2021) have questioned the inherent Eurocentrism and epistemic injustices in African livestock-development projects, in that Western scientific knowledge, and its “firm belief in economic and technological progress – is needed to increase agricultural production”, while structurally suppressing Indigenous ways of knowing and doing (p. 28). In investigating a ruminant project in Mozambique she challenges the projects assumptions; such as that traditional goat keepers need to “change their mindset and become more commercially oriented” (Boogaard, 2021, p. 36).

The current global regime of development, including Canadian international development, is nestled within the thematic approach of sustainable development; particularly the United Nations 2030 Sustainable Development Goals. Sustainable development is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Clark, 2006), therefore looking at the connection between environmental degradation and feeding the world. One of the key efforts of sustainable development is to balance food security, mitigate malnutrition (which is political) while ensuring environmental health (E. M. Young, 2012). The consumption of animal products has doubled in the past thirty years, “driven mainly by substantial growth in meat and dairy consumption in developing nations” (E. M. Young, 2012, p. 93). Within the animal geographies community, and the larger animal studies umbrella, scholars have been advocating for the inclusion of domesticated and livestock animals in the Sustainable Development goals to codify their right to wellbeing (Buller et al., 2018; Kelly, 2016; Verniers, 2021; Visseren-Hamakers, 2020). In particular, Ingrid Visseren-Hamakers (2020) articulates that sustainable development as a system cannot exist without including animal welfare.

2.3 Uniting Animals and Development via Welfare

‘Welfare’ presents an interesting arena in which both animal geographies and development studies are concerned with. Animal geographies’ understanding of animal welfare stems from Welfare Science, a discipline which investigates the wellbeing of animals who live with, or in-proximity with humans (pets, farms, zoos, etc.). In recent years, welfare scientist’s conceptualizations of animal welfare have evolved from one of looking at how animal’s cope, to “identifying and facilitating positive psychological and physiological states…from the point of view of the animal rather than in terms of solely human obligation” (Buller, 2014b). Animal geographers Martha Geiger and Alice Hovorka (2015a) united welfare science, animal geographies, and development, by demonstrating how donkeys are active agents in

shaping human outcomes in Botswana. Their work established a foundation for development practitioners to understand the significance of donkeys in human life, and provided a framework on measuring donkey welfare through physical, emotional and relational components (see also Geiger & Hovorka, 2015b).

Development studies is concerned with human welfare and wellbeing, not animal welfare. There are however, a few examples of texts examining animal welfare in development contexts (Abdulhaleem, 2022; Parlasca et al., 2023). Parlasca et al.'s (2023) article "How and why Animal Welfare Concerns Evolve in Developing Countries" articulate that even though the majority of the world's livestock live in developing countries, little research has gone into investigating perceptions of animal welfare in these regions. They acknowledge that "livestock production in developing countries is not free of farm animal welfare problems", but that the increasing adoption of industrial agriculture systems pose further animal welfare challenges (Parlasca et al., 2023, p. 27). Nonetheless, that animal welfare is complex and multidimensional, varying globally by socio-cultural beliefs, but are critical for the future of sustainable food systems.

While Rault et al. (2022) examine the impacts of introducing global positive welfare standards, which look to provide animals with increased autonomy and freedom (such as free-grazing), to low-income countries. They emphasize that while animals in low-income countries "often live in conditions that one could consider similar to (positive) 'welfare-friendly' systems, where they are free to roam around, forage and express an array of natural behaviours", high mortality of dogs and ruminants due to predation, starvation, disease and drought demonstrate that "good welfare does not necessarily arise from total freedom and no human intervention" (Rault et al., 2022, p. 2). They argue that introducing positive welfare may benefit animals living in industrialized farming systems in high-income countries but would burden low-income countries whose primary concerns are often entangled in resource provision to prevent animal welfare challenges.

Michelle Sinclair specializes in international animal welfare, including examining how cultural attitudes are a determinant of animal welfare outcomes (Sinclair et al., 2022), how global dynamics and issues (such as poverty and gender equality) inform and shape attitudes to animal protection (Sinclair & Phillips, 2017), and the emergence of animal welfare science and policy across Africa, Asia, and Latin America (Marchant et al., 2023). A recent article co-authored with Clive Julian Christie Phillips (2018) demonstrates how international organizations can implement successful animal welfare programming. They (2018) find that animal welfare programming must be mutually beneficial (to animals and people), locally-led, and culturally relevant. While animal welfare initiatives that were perceived to be attacking

cultural identity and long-held customs (they provide the example of bull fighting and dog meat festivals) often fail.

The most recent article by Krithika Srinivasan (2022) expands on these efforts to combine animal geographies and development studies. Employing the critical fields of postdevelopment and posthumanist thought, Srinivasan (2022) proposes that multispecies justice can only be achieved through rethinking what it means to be human (animality). She (2022) argues that contemporary development practice is focused on improving human wellbeing by preventing deaths - human deaths, at the expense and death of animals. The greatest challenges the Earth is currently facing - climate change, water scarcity, and biodiversity loss - are the result of development (Srinivasan, 2022). Therefore, to rethink development means rethinking the human-animal divide so as to avoid placing human life above nature and the welfare of non-human animals (human exceptionalism) (Srinivasan, 2022). As Srinivasan (2022) demonstrates, welfare can unite the worlds of development and animals to look towards sustainable development in both practice and theory.

By merging development studies and animal geographies I contribute to a growing body of perspectives and literature actively undoing colonial relationships to the more-than-human that sees food animals as subjects capable of enacting social change. This chapter demonstrates the breadth of conversation taking place regarding animals in global development initiatives. It showcases that animal geographies is actively engaged in global discussions on animal-human relationships, and that combining this perspective with development studies, who historically has not thought much about animals, can lead to fruitful pathways to explore the lives of animals in development practice. Of note, is just how recent publications of international animal welfare, and animal welfare in the context of development are. Most published within the past 5 years, many within the last year. This demonstrates that conversations about development, animals, and welfare are budding, and are only destined to increase in the foreseeable future. This research is thus incredibly timely to be partaking in these debates, and in many ways, also the first research of its kind in that it is contributing to a scholarly dialogue of animals in development by thinking critically about their space in it, their histories, contributions, and futures.

Chapter 3: Methodology

This chapter details the research methods employed in this mixed-methods qualitative study to explore the actors, roles, and significance of animals in Canada' international development initiatives. I begin by detailing my methodological approach and positionality to situate myself as a researcher in this work. This is followed by the research design, documenting the mixed-methods approach I employed, providing details on each stage of my literature review, qualitative content analysis, and key-informant interviews. Lastly, I discuss my methodological challenges and limitations.

3.1 Methodological Approach and Positionality

My research is guided by a methodological approach grounded in animal geographies, with feminist tenets. As a sub-discipline in Geography, animal geographers explore "human–animal relations through attention to animality, animal spaces, and beastly places as grounded in eclectic and integrative methodological approaches and ethical commitments to improving more-than-human lives" (Hovorka et al., 2021, p. 2). Within animal geographies my research engages with two main prompts. Firstly, by centering the animals within Canadian international development I am addressing Jennifer Wolch and Jody Emel's (Wolch & Emel, 1998) original invitation to "bring the animals back in" to geography to challenge anthropocentric social theories. International development, in both practice and praxis is a human-focused discipline, and this research brings the animals involved in development to the forefront. Secondly, I am responding to a recent call by Hovorka, McCubbin and Van Patter (A. Hovorka et al., 2021) to "bring the animals outwards" to address global socio-ecological events through cross-disciplinary dialogue and praxis. While I am not responding to a crisis, as they suggest, I am still applying a cross-disciplinary perspective to the global processes of animals entangled in Canadian international development.

Feminist methodological approaches encourage self-reflexivity to address how our own values and identity shape our research (L. Brown & Strega, 2015; Seymour & Wolch, 2010). Critical positionality is required to unearth the layers of power and privilege that shape knowledge production (L. Brown & Strega, 2015). My research "reverses the gaze" of disadvantaged research communities (such as the "poor" communities targeted by Canadian international development interventions) by looking at the powerful Canadian state itself. This does not neutralize my position as a white Canadian settler from the Global North examining projects that impact low-income and poor people in the Global South and their animals in this process, but rather serves as a critical reminder to continue reflecting on my role in this research throughout the entirety of its process (L. Brown & Strega, 2015).

I see my own entanglements within this research; I am a colonial settler living and learning on un-ceded and un-surrendered Algonquin Anishinaabe land. My ancestors benefited from and partook in the destruction of Indigenous knowledge and relationships with this land, and the people, animals, plants and waterways that have called this place home since time immemorial. My maternal family immigrated from Ireland to Newfoundland in the late 18th century to fish cod in the waters of the North Atlantic, and from Scotland to Prince Edward Island to benefit from lobster fishing. My paternal family are French Canadian settlers with over four hundred years of exploiting this land for animal pelts, as subsistence farmers, and later as industrial farmers in Eastern Ontario. More recently, sometime in the 1960s and 70s my family sold cattle to Cuba and Brazil in government-backed programs, entangling them in the processes of international development. I too grew up on a small farm, surrounded by animals who enriched my life with companionship and nutrition. These animals: cats, chickens, goats, pigs, cows, and horses shaped my understanding of the more-than-human from an early age through the duality of care and exploitation.

My presence on this land is founded on nearly half a millennia of exploitative settler relationships to land and food animals. I acknowledge this process as critical to shaping the animal-human relationships that I have been naturalized into. I see this research as a critical moment of un-learning in my life, an active thought-exercise to challenge my own generational knowledge of relationships with animals, land, people, and government that I tried my very best to exercise throughout this research by being critical of looking at the histories of processes, and unpacking what could be.

Positionality also requires that I reflect on where I ideologically align in debates of animal ethics. In this research I take the position that animal-human relationships exist and are shaped through dynamics of space, place and time. Globally, animals provide people with nutrition, clothing, labour, employment, and companionship, and are intertwined in human myths, spirituality, and customs. People and animals can and do exist in mutually beneficial relationships. But there also exists relationships of exploitation, violence, and harm. This research therefore employs an animal welfare stance, which believes that animals that are used by humans should have their conditions of life treated with the most care and respect possible (Buller & Roe, 2018). While animal rights and abolitionists, who oppose all animal use, will disagree with this stance (Gruen, 2018), this research emphasizes the value of animal-human relationships in international development. While there is most definitely a space to investigate animals in development through an animal rights perspective, this research is not that.

3.2 Research Design, Data Collection, and Analysis

The purpose of this study is to explore and untangle the actors, roles, and significance of animals in Canada's international development initiatives. To comprehensively address this relationship, I have adopted a mixed-methods research approach that looks to the past, present and future of animals in Canadian international development initiatives. This approach corresponds with each of my research objectives to:

> (1) historicize the animal-human relationship in development
> (2) to evaluate contemporary animal-human relationships, and
> (3) to look towards the future of animal-human engagements in development by engaging in conversations about animal welfare.

Each of these three goals has a corresponding methodological approach: Goal 1, historicizing the animal in development, is addressed in the grey literature review conducted in the context section. Goal 2, is addressed through a Case Study approach and Qualitative Content Analysis. And finally, goal 3 is addressed through semi-structured key-informant interviews. Together, these research methods will allow me to untangle the relationships that exist between food animals and humans in Canadian international development policy and programming. The following section details the study area, and each of these three goals.

3.2.1 Study Area

This research was conducted entirely remotely for three main reasons. Firstly, this research began in 2021, still in the depths of the global COVID19 pandemic making international travel extremely difficult and risky. While COVID19 has slowed down international graduate research, there have also been growing movements questioning the exploitative tendencies of international research (sometimes referred to as helicopter research, see Haelewaters et al., 2021). Marking the second justification for remote research: as a Canadian graduate student, we agreed that staying in Canada and studying Canadian institutions rather than in the global south was more aligned with our perspectives on ethical research practice. Finally, too often final project evaluations and reports performed at the end of development projects are shelved and rarely ever read again. These reports are a wealth of underutilized information. Therefore, the case study of CIFSRF, with its high-quality project reports that are publicly accessible through the International Development Research Centre's Project Database was a logical

decision. These three justifications demonstrate why a remote study, while it has its limitations (explored later in this chapter), when paired with interviews, provided an accurate and thorough research design.

3.2.2 Literature Review

My literature review was adapted to each section of the research. Section 1.22 "History of Animals in Canadian International Development" of the Introductory chapter, presented historical evidence on animals in Canadian development projects. Historicizing animal-human relationships is advocated for and used as a research approach within animal-geographies (Seymour & Wolch, 2010). This stage relied on secondary data collection and analysis from scholarly articles, PhD dissertations, grey literature, government reports, and media from 1950-2013 (which corresponds with CIDA's merging). Grey literature looks at relevant publications from civil society organizations. This section relied on digital archival searches, in particular Library and Archives Canada for information on CIDA, and IDRC's Digital Library for their past project and report details, as well as physical documents from Carleton University's library archives. The Scholarly Literature Review, Chapter 2 employed scholarly articles primarily sources from the following academic communities and journals: Economic Development, Animal Studies, Canadian Studies, and Veterinary Studies.

3.2.3 Case Study

To address Objective 2, exploring contemporary animals in development, I employed a case study approach. Case studies are detailed analyses, allowing the researcher to systematically apply large quantities of qualitative data to make visible intricate relationships and social processes that may otherwise be overlooked (Neuman, 2014). Case studies provide space to engage with a topic more holistically by looking at "multiple perspectives" and they "enable us to link micro level, or the actions of individuals, to the macro level, or large-scale structures and processes" (Neuman, 2014, p. 42). I chose to perform a case study on CIFSRF because it is a recent project (2009-2018) that was partly funded by the Canadian government (Global Affairs Canada, in addition to IDRC, a crown-corporation) and therefore reflects current attitudes and trends in Canadian development. In addition to these larger trends, a case study approach allowed for the perspective of individual projects within CIFSRF, and one step further, the animals in these projects to emerge – thus providing both a macro and micro account of animals in development.

Data collection of the CIFSRF case study began in September 2022. I created a profile on IDRC's website to access their project database. The first step of the data collection was to identify all 39 projects in CIFSRF and review each project's technical reports to determine the presence or absence of food animals. Projects that did not incorporate animals, as far as was made evident in the technical

reports, were excluded from the dataset, of which there were 11. Included projects were categorized as either 'direct' or 'indirect'. Projects in the direct inclusion category are animal-centered projects whose goals or outcomes directly impacted animals. These projects included animals in the project design. While projects in the indirect category are typically plant-centered projects that impacted animal outcomes, but animals were not the target of the development intervention. This distinction was required to demonstrate the prevalence of animals in non-animal centered projects and provided space for non-traditional food animal impacts, such as through their manure, urine, or animal feed sales. Refer to Annex 1 to see the entire list of included projects.

Table 2

Project Inclusion and Exclusion Criteria in CIFSRF Case Study

Project Criteria	Definition	Example	Number of Projects
Direct Inclusion	Animals are central to project design, aims, interventions and/or outcomes.	Project 106512 "this project was intended to improve the milk production potential of indigenous goats through crossbreeding, improved management and control of major diseases…"	15
Indirect Inclusion	Animals are not central to project aims or outcomes but are impacted by project interventions (typically plant-based projects).	Project 107789 "the goal was to assess the effect of poultry manure in increasing resilience on coconut palms…"	13
Exclusion	No evidence of animal participation (completely human or plant-based projects).	Project 108125 "the project aimed to capacitate in scaling up the new potato cultivars…"	11

Once the case study dataset of 27 projects[14] (the combination of direct and indirect projects) was finalized all relevant IDRC documents were uploaded to NVIVO, a qualitative data analysis software, to begin the data analysis process. Documents included technical reports, project profiles, policy briefs, and IDRC media content, such as their 'Stories of Change' series. The case study dataset does not include content that was not provided by IDRC, such as academic publications arising from CIFSRF, or partner institution publications. This decision was made due to the sheer volume of data (as an applied research project, CIFSRF projects resulted in over 600 results in the IDRC database, 167 peer-reviewed

[14] Only documents in English were downloaded from IDRC (most have translated/ bilingual copies) unless an English equivalent could not be identified, then a French document was analyzed. This occurred only once with the project in Mali ID 106515.

publications and over 40 press releases [Abitbol et al., 2016]). In the case study dataset of 27 projects roughly 2000 pages of technical reports alone were reviewed.

A qualitative content analysis was used to analyze the dataset. Qualitative content analyses (QCA) take a systematic approach to data reduction through coding (Schreier, 2012). As per the steps required in a vigorous QCA, I created a concept-driven coding frame that reflected my research goals, with data-driven subcategories (Schreier, 2012). For example, as per Goal 2, I looked to identify the representation of animals, so my main hierarchical code was 'representation of animals in projects' followed by subcategories of 'imagery' – with further child codes such as 'dead animal', 'live animal', 'animal with child', and 'multiple animal species', spurred from encounters with the material. My main hierarchical codes included 'roles of animals', 'representation of animals', 'significance or impact of animals', and 'animal welfare and wellbeing'.

After the creation of the coding frame, I entered the 'pilot coding' phase in December 2022 where I practiced coding 3 technical reports. This pilot phase allowed me to become familiar with NVIVO, test out my concept-driven hierarchal codes and apply data-driven sub-codes that reflected my findings, reflect on data reliability, and become more familiar with the material. To do so I selected three very different projects to code as a measure of variability (ID 108122, ID 106512, ID 106342). I discussed the findings of this pilot phase with my supervisor before proceeding to the next stage to ensure validity and accuracy of the coding frame and coding process. If you are working without a coding partner, as was the case for my research, it is suggested that you recode your material after 10 days to check for reliability (Schreier, 2012), so this was performed at the end of December.

The full coding process took two months over January and February. During this time, I kept a vigorous 'coding journal' as well as well as individual 'project memos' where I reflected on what I was reading in addition to recording when I added new data-drive subcodes. For example, on January 4th at 2 PM I wrote "Added 'd1 animal death' code as I noticed a trend of practitioners acknowledging unintentional animal deaths and how they tried to mitigate them". When new codes were added I reviewed previously completed technical reports to see if the code could be applied to any material I had overlooked. Most of my codes looked to explore manifest meaning (taking what is being said literally as the meaning – for example, my code 'animal death' looked to show examples of animals dying but not the subjective interpretations of animal death. But I also addressed latent meaning, referring to the underlying symbolism or meaning that a word or phrased evoked, in my 'animal as…' code captured how animals were portrayed without the authors directly saying otherwise. This allowed me to address some hidden complexities that may have otherwise been overlooked. After coding was complete, I reviewed

and organized every code. Main takeaways were added to a findings document, then organized and written in Chapter 4 of this thesis.

Throughout the coding process I followed the steps clearly laid out in Martha Schreier's (Schreier, 2012) book *Qualitative Content Analysis in Practice* to ensure a thorough and accurate analysis of the CIFSRF case study. However, even when aiming to minimize faults in research, Schreier (2012) reminds researchers "it is best to remind yourself that there is no such thing as a perfect study" (p.200). Thus, this study that was performed to the best of my abilities with the support and resources provided to me.

3.2.4 Key-Informant Interviews

I conducted semi-structured key-informant interviews with researchers, development practitioners, and veterinarians who previously worked on any included CIFSRF project. Because this research was remote, and CIFSRF was completed in 2018, I was unable to interact with any animal involved in CIFSRF. So, I looked to speak with project-members who had. The purpose of the key-informant interviews was to provide high-level insight into the CIFSRF case study, as well as to address Objective 3 to understand the role of animal welfare in Canadian international development initiatives.

Each technical report analyzed in the Case Study contains the names of the authors of the reports. Through purposive sampling, I contacted the report authors of projects in the 'direct inclusion' category. There were usually multiple authors per report, so I began by contacting them one at a time based on their area of expertise (either development or animal-related). While their names and institutional links are included in the reports, their contact information is not. I then Google searched the individual's contact information and found them on their personal or institutional websites. When located, an interview invitation was sent to the individual by email. When I could not find the individual's contact information I would search LinkedIn and direct message the individual inviting them to participate in an interview. Through snowballing of report authors who were uninterested in participating, I was able to connect with other project contributors who were not report authors.

In total, I spoke with 7 individuals, all of whom had a doctorate degree - 3 of the individuals had educational backgrounds in veterinary sciences, 2 social sciences, and 2 health sciences. Due to CIFSRF's nature as an applied research initiative, 5 of the interviewees were affiliated with a research institute, while 2 interviewees were IDRC representatives. During the interviews, I asked participants about their connection to the CIFSRF project, project-specific questions I was seeking clarity on, animal-welfare observations in the project, and perspectives on animal welfare in their work beyond CIFSRF. The

interviews were 45 minutes long and took place over teleconferencing platforms (Zoom, Microsoft Teams, and WhatsApp). All participants consented to audio-recording. Recordings were not transcribed as the interviews were supplementary to the vigorous qualitative content performed on the CIFSRF case study. During the interviews I took high level notes and participant observation. Once complete, I reviewed the recordings and wrote key findings. Recordings were revisited to confirm statements. These findings supplement this entire research, but especially Chapter 4 and 5.

3.3 Methodological Limitations and Challenges

The most obvious limitation to my research, as an interdisciplinary student of animal geographies and development studies, is that I did not interact with a single *animal or human beneficiary*. While this limits the scope of my research, taking this approach enabled a high-level analysis of the powerful structure involved in the process (the government and development organizations) that may otherwise have been overlooked.

Initially, my research looked to investigate *food animals* in development. However, the more non-food animals I encountered in the CIFSRF case study the more I realized that my research would benefit including these animal perspectives. So, while my data inclusion criteria only included projects with food animals, my findings reflect the other creatures that were encountered. This means that non-food animals, such as insect pests, may have been missed in the 12 excluded projects.

CIFSRF is jointly funded by Global Affairs Canada and the International Development Research Centre. IDRC is a crown corporation meaning that they are not representative of the Canadian government in the same way GAC is. As well, CIFSRF was an applied research project so the types of projects aren't entirely reflective of the entire Canadian development scene (such as non-profits).

Technical reports provide a fantastic wealth of information, but they are often condensed with high-level knowledge that do not provide day-to-day project details. Therefore, they rarely show the intricacies of the relationships between animals, people, organization, and environment. Technical reports, while they follow IDRC's writing guidelines are written by multiple people and therefore in the coding process I kept in mind that the tone of the writer towards the animals in the projects may have not accurately represented the animal realities in the field. For this reason, interviews were added to supplement this perspective.

I encountered several challenges in *interview recruitment*. Firstly, some of the CIFSRF projects were completed nearly a decade ago, so people had moved jobs or felt like too much time had passed for them to speak accurately about the project. Secondly, I was commonly forwarded to animal scientists, veterinarians, and biologists. While I did wish to speak to some of these people, I was also

looking to speak with development practitioners about their animal perspectives – but they were hesitant to do so, referring me instead to the project's animal scientists. This is perhaps due to lack of expertise on animal-issues, especially when there were members of their research team dedicated to the topic. Finally, while I attempted to speak with people from a variety of different projects, there is an over-representation of interviewees who participated in projects in Africa (4), while 1 interviewee I spoke with had participated in a project in Asia, but I was unable to recruit anyone who participated in the South American project.

Chapter 4: Case Study Findings

This chapter details the findings from the qualitative content analysis of 27-animal projects in the case study of the Canadian International Food Security Research Fund (CIFSRF). This chapter responds to Objective Two, *to identify the actors, roles, and significance of food animals in a case study of the Canadian International Food Security Research Fund (CIFSRF)* in order to contextualize how animals are participating in Canadian international development initiatives. It begins the conversation into Objective 3, *to investigate the tensions and/or synergies that exist between international development and animal welfare paradigms,* by examining how animal welfare was both present and absent in CIFSRF projects.

Section one, *Animal Actors,* presents the types of animal species present in CIFSRF. I begin by reconfronting my term 'food animals', and how my animal-encounters in CIFSRF prompted me to explore the non-food animal actors and roles. Afterwards, I demonstrate which animal species are present in CIFSRF, as well as quantify the number of species. I then detail how animal actors are represented through a visualization of international development as a stage, and animal actors occupying the various roles of *Lead Actor, Supporting Actor,* and *Background Actor.* Section two, *Animal Roles,* documents the ways animals are enrolled in CIFSRF. I identify ten roles assigned to animals in the projects. I expand on each of these roles, demonstrating the characteristics and expected outcomes of the animals in the role.

Finally, section three, *Animal Welfare,* embraces the One Welfare framework to document where animal welfare was visible in CIFSRF, and where it was not. I also present findings from the key-informant interviews about how CIFSRF development practitioners are speaking and thinking about animal welfare.

4.1 Animal Actors

Initially, this project sought to investigate "food animals", which I defined as animals whose bodies or bodily productions are consumed by humans (like eggs, milk, honey). This definition provides space for animals like bees and fish who do not always fit into the categorization of "livestock", but who are also raised by humans with the intention of consuming them or their bodily products. With the term "food animals" in my methodological toolbox to untangle the *who* and *how* of animals in development, I embarked on a Qualitative Content Analysis of CIFSRF's technical reports and media content. However, I quickly discovered that this definition was not inclusive-enough of animal-life. "Food animals" failed to acknowledge the contribution of other animals in the projects, like the rabbits, rats, and fruit flies who were tested on, or pests like monkeys, intestinal worms, and mosquitos that challenged plant, human and animal-lives alike.

The further I dug, the more it became evident that these non-food animals were incredibly important to the stage of international development projects and their stories, likewise, just as important to share. Ignoring these animals – the insects, parasites, and lab animals - would go against the very aim of this research: to determine how animals are entangled in international development projects. To neglect these non-food creatures would not provide a holistic perspective on the different types of animals involved and would represent the age-old curse of the charismatic megafauna; shedding light on the large mammals and birds we share our lives more willingly with then the "ugly" and bothersome smaller creatures like mosquitos and intestinal parasites – all of whom are also in the Kingdom Animalia. So, as my research evolved, so too did my understanding of what it meant to be a non-human animal in development. My findings reflect this revelation. All non-human animals who appeared in the 27 CIFSRF project database were recorded to provide a more comprehensive understanding of which animal actors are present on the stage of international development. Creatures encountered in the projects were recorded if they were a member of the Kingdom Animalia, allowing space for both vertebrate and invertebrate animals.

To be included as an "animal actor", the project's technical report had to make explicitly clear the animal's participation through words or imagery. For example, "this project aimed at developing supplementary rations for dairy goats…" (IDRC, 2014, p. 4). In this case, goats are included in the project's mission statement, so their enrollment as animal actors in the project is indisputable. Animals that were not included in a project's mission but still contributed to the project were also included as animal actors. Such as the cows and zooplankton in Cambodia (ID 106928)[15]; "the project team trained households to add cow dung and green manure to ponds in order to promote the growth of zooplankton" (Talukder & Green, 2014, p. 25) which were also included. There are also, however, examples of animals in projects that were not included in the count of animal actors. These include:

- **Knowledge Collection**: when surveys were performed by the project to determine which types of animals were present in local communities. For example, in project 108126, "Based on a survey of 835 randomly selected smallholder farmers across Farm Shop's Counties of operation in…. farmers reported keeping pigs, rabbits, ducks, sheep, goats, and geese" (McKague et al., 2018, p. 12). These animals were not counted as no other evidence in the report suggests that they were involved in the project.

[15] Throughout this research, when I reference a specific CIFSRF project I usually willy provide IDRC's project identification number, which is the six digit number in brackets, for ease of traceability.

- **References to Prior Studies:** if a project referenced a prior study performed on an animal outside of the project, then this animal was not included.
- **Increased Human Consumption of Animals:** projects that recorded increased human consumption of animal products as an outcome of poverty alleviation programs. Such as in Cambodia (106928), where project interventions led to an increase of purchasing "high quality nutrient rich food items such as beef/pork" (Talukder & Green, 2014, p. 18).

Creating a list of animal actors proved to be more challenging than originally anticipated. Reasons include the following; firstly, only animals in the database of 27 projects were included, leaving out insect pests that may have been present in the 12 CIFSRF projects not included in the database. Secondly, phased projects were counted individually resulting in some animal actors being counted twice. However, this was necessary as there were cases of phased projects dropping or including new animals in the second phase - such as in Sri Lanka, where crabs were included in the first phase of the project (106342) and not in the second phase (107519). Thirdly, my categorization of animal actors is only as specific as how the reports described the animals. For example, if an aquaculture project wrote only about "fish" and not which species of fish were involved, then that is how I counted them (such as ID 106505). This led to the challenge of defining animal categories, as the reports varied in the language they employed to describe the animals in their projects, resulting in different levels of specificity in my own categorization. For example, three projects (108126, 107789, 107982) used the term 'poultry', but poultry, however, is a vague term referring to any domesticated bird kept for human consumption - including chicken, duck, turkey, goose, and guinea fowl.

When additional details were provided even once in a document, such as scientific or breed names, these animals were categorized under their more-specific names. For example, Table 3 demonstrates that goats were present in 5 projects; in 3 of the projects, they were described by the technical report authors simply as "goats", in project 106505 they were recorded as "local [Indian] breeds", and project 106512 provided breed-specific information (Toggenburg and Norwegian). If a more specific animal name was provided (scientific or breed), then those projects were not counted in the general name of the animals. Refer to Annex One for the entire list of animal actors and their corresponding project IDs.

Table 3

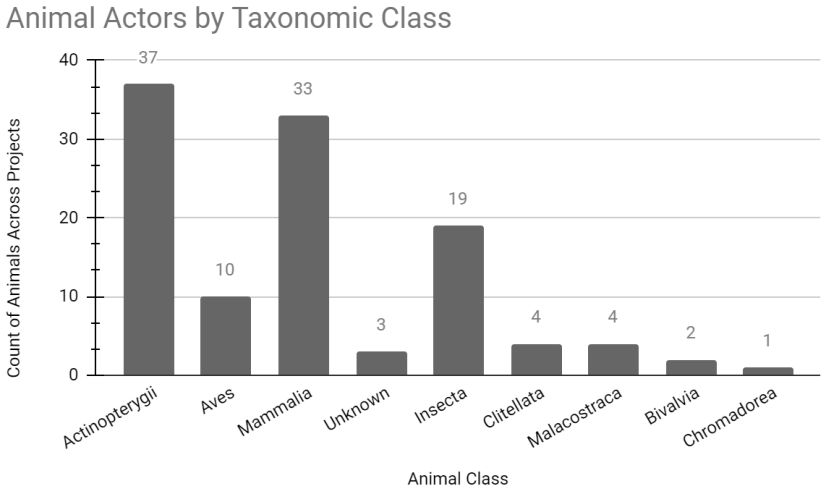
Projects where goats are present, including their more specific breeds

Animal Classification	Project ID
Goat	106525, 106930/107848
“Local goat breeds” -India	106505
Toggenburg (goat)	106512
Norwegian Breeds (goat)	106512

In total, 113 counts of animals were observed across the 27 projects, with 62 of these animals being unique animal-types – an average of 4.2 animal species per project. The most prevalent animal across all projects were fish (in the taxonomic class Actinopterygii), with a total of 25 species listed across 9 projects that practiced aquaculture, fishing, and lab testing (projects 106505, 106928/107982, 106342/107519, 106524/107985, 106931/107847). The high-level of fish participation is a result of mixed-fish pond approaches to backyard and community aquaculture (106928/107982), fishing projects, as well as nutritional testing on fish species, including in Canadian laboratories (such as 106524). As well, fish-centered projects were phased-up more than any other animal-centered project. While Malacostraca (shrimp and lobsters) and Bivalvia (oysters) were only found in two projects that also happened to have fish-centered components (106342/107519).

Figure 3

Animal Actors by Taxonomic Class



Mammals were the next most prevalent animal group, with 33 instances across 17 projects. This includes cattle, sheep, goat, and pigs – all of whom were often centered in the projects' aims and outcomes. These mammals were sold to increase household income (106515), their bodies eaten, tested on (106929), bred to improve genetics (106512), and their milk consumed (106512). Mammals included, but not central to project outcomes were predominately non-food animals, such as monkeys (106525), rats (106506), and donkeys (106510).

Most non-food animals recorded in the technical reports are invertebrate animals (such as zooplankton, earthworms, weevils). In total, 19 insect-types were recorded. Almost all insects were labelled in projects as pests, except for bees, whose participation was actively encouraged and monitored (106505, 106931/107847). Earthworms, while not insects, but in the class Clitellata, were also deemed beneficial critters (106505, 106931/107847). While parasites that inflict harm on animals were recorded across several projects (106342, 106525), only one project (106512) provided descriptors beyond 'parasite'; "gastrointestinal nematodes" are therefore the only one included because it is the only parasite whose participation was made obvious and is without a doubt an animal.

Birds (class Aves) were present 10 times across 9 projects. In 8 of these cases, birds were food-animals (poultry and chicken) centered in the project aims to increase human food-security. It can be inferred that most counts of poultry are actually chicken, but because this was not made explicitly clear they exist as two different animal counts. Non-food animal birds appeared in two projects (106510, 107984) as wild-bird pests threatening food crops.

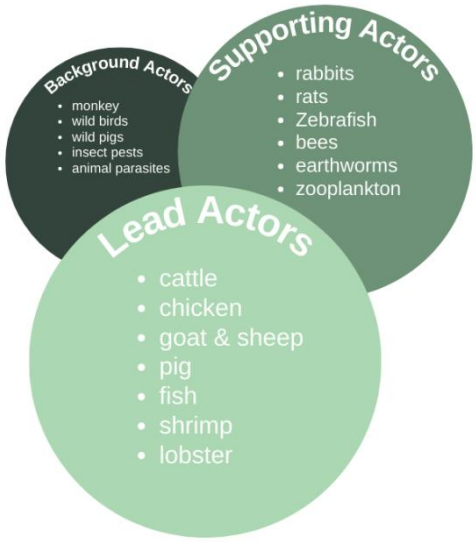
Lastly, 3 animals exist in the 'unknown' category in three projects (106928, 107982, 107983) This is because so little detail was provided about the animal, other than it being an animal that their Taxonomic class was impossible to determine. Such as project 107983, which stated "we conducted laboratory studies on laboratory animal models" without further details in the available reports about which animals were tested upon (Ayanwale et al., 2017). While in project 106928, where zooplankton are described, it was impossible to list their Taxonomic class, and therefore they too are counted in the unknown section despite evidence being provided as to their role. Outside this count, there are also 2 other 'unknown' animals but who were included in the Mammal count. These include a cart-pulling animal in project 106505 and milk-producing animals in 108122 – both of whom were decided to be mammals, and therefore not present in this count despite the limited amount of information provided on them.

4.1.1 Representation of Animal Actors

Now that we have established which animals were included and excluded from the count, and how many, we can now dive into how the animal actors were represented. As stated, the inclusion of the *more than food animals* in this project, allowed a more comprehensive understanding of who the animals actors are in Canadian international development initiatives. These findings unfurled rather visually: with Canadian international development as a stage, and the animals quite literally the actors – interconnected in the performance of animal-human relationships in international development initiatives. This section expands on how the different animals are represented in development through three tiers: *Lead Actors, Supporting Actors,* and *Background Actors.* Within these tiers, it is important to note that these are not rigid parts; animal species do move fluidly between each of the tiers.

Figure 2

Animal Actors identified in CIFSRF (not an exhaustive list)



Lead Actors

Lead actors represent the animals that are most visible and prominent in projects. These are the "food animals" of development projects: the fish, cattle, poultry, sheep, goats, and pigs. Lead actor animals have entire development projects centered on them – often relating to food security and global health projects. Predominantly livestock animals, lead animal actors typically have thousands of years of shared animal-human history through domestication. Therefore, the centering of livestock animals in development project follows the logical order that humans are closely connected to and rely upon

livestock animals which support human life. Across all CIFSRF documents, an NVIVO word frequency query reveals that goats were mentioned 464 times, cattle 291, sheep 244, and poultry 109 times.

Globally, the livestock industry is enormous, both on an industrial and subsistence-scale; with an estimated 22 billion livestock animals directly supporting the livelihoods and food security of over 1.3 billion humans (Robinson et al., 2014; World Bank, 2021). These animal realities and histories (local and global) are sometimes made evident in the CIFSRF, such as in 106512, where "Goats are an important component of the agricultural sector in Tanzania and are kept by small-scale farmers in rural areas for provision of meat, milk, skins and manure" (IDRC, 2014b).

Table 4

NVIVO Frequency Results of Lead Actor animals in CIFSRF projects.

Lead Actors	NVIVO Frequency Results
Fish	1255
Cattle[16]	219
Poultry[17]	109
Goat[18]	464
Sheep[19]	244
Aquaculture	873
Livestock	274
Vaccine	1063
Dairy[20]	358
Meat	60

But in the case of CIFSRF, with its 7 aquaculture projects, fish are actually the most represented lead-actors, with NVIVO word-frequency query of the technical reports finding fish mentioned 1255 times, and aquaculture 873. One species of fish, Paiche, is mentioned an additional 159 times alone (projects 106524/107885). Looking beyond CIFSRF, aquaculture is one of the fastest growing forms of human food production, with inland aquaculture experiencing a 575% increase from 1990-2020 (FAO, 2022). The Global Affairs Project Browser database (*Project Browser - Canada.Ca*, 2023) revels that since 2018 (the end of CIFSRF), the Canadian government has provided an additional funding $92 million in

[16] Search includes cattle, cow, and bovine.
[17] Search includes poultry, chicken, hen, cock, rooster.
[18] Search includes goat, ram, buckling, doeling, doe, buck
[19] Search includes sheep, ewe, lamb, bélier, brebis, agneau, agnelle, mouton (notice ram was not included, documents were predominately in French, so it was excluded to avoid double-counting goats).
[20] Search includes dairy, milk

funding to 7 more aquaculture and blue economy related development projects. Demonstrating that fish continue to be lead actors on the stage of Canadian international development.

Keeping lead actors alive long enough to serve human needs is always the goal. Lead actors are provided veterinary care, their care takers with animal husbandry classes, and their death avoided. Such as in project 106510, where vaccination saved chicken life:

> "Vaccination has increased bird survival rates not only within the flocks of the trainees, but also those of farmers reached through the learning and knowledge networks the trainees have built. A sample group of 31 trainees, male and female, vaccinated more than 18,000 chickens over a six-month period in 2013. In Kavati village, Makueni, farmers whose flocks were vaccinated achieved a near 100% survival rate despite an outbreak of Newcastle disease in the area. Neighbors who didn't vaccinate lost 75%-100% of their birds." (Brownhill, Pelletier, et al., 2014)

Lead actors are also more likely to be represented through imagery than animals outside of this category. Out of animal photographs provided in the technical reports and media posts, every single animal portrayed was a lead actor except in one instance (which were photos of laboratory animals in project 106931). Lead actor animal photos are the ones typically used in campaigns for the project, logos, and media posts. See Figure 4 for examples of lead animal actor photos.

Figure 4

CIFSRF Lead Actor Images

Note: Examples of Lead Actor animals represented through photos shared by IDRC about the projects (project IDs clockwise starting with upper left: 106510, 106929, 106524).

Supporting Actors

Next are the supporting actors; the animals who are not the main topic of the project but are nonetheless crucial to the success and performance of the project. Often these animal encounters are incorporated into the projects through direct human manipulation, meaning that they were introduced into the project to support the outcomes of the lead actors, or core project (if it was plant-based). This includes some lab-tested animals, such as project 107983 which tested on rats before hoping to move onto human testing (Ayanwale et al., 2017), as well as insects measured in biodiversity studies (106525).

Project 107789 was a plant-focused project looking to stop the spread of yellowing disease on coconut farms. Researchers on this project discovered that poultry manure applied to the base of the trees improved the trees resiliency to the disease (Rosete, Yaima A. et al., 2017). Poultry in this project are therefore the supporting actors; while they were not the main target of the project, they, more precisely their manure, were crucial to project outcomes.

Table 5

NVIVO Frequency Results of Supporting Actor Animals in CIFSRF Projects

Supporting Actors	NVIVO frequency Results
Rat	5
Rabbit	8
Zooplankton	1
Earthworm[21]	30
Bee	58

There are also supporting actors in animal-focused projects. Project 106928/107982 in Cambodia, which was aquaculture-focused, relied on two supporting actors. Firstly, households were taught to monitor zooplankton to feed the fish in their ponds. Secondly, the households were instructed to feed the zooplankton cow dung (Talukder & Green, 2014). Both the zooplankton and cows became entangled in this project and were necessary for its success and are therefore both considered supporting actors in this case.

Background Actors

One step further removed from the supporting actors are the background actors. These actors are comparable to the stage technicians of theatrical performance, creating the scene and changing the

[21] Search includes worm and vermi

environment. Like stage technicians, these background actors are not given the same recognition as the core or supporting actors, but they are also crucial to shaping the outcome of the performance.

Table 6

NVIVO Frequency Results of Background Animal Actors in CIFSRF Projects

Background Actors	NVIVO frequency Results
Monkey	1
Insect	46
Pest	81
Parasite	33

Unlike supporting actors, who are typically inserted into the project with human intention, background actors are animals that participate in the projects out of their own choice (knowingly or not), but their encounters are intercepted with measures to prevent or deter them. These animals are most often the pests and parasites of the projects, and in technical reports, these background actors are made most obvious in the "challenges" section, steering the project off course or in a new direction. Animal actors represented in this section include wild animal pests who damaged crops or ate core actor animals, such as snakehead fish (project 106928), monkeys (project 106525), wild pigs (project 106506), and wild birds (projects 106510, 107984). While parasites were rarely detailed, roundworms were documented (project 106512), and Anagrus nedotepae sp. n. (Hymenoptera: Mymaridae) which is an egg parasite of Nedotepa curta (project 107789) – both insect species.

4.2 Animal Roles

While the previous section identified which animals were present in CIFSRF, this section details *how* animals participated in the projects. I identified ten roles assigned to the animals in the projects. I expand on each of these roles, demonstrating the characteristics and expected outcomes of the animals in the role. These ten categories are not intended to be rigid definitions, rather as you will read below, I found quite the opposite: roles are quite fluid in nature, depending on factors such as animal species, project intention, or outcomes (positive and negative – changing the shape of projects, or halting them all together). I acknowledge the arbitrary and limiting nature of categorizing animals into ten tidy and easily defined roles. However, I see these ten categories as a tool that firstly, assisted me in thinking through the many, many roles of animals in development projects (Banda & Tanganyika, 2021 employed

similar categories), and secondly, because very little research exists on this topic, these roles can serve as a starting point for future research.[22]

Importantly, is the discussion of *participation* and *roles.* The animals in these projects did not sign-up or volunteer to participate in a multi-million-dollar Canadian-funded international development project. Animals cannot and do not consent to participate in development projects (Gillespie & Collard, 2015).[23] And while some animals have more agency in their participation than others, such as the wild monkey who chose to eat the grass being grown for sheep and goats in St. Kitts and Nevis (106525) (Phillip & Francis-Granderson, 2014), it does not negate the fact that they were not aware of the multi-national project they stepped into. So, while animals did in fact participate in the projects, I use the word *role* to describe their enrollment in the project. *Roles* refers to the space the animals occupy in the larger social network of the project; the expectations and social positions assigned and enforced on to them.

The roles of livestock in developing countries has been investigated by development studies scholars such as Herrero et al. (2013) who state that "recognising the different roles played by livestock in the developing and the developed world is essential to understand the impact of livestock on livelihoods, economic development and the environment" (p.3). As well as Liveness Jessica Banda and Jonathan Tanganyika (2021) who emphasize that both food animal and non-food animals embody complex and significant roles in development. Animal Studies scholars recognize that animals are not background fixtures, rather, they fulfil a multiplicity of complex roles in society. Charlotte E. Blattner, Kendra, and Will Kymlicka in their book *Animal Labour: A New Frontier of Interspecies Justice?* (2019) articulate that animal roles are connected to labour, with animals working to achieve human outcomes with little acknowledgement, protection, or compensation for their service. They caution that "animal labour cannot and should not be reduced to its purely descriptive content in a way that locks animals into their status as exploited beasts of burdens", instead, that nuanced attention be placed to the animal

[22] Categorizing animals into roles, as I have done in this section, can be critically analyzed by reflecting on my positionality: as a Canadian settler of Northwestern European descent who has been educated in neoliberal academic institutions. I reflect on this after coming across Birgit Boogaard's (2021) article after I had already completed this section. In this article, Boogaard critically engaged with a past goat-centered research project she participated on in Mozambique. She (2021) highlights that she categorized goat keeping into 13 categories, and how her perspectives at the time represented 'epistemic blindness', in that she too quickly framed her findings in a Western framework that overlooked Indigenous epistemologies. I comment here because I too see the restrictions in my neatly and orderly ten categories of animal roles. Inherently, the scope of this paper – looking at all animals in development projects everywhere – is broad, and consequently overlooks spatially and temporally-specific animal and human nuances that I encourage to continue to be engaged with in further research.

[23] Gillespie and Collard speak in regards to animal testing, but what they have to say is still relevant here.

labourers and their roles in order to "create, augment, and deepen human–animal relationships rooted in respect, rights, justice, solidarity, and mutual flourishing" (Blattner et al., 2019, p. 11).

This section heeds their caution by centering the animals in CIFSRF, and the work they are enrolled in, while highlighting the connections between animal-human relationships and outcomes. I define each of the ten roles, provide evidence as to where these roles take place, and provide insight into individual animal stories across the projects. I do so to demonstrate that while food animal actors play an integral part in the stage of development, their duty is assumed and placed on them, and they are therefore intertwined in the performance of development. Animals do not consent to participate in development projects, but the day-to-day decisions of animals emphasize that their roles are not static. They act with agency to create their own niches in the projects, but some animals have more agency than others – and this shines through in this section.

Role 1: Animal as Food

The overarching goal of CIFSRF was to improve global food security outcomes. The first animal role is thus the most direct link to how animals contribute to food security – by nourishing people with their bodies. Animals in this role were in projects with the goal of making meat more readily available to human households. This was accomplished by households raising animals which they would then kill and consume. Surprisingly only 3 projects[24] (out of 27) took this approach despite being the most direct way to increase human food security through animal-use. Projects include a mixed aquaculture, poultry and vegetable farming in Cambodia (106928 & 107982), and traditional crops and Indigenous chicken-rearing in Kenya (106510). Notice that both projects include a mixture of animal and plant-based targets (these are mixed farming systems).

Animals in this role include chickens and several species of fish. They are either born on-farm, acquired through the project, purchased, bartered for, or gifted. They are cared for, fed, housed, and could receive medical care. In each of the projects, the people tending to the animal may have previously raised the species prior to intervention, and in all the projects participants had the opportunity to partake in animal-care training, including how to slaughter the animals more humanely[25]. Ultimately, the animal's purpose in the project is to die to nourish the same households that upheld the conditions of life it once needed to survive.

[24] Technically 2 projects, but one project is phased, and thus counted separately
[25] Source: key-informant interview

Both the projects in Cambodia (106928 & 107982) and Kenya (106510) employed approaches that prioritized household hunger over the market (i.e. selling animals to make an income)[26]. These projects were also participatory in nature; in Cambodia, households were able to choose between a combination of vegetable farming, poultry-raising, and aquaculture. And in Kenya, the community selected chickens as the project's priority. This level of participatory action and community agency is interestingly most evident in these *Animal as Food* projects in comparison to other projects.

> "Other models emphasize production. Our model incorporates all the integrated aspects of rural livelihoods and farming systems….prioritizing household consumption first, sales second" (Brownhill, Pelletier, et al., 2014, p. 3).

However, even within *Animal as Food* projects animals occupied different roles. In Cambodia, only smaller fish species were intended to be consumed by the household, while larger fish were raised to be sold: "families generate income from surplus vegetables and selling large fish, while improving household diets by eating the small fish in the ponds" (Talukder & Green, 2014). And in the ponds, conditions were maintained to make life viable for *both* fish and another creature who potentially fits into the *Animal as Food* role: zooplankton.

> *Role Snapshot:* Zooplankton are a large group of microscopic animals that fish raised in aquaculture systems feed on (in addition to phytoplankton, which are not animals). They are also the only animals in the entirety of CIFSRF that were recorded as being intentionally fed to another non-human animal (fish). Zooplankton in Cambodia (106928) lived in human-made aquaculture ponds. Their ponds were supplied with cow and green manure for them to feed on. They grew, ate, reproduced, and swam about their small pond ecosystems. While the unfortunate ones were gobbled up by their fish neighbours.
>
> Like the fish and chickens in this role, zooplankton too occupy role 1 'animal to be fed', even though they didn't directly feed the human households. Rather, they fed another non-human animal; fish. However, like the fish and chicken in this role, the zooplankton also encountered the ultimate sacrifice this role inflicts; death. While zooplankton in the wild are also eaten by other animals, the zooplankton in this project lived in a manufactured ecosystem created by humans to benefit humans.

[26] In Cambodia – Homestead food Production approach, In Kenya - Primary (and Secondary) Participatory Agricultural Technology Evaluations

In all cases, the animals as food role represents a life-death paradigm. But unlike wild fish, zooplankton and birds, whose labour is directed towards self-sustenance, the animals in this role exist in what Blattner et al. (2019) refer to as 'continuous domination'. So, while humans care for and seek to sustain life in these animals, they also act with the violence of death – deciding which animals should be killed, and for what purpose to sustain human-life.[27]

Role 2: Animal to be Sold

Animals in this role are sold for the following reasons: 1) to be eaten by a human outside of the beneficiary household (animal may be dead or alive at the point of sale), or 2) to increase animal numbers at another household (such as the purchase of a new goat buck to contribute to genetic outcomes desired by people). In both cases, the process of being sold entangles the animal in market-based development approaches, cementing the animal as a commodity to be bought and sold to for human benefit. 11 CIFSRF projects had 'animal to be sold' components. Interestingly, out of the direct inclusion projects, only 5 projects did not have animals to be sold – and 4 of these were projects aimed at creating new livestock vaccines. Thus, the animal to be sold role is currently deeply entrenched in the development community as an avenue to address both social and economic issues, with the belief that entrepreneurs and the private sector can contribute to uplifting people out of poverty.

The rationale for these market-based approaches is that by increasing household income through the sale of animals (dead or alive), it allows for the household to purchase the foods they need to meet more diverse and nutritionally healthy diets, in addition to goods and services they may need to purchase (like school fees and clothing). In all cases an increased household income is always viewed as the determinant of project success, such as in Bolivia (107985), one of CIFSRF's most widely celebrated projects, where families that participated in aquaculture experienced a substantial income increase from $7,705 USD/year to 19,079 USD/year (Carolsfeld et al., 2018).

In market-based approaches, the animal's role is that of a commodity, an object to be bought and sold. And within that role, the animal to be sold is enshrined in a larger network of transactions and relationships. In Sri Lanka (106342 & 107519), this network can be explained through the example of the oyster aquaculture project:

> *Role Snapshot:* Oysters are salt-water mollusks. They are not traditionally eaten in Sri Lanka, so before this project these relationships did not exist. Over the duration of

[27] While these conversations are particularly true for factory farming though, it is important to remember that these projects are subsistence base – and while it may not be a life-death outcome for the people raising them, it does concern human quality of life.

> the project, the oysters spent their days living on a netted home in brackish waters, tended to by women of the neighboring communities. Fishing has greatly diminished in the area, and women do not participate regularly in the well-established and male-dominated shrimp-farming sectors. Oysters and women care for one another on these coasts. Once grown to size, the oysters are sold and part in different directions. The woman who raised them will make 1,500 LKR a month for her service. Some oysters will be transported to the tourist towns and eaten by visitors who view oysters as a luxury food. While others will travel further – to Thailand, China, or Saudi Arabia; partaking in export markets newly established by the project. The oysters are alive for these journeys and are only killed right before being served, or in the mouths and digestive tracks of the people who eat them.

Like oysters, other projects sold live animals to increase women's income. In Mali (106515), women raised rams to sell, and in Kenya (106510) women's groups came together to have greater community support and market leverage in selling chickens. On the other hand, fish were sold already dead, such as in Cambodia (106928 & 107982) and Bolivia (106524 & 107985). And in the Tanzanian dairy goat project (106512), smallholder farmers benefited from selling male kids, but as per the project contract, had to gift two female goats onto another new dairy farmer (IDRC, 2014b).

But there exists no monetary value in selling animals without a market. So, to sell animals, projects worked to research existing markets (106515) and create new markets to sell their animal commodities. In Bolivia (106524), "Market development pathways were pursued with 3 multi-day gastronomic events in urban centers of Cochabamba and Santa Cruz, and with fish fairs in rural regions" (Damme et al., 2014). With the effect of increasing local animal consumption "market availability of fish in Yapacani has grown dramatically, contributing to an increase in per capita fish consumption, from 3.8 kg per year (2008) to 5.6 kg per year (2014). Families who practice fish farming, previously among the most vulnerable, now consume more fish: nearly 42 kg per year" (Damme et al., 2014). Ultimately, the role of animal to be sold views animals as commodities, in a network of markets, sellers and buyers.

Role 3: Animal to be Fed

While all projects sought to feed their farm-raised animals, CIFSRF's applied-research approach allowed for a unique role to emerge, where projects sought new techniques to *best* feed animals. The rationale for improving animal feeding techniques includes the following: for people to be food secure (have access to diverse and nutritious diets), the animals that contribute to human diets must also be food secure. The role of animals here is to eat and grow to serve desired human outcomes.

7 projects contained animal-feeding components. With 3 of these projects being experimental and plant-based, searching for locally available, climate resilient food sources, including: In Tanzania (106512) the introduction of dairy goats to warm coastal regions (an experiment in itself) was paired with root crop farming innovations, in the Caribbean (106525) local grasses underwent vigorous testing for their ability to feed goats and sheep, and in Mali (106515) community leaf-fodder feeding practices were analyzed on their capacity to feed sheep. Within these projects, two distinct types of animal feeding projects emerge: animal-feeding and animal-fattening. The distinction between these feeding regiments is important because while their outcome may appear to be the same (to feed), their intention is different: animal feeding looks to keep the animals alive, while animal-fattening looks to prepare the animal for death (slaughter).

Animal-feeding seeks to ensure that animals meet their dietary needs. The role of animals in animal-feeding programs is to eat so that the animal can continue living. In these instances, while the animal may eventually be consumed, they have more value currently to humans while they are alive than they do dead. This is especially the case for female animals, like cows, does, and hens, who contribute to household food security by having offspring, producing milk, or laying eggs. The ability to produce offspring, milk and eggs is influenced by the quality and quantity of nutrition animals receive, and therefore animal-feeding projects look to productivity as a marker of success. A completely plant-based project in India (106314) which sought to increase grain production (for human consumption) found that the improved millet-growing techniques provided a surplus of straw (a by-product of millet), which could then be fed to local cows: “The increased straw yield is appreciated for animal feed (which benefits the family with increased dairy production)” (Orsat et al., 2013, p. 18). In this case, animal-feeding, which was an unintentional outcome, was measured in the cow’s ability to produce more milk. However, notice in this statement also that the emphasis in this outcome is placed on the family benefitting from the animal feed surplus, and not the cow.

Animal-fattening, on the other hand, refers to intensive feeding practices aimed at promoting rapid weight gain and improving meat quality over a short period of time. As a practice, animal-fattening has a long and global history (see Forth, 2015). It takes place on both small-holder farms, and large-scale industrial farming. While animal-fattening can be linked to improvements in quality and taste of the meat, the goal of the practice is to increase productivity and efficiency of meat production. However, studies have found that regions transitioning to the practice of animal-fattening results in worse animal welfare outcomes: animal life spans shorten, and the reduction of roaming space which falls in tandem with the practice limits natural behaviour (Aparicio Tovar & Vargas Giraldo, 2006).

Within CIFSRF, animal-fattening emerged across several projects. In the Caribbean (106525), diet supplementation for young sheep grow "three time faster than observed under on-farm conditions…This means that lambs weaned at 8 weeks of age, with an average body weight of 18 kg, could be marketed within 7 months rather than over 12 months, as is the currently accepted norm in St. Kitts" (Phillip & Francis-Granderson, 2014). And in Sri Lanka (106342) "the project's work with communities conducting lobster fishery showed considerable income promise to shift toward "fattening" of undersized animals and eventually to full culture…new policies were created to regulate harvest size and thus support a lobster fattening industry" (Stephen et al., 2013).

Role 4: Animal as Producers

This animal role was assigned to animals whose natural bodily functions produce goods, other than meat, which can be consumed or used by humans. These include offspring (animals as re-producers), eggs, milk, (wool – not in the case of these projects) honey, as well as by-products not intended for consumption, such as leather, manure, urine, and worm castings. The items the animals produce is shaped by species, genetics, health, environment, and the human society they engage with. These products can either be sold or consumed or used by households. In total, 11 projects enrolled animals as producers.

Animals in this role often serve other animal roles concurrently, such as the dairy goats in Tanzania (106512) in the 'animal to be fed role' to maximize dairy production, in Bolivia (106524 & 107985) fish in the 'animal to be eaten' role also had their skin made into leather and scale art, and chickens in Kenya (106510) were simultaneously egg-producers and meat depending on the animal's sex. The life of animal producers varies across species and locale, but let's explore the life of the Tanzanian (106512) dairy goats:

> *Role Snapshot*: The Toggenburg is a goat breed that originates from Switzerland, where it was selectively bred to suit the mountainous landscape and dairy-consuming society of the region. They are world-renowned for their ability to produce good quality milk, and lots of it. This world-recognition has brought the Toggenburg to nearly every continent, including Africa. Sometime in the past century, the Toggenburg arrived in Tanzania where they found home in the cool highland regions of the country. The success of this introduction encouraged the Nairobi-based International Livestock Research Institute to share the milk, and good fortune that the goats provided to their human households with communities in Tanzania. The goats were transported from Mgeta's cool highlands to the warm semi-arid

> project villages. Upon arrival, two female does each were paired off and arrived in their new home: a fenced-in enclosure which was thoroughly inspected and approved by the project. Every part of their life is monitored to ensure ultimate production and good health; their human caretakers received extensive training, used monitoring cards to record breeding activity, milk production, kid growth and disease treatment and incidents. They were fed foods such as sweet potato vine, cassava leaves, and expensive seed cakes. They received access to veterinary care whenever was required. The milk they made was shared between their offspring and the human household who drank or sold it.
>
> All the while, the Toggenburg goats never left their pens. A strict 'zero-grazing' policy was enforced – in contrast to the local goats who wander or are grazed by men in communal lands. Toggenburg goats are cared for by women at home. These goats are too valuable to wander, and their milk production too important to allow them to interbreed with local goats.

The goats in this project (106512) are intertwined in the process of alienation (from other goats), reproduction and production – as is the case for other *Animals as Producers* (Blattner et al., 2019). Animals as producers work (however natural as function) to perform reproductive labour duties to benefit human outcomes.

Role 5: Animals as Pests

What do monkeys, tapeworms, and snakehead fish all have in common? These animals were deemed pests in CIFSRF projects, actively deterred, and sometimes attacked and killed with vengeance. Animal pests include a diverse range of actors varying across class, such as birds, mammals (monkeys, rats and pigs), fish (snakehead), insects (bollworms and mosquitos), and invertebrates (including parasites such as gastrointestinal nematodes). The role of pests in the projects emerged as a paradox: as both a destructive force, and perhaps more surprisingly, as an enabler of creation.

Pests are a threat to the domesticated world (Arseneault & Collard, 2022). They challenge human and animal food sources, health, and desires, and as an extension to this – the goals and outcomes of development projects. As a destructor and disruptor, pests in CIFSRF projects challenged food animal productivity: in the Caribbean (106525) "Gastrointestinal parasite burden was demonstrated to be a serious constraint to sheep production" (Phillip & Francis-Granderson, 2014), pests were tied as the second largest challenge to farming after weather and climate issues (108126), and destroyed crops

in many projects (107984, 106525, 107789). Pests are actively deterred using strategies such as donkey dung and smoke (106510), solar fencing (106506), and insecticides (107984).

Nonetheless, CIFSRF projects also, unknowingly, demonstrate that pests can be enablers of creation. Projects attempt to solve food security problems and challenges, and because pests are both of these things in agriculture, entire projects are created, formulated, and adapted to work around the instinctual artistry of the pest. While speaking of bacteria and not animals, the lead researcher seeking to create a vaccine to combat contagious bovine pleuropneumonia, Andrew Potter, stated "Bugs are a lot smarter than we are. Anything with a generation time of 20 minutes is going to outsmart us…. Control is what we're after through these vaccines." (IDRC, 2013).

> *Role Spotlight:* Mosquitos kill more humans than any other animal (Kamerow & Graham, 2014). They have the incredible ability to transmit diseases between their animal-hosts. Rift Valley fever and lumpy skin disease are both caused by mosquitos and other blood-feeding insects. These are devasting livestock diseases, causing animals painful lesions, fevers, spontaneous abortions, and sometimes death – especially in young animals. A project in Southern Africa (106930 & 107848) created a vaccine to protect livestock (like cattle, sheep, and goats) from the grips of these insect-born sicknesses. These animal-species underwent vigorous, and sometimes deadly, testing to create a vaccine to protect future animals from the mosquito-borne diseases.
>
> So, while the mosquito (we assume unintentionally) enabled destruction, sickness and death through these diseases – the argument can be made that they also spurred the creation of this project and vaccine, the collaboration it required, and further entangled the animal testing subjects and the animals that benefited from the protection the vaccine enabled.

Similarly, in Cote D'Ivoire (107789) researchers and farmers came together to solve the problem of lethal yellowing disease in coconut trees. The culprit? Researchers suspect the insect Nedotepa curta Dimitriev. The solution? Poultry manure. The actions of the insect, just going about their day-to-day life had global impacts: causing economic destruction, the loss of plant life, but also uniting international researchers and institutions in collaborative work - in addition to entangling local chickens in the impacts. This pest has a lot of power – whether intentional or not.

Ultimately, pests are a nuisance to development and for this reason they also are a major recipient of development attention. Pests act with extreme power, their freewill and decisions move beyond the ropes and fences that confine domesticated food animals and allow them to be global forces that destroy and challenge, and shape and create projects.

Role 6: Animals as Test Subjects

Animal testing is rife with ethical, legal, and socio-cultural tensions and represents an entanglement of "science and care, human and animal, and subject and object" (Davies et al., 2018, p. 604). In CIFSRF, animals as test subjects[28] emerged as one of the most prevalent animal roles, with 12 projects partaking in the process. Within the projects, I identified two types of animal testing roles. The first being animals in laboratory testing, where animals are enrolled in scientific testing – this includes live animals, as well as dead animals whose bodies were tested upon. This category of testing tended to be more medical in nature, and therefore more invasive, i.e. the more traditional idea of what animal testing looks like. This includes projects such as 106506, where the bioavailability of various millet grains was tested on lab rats, and the results used to influence human diets; Boran, Zebu and Angus cattle in Kenya and Canada who were tested on to create a vaccine or Contagious Bovine Pleuropneumonia (106929 & 107849); and dead fish in Bolivia (106524 & 107985) and Cambodia (106928 & 107982) who had their bodies dried, powdered nutritional analysis performed.

The second type being what I refer to as experimental care testing. This form of testing sought to test out animal care techniques, such as housing and nutrition. This type of experimentation was observed in Cambodia (106928), where the team designed and tested pond water treatment techniques to improve water conditions for the fish; in the sheep fattening project in Mali (106515), and the goat feeding project in the Caribbean (106525).

While the scope of animal testing I employ is not conventional, it makes space for a wider scope of animals in research and their experiences. Ultimately, the unifying characteristic between both laboratory and experimental testing is risk; animal testing roles risk an animal's wellbeing, life, and outcomes. While some research places greater risk than others, risk exists on a spectrum. Risk is central to the role of animal testing and raises an ethical dilemma: is the risk of, or guaranteed harm committed to one animal justifiable if it contributes to future greater animal wellbeing? Regarding vaccine trial projects (106929, 106930, 107849, 107848), researchers on the projects calculated yes, the risk was

[28] Interestingly, *Animals as Tests Subjects* is the only role in CIFSRF that I have found to entangled Canadian animals (cattle and pigs), and transported dried fish powders for nutritional testing to Canadian universities partnered in the projects.

justifiable. In regards to the cost-benefit analysis that can play out when justifying risk in animal projects "Animal use and animal care are not separated but connected through capacities to recognize and respond to the suffering of another; what is inadequate in this conceptual formulation are the administrative techniques like cost (or more usually harm)/benefit analysis in accounting for this ethical relation" (Davies et al., 2018). In South Africa, the harm Rift Valley fever caused to cow life, their owners, the economy, and international trade justified invasive medical testing on a handful of cows.

While experimental care posed less severe outcomes, death still arrived. In Tanzania (106512), introducing dairy goats to the more humid-climatic regions was considered an experimental project looking to benefit farmers by increased access to milk. The risk is that researchers were unsure how the goats would handle the environmental changes. And while the project was at large deemed successful, goat deaths were a challenge for the project "mortality rate during the study period was 15.5% and the major causes of deaths were respiratory diseases, bloat and food poisoning" (IDRC, 2014b, p. 33). Deaths prompted additional human training to minimize it in the future.

Individual animal life, and death, over the course of the CIFSRF projects was however, best documented in the 'animal as test subject' role. In no other project can the lifetime of an individual animal be traced in the technical reports, except in the case of the Kenyan Vaccine project (106929 & 109849). So, let's do just that:

Figure 5

Clinical and Pathology Data from Efficacy Trial 1 (Project 106929)

Animal ID	Group	Fever ≥39.5°C	Clinical: cough, nasal discharge, dyspnea	Lung Lesions	Lesion Score	Pathology Index	*Mmm* culture
999	C	No	Yes	No	0	0	No

Note: Table portion retrieved from page 38 of the technical report for "Development of a Vaccine to Eradicate Contagious Bovine PleuroPneumonia in Africa" (2014), written by Dr. Andrew Potter, Dr. Volker Gerdts, Dr. Hezron Wesonga and Dr. Reuben Soi.

> *Role Spotlight:* Animal number 999 was relocated to Muguga station, a research facility operated by the Kenya Agricultural Research Institute just outside of Nairobi, sometime between 2012 and 2014. Because the project was looking to create a vaccine for Contagious bovine pleuropneumonia (CBPP) we know that they were a

> type of cattle, most likely Boran. No details are ever provided on their sex, but for simplicity I will refer to them in the feminine, and she was most likely around 2.5 years in age. Cow 999 was procured to participate in a vaccine trial. We do not know where she was born, nor what her life would have been like if she wasn't in this vaccine trial. Documents suggest cow 999 was well-cared for, and that the people who cared for her were well-trained. She was assigned into Group C, with 9 other cows in her cohort. She would have had her blood drawn multiple times during the study. When she received the vaccine prototype, she experienced no adverse side-effects. She was then exposed to CBPP. While she did not experience a fever, she did have clinical symptoms –a cough or nasal discharge. After some time, she died, or she may have been euthanized. In death, a necropsy was performed on her body to look for lesions on her lungs, and a culture was performed to identify the presence of Mycoplasma mycoides (the bacteria that causes CBPP). Neither were found. Does this mean she was healed and could have gone on to live her life? [29]

Cow 999's story (and of her peers) is remarkable because nowhere else is an individual animal's story visible. Why would a technical report include individual animal IDs? In this case it is because providing details allows for the study to be reputable and repeated. Technical report authors write differently – the vaccine trial projects were written by animal scientists first, not development practitioners. While the outcomes for some of the animals tested in this project are grim, deadly rather, the authors are truthful and upfront about the roles and harm caused, and there is value in that.

Role 7: Animals as Subjects of Care

Animals in the role of 'Animals as Subjects of Care' represent the animal-human dynamic of 'reciprocity' in food production and consumption (Gibbs, 2021). While this role may be seen as an aspect of all animal projects, this role represents projects who specifically impact animal-care methods or standards. Care is complex, and in food production, is intertwined with productivity and death – a dichotomy that represents the places where care may be violent (act of killing), lacking, missing altogether (Gibbs, 2021). Animals as subjects of care are tended to by humans. This can be both motive-based (such as food outcomes for humans or preventing zoonotic disease transmission), and appreciation-based (people love their animals).

[29] This section required some inferring but is accurate to the best of my abilities.

Across CIFSRF, 12 projects aimed to improve animal outcomes through some form of care, while an additional 6 projects indirectly cared for animals/worked to improve animal conditions. That is an incredible 18 projects total which employed animal-care components. Animal care takes many forms, such as the following: providing medical care (106342, 106510, 108126), animal husbandry training (106342, 106512, 106928), feeding and watering (106515, 106928, 106930), ensuring adequate housing (107791, 106512, 106510). While the above represent care to deter animal death, care can also take place entangled amongst the violence of death: slaughter practices were improved to be more humane in Kenya (106510), and animals suffering from severe illness in vaccine trials (107848) were euthanized to end suffering.

The role assigned to the healthy animal is to produce and contribute to the household's food security through their eggs, milk, meat, offspring. A healthier animal results in more of these things, while a sick animal less so, and an unintentionally dead animal is the ultimate loss. Across CIFSRF, while not directly stated, a One Health approach is most evident in this role, where preventative measures and response to animal health are noted as direct causal links to human, health, food safety and security, and global health and security.

Role Spotlight: Animal-focused training programming targeted topics such as proper feeding, housing, reproduction:

> "The farmers were trained on improved goat husbandry practices, including feeding system, good house, feeds and feeding, breeding, health management and record keeping. After the training, the farmers constructed improved goat houses using locally available materials" (IDRC, 2014b, p. 9) Project 106512.

> "Farm Shop has directly trained 26,578 farmers (52% women) on various aspects of agronomy and animal husbandry through a network of 59 village demonstration sites" (IDRC, 2019, p. 2) Project 108126.

> "More than 288 farmers and animal healthcare practitioners were directly trained in livestock care and vaccine use and thousands more were indirectly trained to use the vaccine via farmer's days in which information materials on correct vaccine use etc. were distributed" (IDRC, 2020, p. 2) Project 197848.

Role 8: Animals as Labourers

The role of animals as labourers was only directly mentioned once, in a project in Nepal (107791) that looked to replace animal labour (a cart-pulling animal) with machinery. The goal of this transition – from

animal to machinery – was not to lessen animal hardship and improve animal outcomes, but rather to reduce the drudgery of women (Pudasaini et al., 2018).

However, it could be argued that every animal included in CIFSRF's project intentions (all animals except pests and parasites), could also be considered animal labourers. Every single animal worked for the benefit of human outcomes. Such as the fish raised in aquaculture ponds in Cambodia (106928 & 107982) whose bodies lowered childhood stunting rates; the worms in India (106505) who turned household waste into compost to nourish gardens and helping to feed entire families; and the pigs (106930 & 107848) who were enrolled in vaccine testing to prevent the spread of African swine fever.

Role 9: Animals as Unrecognized

'Animals as unrecognized' represent the most invisible animals in development, where their discussion was left so vague that their participation could be easily overlooked or ignored altogether. Examples of this include project 108122, which looked to provide yoghurt to children in Tanzania. In this example, no context was ever provided about where the milk to make the yoghurt came from, or what animal the milk came from (goat or cow). In project 107983 a lab animal model was tested on, with no inkling as to what this animal could be. Project 106505 replaced a cart-pulling animal with machinery. And in project 107982, fish in aquaculture ponds were killed by a predator. By not identifying which animals impacted these projects, the message is clear that the role of these animals is unimportant to project outcomes, or that there was not enough room to include details on these animals.

Role 10: Animals as Relational Beings (the more than utility)

Within CIFSRF, snippets emerged here and there about the importance of animals beyond their productivity and outputs to the project. This role, 'animals as relational beings' demonstrates the relationships and interconnectedness of animals to each other, to humans, and to their environments beyond their 'utility'. Again, all animals occupy this role, but rarely were these roles officially documented or acknowledged. This section draws attention to 3 examples that emerge in the reports to provide evidence of more nuanced animal-human relationships that exist:

> *Role Snapshot 1:* Every year millions of animals, including camels, cattle, and sheep are slaughtered for ritual sacrifice to celebrate Eid al-Adha. In Mali, the holiday is referred to as Tabaski, and sheep are the animal of choice for the masses. Sheep in CIFSRF's Malian project (106515) were enrolled in an already existing century's old spiritual animal-human relationship – where male sheep are separated from their family herds at a young age, then transferred to a corral where they will be fattened then sold for the sacrifice, or to a family who will care for the ram until it is time for slaughter. Sheep are therefore the most prevalent livestock animal in peri-

urban areas, dominating the landscape due to their cultural and religious significance. Sheep have a long history in the Sahel region, capable of surviving the harsh climactic conditions. In this example, sheep are entangled in complex, gendered and spiritual relationships between humans, God, and the environment.

Role Snapshot 2: Phase 1 of the South African vaccine project (106930) engaged in a very nuanced discussion on the gendered relationships between livestock animals, animal health, gender, and society. They uncovered that livestock care is a designated male domain, and women face serious constraint in being accepted as farmers and animal healthcare providers due to societal taboos and norms. "Restrictions and fears about women's bodies and presence around kraals and pregnant cows previously affected women's abilities to engage in animal healthcare, as another (female) farmer confirms: There was a saying then that if a woman walk[s] between the animals when they are pregnant they are going to miscarry the calf, but I think now it's a little bit better. And then they didn't want us women to inject the cattle because if it dies they were going to blame you and say it is dead because of you…"(Babiuk & Wallace, 2014, p. 22). Their study revealed that these taboos have serious constraints on women's access to learning about and working with animals – both as farmers and in animal healthcare providers perception of women as being less capable.

Role Snapshot 3: Paiche were the central fish in the Bolivia Fishing and Aquaculture project (106524 & 107985). Paiche (Arapaima gigas) are massive freshwater fish, with adults weighing up to 200 kg. Paiche are listed on the Convention on International Trade of Endangered Species (CITES) as critically endangered in their native rivers in Brazil; but in Bolivia Paiche are an invasive species. They are voracious eaters and have caused ecosystem damage across Bolivia. The solution? To eat them! Because Paiche are new to the region, so too are peoples relationships to the fish. The project fostered a Paiche-fishing and eating industry, including organizing a 'Paiche Week' for organizations, restaurants, chefs, students, and families to try the fish and encourage national uptake in Paiche consumption. In Phase 2 Paiche meat was found to contain mercury, and while consumption was still encouraged, warnings were provided about limiting consumption to pregnant and breastfeeding mothers. This example highlights the many relationships Paiche have to their world; as victims of over-consumption in the Amazon leading to their endangered status, to hungry carnivores shaping and changing Bolivian waterways and

deemed ‘invasive’, to the plates of families across the country looking to feed their children, and finally as a carrier of heavy metals.

These 3 examples demonstrate that no animal roles are static. Their relationships to each other, the environment, and to humans and societal norms shape animal outcomes. This role represents that not-so-tidy aspect of categorizing animals in development into roles. Ultimately showcasing that an animal’s space and place impacts their relationships to each other, other animals, to people, and the environment.

4.3 Animal Welfare

So far, I have discussed which animals are present and how they are represented in project documentation, and the roles animals occupy in the projects. This section discusses findings to Objective 3, investigating the synergies and tensions that exist between development and animal welfare paradigms. I demonstrate where animal welfare is present in CIFSRF, and where it was absent. To determine what is considered animal welfare I lean into the Five Freedoms and One Welfare frameworks. This section shows how animal welfare is entangled in the daily acts of care and intimacy between the project animals and their humans.

Across all 27 CIFSRF projects, “animal welfare” only appeared in one project: Phase 2 of the Kenyan Contagious Bovine Pleuropneumonia project (ID 107849), where an “institutional animal welfare committee representative” was included in ‘animal trials’ (testing). Why would animal welfare be present here and in no other projects? Because animal testing for biomedical research is required to follow institutional requirements and national laws, including animal welfare standards in testing. At IDRC, all project grantees are required to receive ethics approval, including animal testing projects, and as per my meeting with IDRC officials:

> “We respect the (Canadian) Tri-council standards on research ethics. When working in developing countries, we ensure that the grantees are working with the ethical standards of their own institutions. Within of course, what is acceptable and recommended by Canada. And if we see that these standards do not meet the basic Tri-council standards, then we intervene and implement additional measures.” *IDRC Interview.*

And this was also confirmed when I spoke with an animal scientist who worked on the vaccine project located in South Africa (106930/107848), who stated that the research abided by ethics protocols, local

animal welfare laws, in addition to having on-site inspectors to ensure regulations were being upkept.[30] This researcher even stated that animals in testing scenarios received superior care in comparison to local animals; a combination of top-quality food with regular feedings, clean living environments, and access to medical care, which actually distort findings as "animals in labs have better health outcomes than in the field".

While the institutional application of 'animal welfare' was only evident in animal testing projects, aspects of animal welfare were, in fact, incorporated into many projects. To demonstrate this, let us look to Table 7 to recall the Five Freedoms. I will now extrapolate on how welfare is and is not present in CIFSRF projects as referenced in wording, photos, or confirmed by interviews as to the steps that were taken to meet the freedoms. I am not looking to see if animal welfare freedoms were upheld throughout the duration of the project, or for all species, but rather if it exists at all, and if not, were strategies implemented by the project to improve animal welfare?

Table 7

Relationship between One Welfare and Five Freedoms, and Provisions

Freedom	Provisions	One Welfare Connections
1. Freedom from hunger, thirst, and malnutrition	Ready access to fresh water and a diet to maintain full health and vigour	Provision of food and water to animals is key to secure their health and welfare, and to underpin human livelihoods.
2. Freedom from discomfort	Providing a suitable environment including shelter and a comfortable resting area	Environmental resources are connected to both humans and animals / Suitable accommodation for animals improved their coexistence with humans
3. Freedom from pain, injury, and disease	Prevention or rapid diagnosis and treatment	Improved animal welfare helps sustain a better immune system and underpin health livelihoods, having positive impacts on productivity, reduction of antimicrobial use or longer working lives / Animals sick and/or in pain may display unwanted behaviours which may negatively impact animal-human interactions and compromise welfare
4. Freedom from fear and distress	Ensuring conditions avoid mental suffering	Non-violent handling of animals fosters better human societies and helps prevent human violence and abuse

[30] There was one example, within the Kenyan vaccine project where they encountered a delay in receiving their permits from the Canadian Food Inspection Agency which resulted in the project transferring the trials (testing) from cattle in Canada to Kenya (Babiuk & Wallace, 2018) – prompting questions of how animal testing is sometimes exported to regions with lesser/different regulations.

5. Freedom to express normal behaviour	Providing sufficient space, proper facilities, and company of the animal's own kind	Animals free from behavioural disorders will have better relations with the humans they interact with

Note: Table data retrieved from Table 1 of One Welfare: A Framework to Improve Animal Welfare and Human Wellbeing (2018) page 11.

Freedom from hunger, thirst, and malnutrition: Nearly every animal-centered project in CIFSRF upheld the freedom from hunger and thirst. This was especially the case for animals in the *Animals to be fed* role, where entire CIFSRF projects researched mixed-crop livestock systems approach to feed animals nutritionally sound, and climate resilient foods. These include the sheep fattening project in Mali (106515), the dairy goat project in Tanzania (106512), and the goat fattening project in the Caribbean (106525). References to providing animals with water were less frequently mentioned, but was listed in the dairy goat project in Tanzania (106512). Examples of this freedom not being upheld were few, but once again, goats in the dairy goat project in Tanzania (106512) did die of starvation (though it may have been because of plastic bag impaction, and not lack of food). In this example, as mentioned earlier, the project saw further animal care training as a tool to mitigate future occurrences of this problem. The One Welfare connection to this Freedom states that the "provision of food and water to animals is key to secure their health and welfare, and to underpin human livelihoods", and all CIFSRF animal projects aligned with this statement – in seeking to improve food animal access to food and water – while upholding the connection between well-fed animals and their contributions to human wellbeing.

Freedom from discomfort: This freedom emphasizes the interconnection of environmental conditions and animal wellbeing, including proper access to shelter. For this freedom I evaluated which project referenced upholding good environmental conditions (shelters, pond water quality, etc.), of which 12 projects met this freedom in some capacity. Looking at the Cambodia Aquaculture project (106928/107982), they encountered an issue with water quality (turbidity) in the human-made backyard ponds which was impacting overall life conditions for the fish. In response, the project team successfully created a pond water treatment technique that addressed the issue, improving water quality for the fish once more. By ensuring vigorous environmental standards were upkept with the ponds, the project found "no significant adverse environmental impacts were observed as part of the fishpond component" allowing for people, fish, and the environment to reportedly exist in conjunction with one another. (Talukder & Green, 2014, p. 22). Meaning that this project too upheld the conditions for the One Welfare connection for this freedom, in that "Environmental resources are connected to both humans and animals / Suitable accommodation for animals improved their coexistence with humans".

Freedom from Pain, injury, and disease: this freedom is upheld if animals receive proper and efficient diagnosis and treatment for injuries or illnesses. Roughly 10 projects upheld this freedom, and they did so by providing animal health care training for disease identification, treatment, and prevention, as well as by directly providing medical care to animals. The Sri Lanka aquaculture project (106342/107519) presents an interesting example of upholding this freedom; where in-part the project focused on preventing the spread of shrimp diseases (white spot syndrome virus) by connecting farmers to outbreak alert systems, PCR tests to detect the disease, and implementing bio-security measures when the disease was found. While these steps did not treat shrimp suffering from the disease, the measures were successful in preventing the spread of the highly lethal disease. The project also improved living conditions and water quality all-around for the shrimp, partly responding to the One Welfare connection to this freedom in ensuring disease prevention to uphold productivity of the animals to enhance human livelihoods.

Freedom from fear and distress: This freedom, which addresses the mental state of the animals was scarcer in project documentation, but one example does exist. An animal scientist working on the Indigenous chickens' project in Kenya (106510) described during an interview that one of the welfare considerations taken into this project was 'more humane slaughter practices' of the chickens to prevent any additional pain of fear that the bird could endure. However, this is the only concrete example represented in this section.

Freedom to express normal behaviour: This freedom, emphasizes animals needs to express their natural behaviours, be in companionship with their own kind, and have sufficient space. This is another freedom that was challenging to identify in the CIFSRF projects. One could perhaps point to honeybees and earthworms in the projects as having sufficient freedom in the project in acting and moving with free will. While other projects such as the goat keeping in Tanzania (106512), where dairy goats are kept in enclosures unlike local goats, could be considered to not be upholding this freedom. However, the dairy goats did have companions, and the dairy goats appear to have been kept in pen systems prior to project interventions as well. So, this example represents how this freedom was partially upheld by the project.

Reflecting on these findings, we see that despite animal welfare not being directly addressed in the projects, three of the five Freedoms were well-established animal-care norms. Additionally, the One Welfare connections were also frequently upheld. While no evidence exists that a single project was able to address all five freedoms at once, I believe these are still promising findings considering just how

human-centric we have found development to be. Therefore, it appears that *to some degree, development interventions are interested in animal welfare.*

Evidence of interest for animal wellbeing and welfare are also present in CIFSRF, with projects demonstrating that people are interested in taking care of their animals. The Cambodia aquaculture project (106928/107982) found that retention rates (people staying in the project for the duration of the initiative) were higher when programs incorporated "some type of animal husbandry" (Green et al., 2018, p. 14). While another project (106930), found that more than half of livestock keepers requested training in understanding disease symptoms and vaccination practices. Moments of intimacy also shone through in projects; with intimacy referring to the social bonds that forms between animals and their people - the emotional, physical and spiritual connections. The sheep fattening project in Mali (106515), while looking to feed tree fodder to sheep reared by women, did not exist in isolation from the spiritual significance of the ram as a body of ritual sacrifice. There exists intimacy in the every day care for animals that hold such spiritual significance, even in the face of sacrifice, as demonstrated by Govindrajan (2018).

Regarding the key informant interviews, I learned from speaking about animal welfare to development practitioners that welfare is an uncomfortable subject. I observed a substantial shift in participants confidence in how they addressed my first questions about the animal actors and roles in their CIFSRF project in contrast to their responses on animal welfare. Often it was an extra pause, a moment to gather thoughts about how to best order their thinking to prepare me for the eventual "no, animal welfare was not considered in the design". For one participant in particular, their hesitancy was well-founded; as an animal researcher whose research involves animal testing, a past interview they had undergone about animal welfare standards was shared with the press as an exposé, garnering negative backlash about their research. This researcher expressed to me that while they do biomedical testing on animals, they began a career in veterinary research because "they've always loved animals," and their research allows them to "help improve the lives of animals…and indirectly the lives of people and farmers as well".

The individuals I spoke with, however, for the most part viewed animal welfare in a positive light. This is especially the case for participants with animal and veterinary sciences backgrounds. For example, one animal scientist told me that his training as a veterinarian has directly impacted how he approaches all animals in projects, emphasizing that welfare is about making animals "as comfortable as possible". His description of animal welfare aligned with the Five Freedoms, and he proudly explained how he was able to implement 4 of them in the project he was a part of. This included: first, teaching the

communities how to make supplementary chicken rations to ensure chickens would never be hungry, second, ensuring shelters were constructed to protect the birds from the weather and predation from mongooses and eagles, third, carers were taught how to medically assess, treat and vaccinate, and finally, he provided training on how to more humanely slaughter the birds (ie Freedoms 1-4).[31]

When asked about One Welfare, one interviewee, a One Health expert, had encountered the term before. On two cases, conversations about One Welfare prompted discussions about overall trends in development that they had witnessed across the lifetime of their careers. In particular, EcoHealth (which is a systems approach to ecological health), and One Health (a framework focused on preventing zoonotic disease transmission). With one participant stating: "One Health is one in a long line of approaches: sustainability, sustainable development, Ecosystem Health, Eco Health, Planetary Health – all of which try and converge knowledge to inform action", "it's the recognition for cross-sectoral collaboration to deal with the world's messy problems". While another participant stated that "a lot of the trends we see are not brand new. They just revisit different elements of the system and put some emphasis on some parts of the system rather than others."

This chapter presented the findings of the Qualitative Content Analysis performed on CIFSRF's project media and reports. In doing so, this chapter responded to Objective 2 by identifying the animal actors, their representation, and their roles in CIFSRF, as well as laid the groundwork to address Objective 3 by presenting how animal welfare was and was not present in the projects. Section 4.1, *Animal Actors,* demonstrated the vast prevalence and diversity of animals in CIFSRF, as well as presented the idea of the 'stage of development', where lead, supporting, and background animals exist on different scales of representation in the projects. Section 4.2, *Animal Roles,* identified ten roles that represent how animals participated in CIFSRF. These roles are not intended to be rigid categories, but rather jumping stones for which to continue researching the relationships that exist for animals enrolled in development projects. And finally, section 4.3, *Animal Welfare,* employed One Welfare and the Five Freedoms to determine how projects upheld or neglected animal welfare. I found that animal welfare is an uncomfortable and divisive topic, but ultimately found that people care about animals having good welfare in projects.

[31] Notably, this information was not included in the project's technical report. Meaning, that there were most definitely other moments where welfare considerations were taken into account in other projects.

Chapter 5: Discussion

In this chapter, I unite the findings from my research – the historical context of animals in Canadian international development, the CIFSRF case study, and key informant interviews to respond to objective 2 and 3. In particular, this chapter responds to Objective 2's aim in identifying the significance of food animals, and Objective 3 by investigating the tensions and synergies that exist between international development and animal welfare paradigms.

To do so, this chapter presents two sections. The first of which, *The Animal Changemaker,* addresses the significance of animals in development. It demonstrates how animals are enrolled as changemakers, agents of positive change in projects, providing tangible and improved life outcomes to the participating families in the projects, including improved gender outcomes, childhood nutrition, and family incomes. Even animals can benefit, with improved access to veterinary care and life conditions. However, being a changemaker entangles food animals in two unique challenges in development. Firstly, animals become embroiled in development's attention to norm change to improve human conditions. I explore the significance of food animals in this process; as bodies of intervention, layered in assumptions and biases as to how animal-human relationships should look in development initiatives. Secondly, these altered animal-human relationships focus on the productivity and production capabilities of the animal, effectively entrenching the animal as machines in the process and justifying harm.

The second section, *Animal Welfare and Development* expands on the findings of animal welfare in Chapter 4, to envision the possibility of including animal welfare in development practice. I present three tensions I encountered in incorporating animal welfare paradigms in development, namely: questioning if development could engage with animals and their welfare; whose interpretation of animal welfare should be considered, addressing that while animal welfare is a science, cultural applications and interpretations exist; and finally, which animals would be included in animal welfare, denoting the layers of human exceptionalism and specism. Afterwards, I present three synergies that the inclusion of animals and their welfare in development could present, including that animal welfare considerations may already be taking place; heightened interest in animal issues in response to COVID19; and present that One Welfare shows a promising future of animal-inclusion in development initiatives.

5.1 The Animal Changemaker

"Changemaker" denotes an individual (typically a human) who aspires to improve life for others, often through knowledge-based, creative, and collaborative action. A Google search of Changemakers presents people like environmental activist Greta Thunberg, or education activist Malala Yousafzai.

Changemaker is a hip word in social justice circles, and almost always "considered normatively positive" and collectively-oriented (Bandinelli & Arvidsson, 2013). It can be both a self-imposed title used by professionals and social media stars alike to brand themselves as "do-gooders", as well as a title or recognition bestowed upon an individual for achieving social change; as is the case for Greta and Malala. But layered within the "socially engaged goals of social movements", Changemaker status is tied to neoliberalism's productivity and profit orientated approach (Bandinelli & Arvidsson, 2013).

So, if animals are ignored in development, as I have stated throughout this research, how can they also be changemakers? Animals are enrolled into development, and they do not brand themselves as changemakers, nor are they individually recognized with prizes or titles for their accomplishments by the initiatives. They are, however, viewed by development as *collective makers-of-change*, capable of providing improved and better life outcomes for the human families and communities who rely on them. Findings Chapter 4 demonstrated that a wide variety of animals actors are present across development projects, even in places and projects you wouldn't expect them to be. Their sheer prevalence, and the vastly varied roles they embody, demonstrate that development truly does see animals as pertinent and necessary to human wellbeing and in shaping positive global human and environmental outcomes.

Leading to the first point demonstrating that development views animals as changemakers (i.e. makers of change): *development is very aware that animals are crucial to global livelihoods and human wellbeing, especially to small-holder farmers and fishing communities in the Global South.* The development community knows that the world's poorest people are more likely to live lives closely entangled with animals, and rely on them for personal subsistence, transportation, employment, and incomes (Banda & Tanganyika, 2021), which partially explains why animals have been centered in projects since the conception of poverty-focused development assistance interventions.[32] Current statistics continue to reflect this relationship; according to the International Fund for Agricultural Development, a UN agency, "livestock contribute to the farming operations of more than 800 million

[32] Other reasons animals are employed in developments can include (not exhaustive): the *issue/challenge* of 'low productivity', which is viewed as a cause of food insecurity and poverty, is also viewed as a solvable challenge in the global development community. The transfer of knowledge, technologies, and animal health care mark easily measured inputs and outcomes to improve the amount of food and income available to people. Secondly, development, as an industry, does not exist in a vacuum and builds on previous initiatives. As we learned in Canada's history of development, food animal projects have targeted animals as intervention points since the very beginning of Canada's engagement in the industry. Feeding the world's population through animal-agriculture projects is a tried-and-true point of intervention. And lastly, when local institutions are engaged in participatory project creation, such as in CIFSRF, animal projects are implemented because it reflects local interests: 2 of the CIFSRF project leaders I interviewed stated that animals were incorporated in the projects because local organizations viewed them as important points of intervention.

poor smallholders" (IFAD, 2023), and small-scale farms produce 80% of all food consumed in Asia and sub-Saharan Africa (FAO, 2015). Animals are therefore seen as integral to development interventions of small-holder farms and fishing in the Global South. While looking backwards to Canada's historical development-oriented documents we find phrases such as "protein is the building block of life, and millions of people throughout the world *depend* on fish" (Fisheries and Oceans Canada, 1984, p. 4). Additionally, I have found that some (nonetheless, not all) development projects do emphasize the significance of animal-human relationships within these interventions. Looking at Table 8, we can see the emphasis that three development practitioners have placed on the meaning of animals: with strongly chosen words describing the significance of the animal-human connection as "integral", of "paramount importance", and "part of our life". Demonstrating both the significance of animals for human livelihoods (such as through the example of mixed farming methods, and reference to their roles in diets and the economy), *but also the significance of animals beyond human livelihoods* (the social and cultural impacts). And while development initiatives containing animal interventions predominately center human outcomes, this demonstrates some awareness that animals are intrinsically interlaced in the social fabrics of the people who care for them, and the people they care for (Banda & Tanganyika, 2021).

Table 8

Animal Significance Quotes

Origin	Quote
IDRC Workshop Report (Mangurkar & Joshi, 1994)	"Livestock form an **integral part** of small holder mixed farming systems in developing countries."
CIFSRF Technical Report (IDRC, 2014a, p. 1) Project ID 106515	"In Mali, sheep are of **paramount importance**. Inseparable from customary and religious ceremonies, they play an essential role in diets, the economy, and social and cultural aspects." *
CIFSRF Key-Informant interview	"Chickens are **part of our life** in Kenya, our project only added value to what they are already doing"

* *Quote translated from French*

Secondly, *animals are viewed by development as changemakers because animal-centered interventions can and do result in beneficial life outcomes for people and animals* (i.e., animals as maker-of-change for human and animal outcomes). Looking to the CIFSRF case study, several projects demonstrate how animals are positioned as changemakers capable of improving both animal and human outcomes (see Table 9). The non-animal centred CIFSRF project in Nepal (ID 107791), which built improved livestock shelters found that both animals living in the shelters and the women tending to the

animals had more sanitary and healthy conditions to live and work in. The Indigenous chicken (ID 106510) project in Kenya's vaccination training program saved the lives of chickens from Newcastle disease, while improving women farmer's social network connections and household incomes. Animal care training programs and improved access to veterinary care shine as examples improving animal outcomes across CIFSRF, such as in the Farm Shop Kenya (ID 108126) project, which improved both animal health outcomes. Looking at human-centric outcomes, CIFSRF projects with animals did have positive outcomes, such as in Cambodia (107982) where 72% of project households were identified as food secure by the end of the project (thanks to a combination of fish, chickens, and vegetables); and in Bolivia (107985) 84% of fish farmers reported being satisfied with adopting aquaculture, and gross average income increased by 148%. In contrast to these positive findings exists the reminder that Ashley et al. (1999) and Wanyoike and Baker (2013) found that at-large animal-centred projects were not 'successful'. Of course, the purpose of my research is not to say *if* animal projects are successful in improving human outcomes, rather these CIFSRF examples demonstrate that at least moments of success in improving human and animal life outcomes exist in this process, demonstrating animals are makers-of-positive-change in project interventions.[33]

Table 9

Positive Project Outcomes – Some mutually beneficial, some human centric.

CIFSRF Project ID	Examples of Positive Project Outcomes
CIFSRF Technical Report ID 107791	"Farmers notice **less animal disease, women have cleaner day-to-day conditions**, and manure quality has improved" (Pudasaini et al., 2018, p. 15)
CIFSRF Technical Report ID 106510	**"Vaccination has increased bird survival rates** not only within the flocks of the trainees, but **also** those of farmers reached through the **learning and knowledge networks** the trainees have built" (Brownhill, Bukania, et al., 2014).
CIFSRF Technical Report Project ID 107982	"Ultimately by the end of the project, **72% of households were considered 'food secure**'" (Green et al., 2018, p. 24)

[33] At least in the short-term. Of the interviewees I spoke with, only 2 were able to answer my questions about the long-term impacts of the projects to today, and both were in-country experts and not the Canadian academic partners on the projects. The animal sciences team lead on the dairy goat project in Tanzania (106512) was able to confirm that the introduction of dairy goats to the warm coastal regions is considered a success to today, in that they continue to sees the dairy goats in the countryside (meaning that they have kept their "high value status" and never fully interbred with local goat breeds), numbers of the dairy goats have increased, as has demand (people continue to contact Sokoine University of Agriculture [the partner research organization of the project] asking for their own dairy goats as they see the benefits their community members with dairy goats have experienced).

CIFSRF Technical Report Project ID 107985	"Approximately 84% of the fish farmers surveyed in workshops were **satisfied or very satisfied** that they have incorporated aquaculture in their livelihood strategy… 2018, gross average income had risen to $19,079 USD, an **increase of 148%**" (Carolsfeld et al., 2018, p. 16).

5.1.1 Animals as Agents of Social Change

Thirdly, *animals are social changemakers in development,* capable of spurring and challenging local socio-cultural as well as larger institutional social norm change. By changing the small day-to-day practices of farmers and fishers, or the larger governance strategies of local institutions, development assistance directly impacts both immediate human behavior change, and larger societal norm changes to improve human outcomes. Within this process, animals are enrolled in the political act of changing human social norms, in addition to having their own social norms impacted. Social norm change is evident in almost every development project I encountered; and it played out as an interruption to what animal and human life looked like before interventions, and how it was expected to look as a result of the intervention. To demonstrate animals as social changemakers, let's explore the following examples: gender, human nutrition, animal care, and governance.

Gender: Currently, the international community, and especially Canada (through their Feminist International Assistance Policy [FIAP]), sees gender as an important lens of analysis and place of intervention in development initiatives to foster meaningful and sustainable global change. Gender mainstreaming in development addresses topics such as women's access to education, financial liberty, and political inclusion. Within the process of development, scholars and practitioners have acknowledged the gendered impacts of animal-human relationships; where cultural norms shape animal responsibilities and ownership: with women more likely to engage in relationships with 'lower-value' animals (such as chickens) which are sold in informal markets; while men are more likely to engage in 'higher-revenue' animal sales (like cattle) in formal markets (Banda & Tanganyika, 2021; A. J. Hovorka, 2012; Njuki et al., 2013; Patel et al., 2016; Rota & Sperandini, 2010). The CIFSRF South African Vaccine project (106929) describes the role of women as the following:

> "Women are powerful but often neglected agents of change, and their leadership is critical: they play a significant role in decision-making within households, including decision-making about animal care, the use of livestock farming by-products and household food security. As key actors in the agricultural sector, women play a vital role in addressing and leading efforts to improve local economic growth by farming with

livestock and improving livestock health, thereby contributing to household food security" (Reddy et al., 2015).

Gender mainstreaming in development initiatives looks to transform existing gender norms, to make spaces more equal and equitable for women and girls. CIFSRF employed "gender transformative approaches to agriculture to address the root causes of inequalities" (IDRC, 2018a, p. 13). Which translates to a wealth of research into existing gendered animal-human examples across CIFSRF projects; every project provided a gendered lens of analysis and implementation. For example, the livestock vaccine project in South Africa (106930), even though it was predominately focused on lab-based animal research, performed an incredibly rich gender study investigating the experiences of women farmers and animal health care providers and the hurdles they face in providing medical care to their animals. They uncovered layers of social biases surrounding women's ability to care for animals: "Animal health practitioners express frustration when having to deal with female farmers: 'They know less [...] With livestock they don't know much [...] when you find a woman that is doing farming you know you have to do everything even if you can explain to her but they don't have those guts to assist'" (Babiuk & Wallace, 2014, p. 23).

Animals in CIFSRF were agents of gendered social norm change (see Table 10), and this was intentional. Firstly, the introduction of new animal-women relationships through industries not already established socially as 'male-domains' provided women with decision-making and income-increasing opportunities; such was the case with the introduction of Oyster farming for women in Sri Lanka (while men farmed shrimp) (106342/107519). Secondly, gendered social change has transformed animal care roles: "In the past Mr. Sokha had lots of free time, unlike his wife, but now he helps with more of the housework, the home garden and the fishpond. Although there remain distinct gender roles, the work is much more equitably divided now" (UBC, n.d.). Thirdly, animals transformed individual women's sense of self, such as in Bolivia where fish farmers began to feel confident in their ability to provide for their families by selling fish and "now proudly consider themselves 'businesswomen'" (Carolsfeld et al., 2018, p. 4). While at least one CIFRSRF project lead, responsible for project design, stated that the overarching goal of their project was to transform social norms through goat ownership to improve women's socio-economic standing.

Table 10

CIFSRF Quotes demonstrating animals as gender changemakers.

Source	Animals as Gender Changemakers

CIFSRF Project Story ID 106512	"Since we started keeping goats my husband and my children take turns in collecting water for them. Last week I came down with malaria and **my husband cleaned the barn, fed the goats** and brought water not only for the goats but also for home use - Tabia Mapya" (Lekule et al., 2014).
CIFSRF Technical Report 106342	"…sectors that are new or emerging, such as bivalve (oyster, mussel) aquaculture in coastal Sri Lanka, can **provide more space** to develop in a gender equitable manner because the activity has **no prior association with gender-defined roles.**
CIFSRF Technical Report 106254	"…the farmers themselves, who now **proudly consider themselves 'businesswomen**'"

Nutrition and Food Culture: CIFSRF demonstrated that animals are viewed in development as agents of social change in shaping and transforming human diets. As a food security initiative, projects pushed to change local diets with the goal of improving food security, diversifying diets, and making climate appropriate food choices (see Table 8). This was most obvious in the Bolivian aquaculture project's (106524/107985) push to transform Paiche fish into a culturally acceptable and desirable food. Before the project's arrival, Paiche were fished by Indigenous communities and eaten in soups for breakfast. The project sought to change perceptions of Paiche from low-value to desirable and profitable. The project went so far to transform social norms surrounding eating Paiche that they created a cookbook (which was promoted on television and radio shows, reaching 40,000 people), organized "five major events promoting fish consumption, with significant impact", including a "Paiche Festival", hosted open houses for university students, and fish fairs which they said to be a "very effective method for promoting fish consumption" (Carolsfeld et al., 2018, p. 20). This project demonstrates the extraordinary efforts projects go to change human food norms – creating entire industries around animals that they believe should be eaten, and creating markets and demands to support the creation of the fishing industry behind it. As a reminder, the Paiche fish is considered endangered in its home territory in the Amazon, but is invasive in Bolivia, further entangling the Paiche and its body in layers of human and environmental politics. And when people were not interested in eating dried fish powders, the project stated that "more work is required to promote cultural acceptance of this new product in Bolivia"(Damme et al., 2014, p. 1). This project was selected by IDRC to be phased, allowing it to reach more people, and showing how success in changing cultural food norms (in this case the creation of a newly acceptable food), was viewed as a positive outcome.

Table 8

CIFSRF Quotes demonstrating animals as agents of human nutrition changemakers.

CIFSRF Project ID	Social Norm Change – Animal Relationships/ Food
CIFSRF Technical Report 106928	"Women farmers in the intervention group were **highly accepting** of the small fish consumption but our qualitative research, including the gender analysis, **uncovered concerns about small fish for young children** (e.g. due to small bones and risk of choking). The project promoted three different types of micronutrient-rich small fish for household consumption, along with **behaviour change communication** and simple recipes targeting young children." (Talukder & Green, 2014, p. 26)
CIFSRF Project Story 106512	"I drink goat's milk although not every day. At the beginning **I did not like its taste because I was not used to i**t. But now I take it with tea twice per week before I go to school." (Lekule et al., 2014)
CIFSRF Technical Report 106512	"There is also a **general change in the mind-set of the farmers about consuming goat milk**… Both men and women in Ihanda and Masinyeti in Kongwa district reported that they see greater benefits in milk consumption by their children than in selling the milk" (IDRC, 2014b, p. 17).

Animal Care: Transforming animal care was also very visible across projects, in particular the emphasis on *improving* animal care (husbandry) (see Table 9). As an example of this, let's think back to the Tanzanian dairy goat project again (106512), where participants of the project were given two dairy goats that had to be kept in enclosures, unlike local goats who are tied, herded, or free wandering. This required families, in particular the women of the household, to change their day-to-day relationships with goats; providing them with food such as cassava tops and sweet potato vines, ultimately increasing the requirement of care for the dairy goats in contrast to their free-grazing counterparts. This process required changing human-goat relationships, the expectations of the duty of care for goats, and the outcome of dairy-goat keeping (milk) – ultimately transforming the women goat keeper's individual behaviour (by adapting her daily schedule to have time to feed and water the goats, as an example), and challenged existing social norms of how goats in Tanzania can and should be cared for. While the Toggenburg and Norwegian goat breeds in the project may have existed in similar care-systems in the highlands that they lived in prior to the project, some new dairy goat carers struggled with the newly introduced style of caring for the higher-need goats. With the project finding that the amount of goat

deaths became an issue, with 25% of all kids (baby goats) dying: "some of the causes of death such as excessive eating of cassava leaves and insecticide-treated maize, plastic bag impaction and starvation could have been prevented if the farmers adhered to best management practices for dairy goats. This underlines the need for more training of the farmers on improved animal husbandry practices and health care" (IDRC, 2014b, p. 10). Training is a form of knowledge acquisition, but it is also a tool to change social norms and behaviour, and in the case of the Tanzanian project, also impacted local non-dairy goats; "Farmers adopted strategies of managing goats (e.g., providing supplementary feeds and routine control of diseases) and these have been extended to local breeds" (IDRC, 2014b, p. 17).

Table 9

CIFSRF Quotes demonstrating social norm change regarding animal care

CIFSRF Project ID	Social Norm Change – Animal Relationships/ Food
CIFSRF Technical Report 106512	"New housing, feeding, health, milking and breeding strategies for the dairy goats have been widely adopted. **Farmers adopted strategies** of managing goats (e.g. providing supplementary feeds and routine control of diseases) and these have been **extended to local breeds.**" (IDRC, 2014, p. 17)
CIFSRF Technical Report 106928	"In Cambodia, **farmers traditionally do not provide feed to fish**, and one of the major initial constraints for the project has been the lack of locally produced high quality fish feed." (Talukder & Green, 2014, p. 26)
CIFSRF Project Story 106512	"I drink goat's milk although not every day. At the beginning **I did not like its taste** because I was not used to it. But now I take it with tea twice per week before I go to school" (Lekule et al., 2014).

Policy and Governance: Thinking larger, animals are also entangled as changemakers in institutional transformation that will long outlast the conclusion of CIFSRF, especially in the case of fishing and aquaculture. Looking once again to the Bolivian project (106524/107985), national policy change was engrained in the project's very mission, where alongside local actors the project assisted in the enactment of Law (Nº 938) on Sustainable Fisheries and Aquaculture which "regulate(s) and plan(s) the fishing and fish farming activities in Bolivia. The norms regulate the use of Paiche for environmental control purposes in indigenous territories and protected areas and considers the importation of non-native species for fish culture" while simultaneously also providing legal recognition to women as fishers, and additionally, June 29th was declared "National Fisher's Day" (Rainville, 2018, p. 22). At the time of

the project, “Bolivia (was) in an active period of governance transformation, including defining public responsibility for fishing and aquaculture” (Carolsfeld et al., 2018, p. 23). This was also the case in Cambodia, where the Government’s Fisheries Administration was "*intimately* involved through both phases of the project, [and] they have already taken steps to incorporate our poly-culture model into their next five-year national fisheries strategy” (Green et al., 2018, p. 22). Similarly, in Sri Lanka, for lobsters “new policies were created to regulate harvest size and thus support a lobster fattening industry” (Stephen et al., 2013, p. 23). Governance transformation was prevalent across the aquaculture projects, and this makes sense: CIFSRF viewed engaging policy makers as “essential to gains in productivity” (IDRC, 2018a, p. 27).

These examples demonstrate that animals are deployed as changemakers in development. They are agents of development’s social norm change endeavors, both at the smaller scale of individual behaviour change, to changing larger social norms, policies, and governance systems. And while positive change for humans and animals can and did arise from these changes, it’s important to take a critical perspective on the entanglement of animals as *agents* of social change in development. Development’s enrollment of animals as changemakers is not innocent. Rather, it carries layers of assumptions about how animals should be engaged with, which animals, and by who. I think to Birgit K. Boogaard’s (2021) work investigating a development project in Mozambique centering goats and the presence of *epistemic injustice,* in which Indigenous and local knowledges and agency are undermined by the project and supplanted by ‘better’ foreign knowledge.[34] She articulates that the manner in which the West engages in development is rooted in “longstanding structural unequal power relations, characterized by historical, social and political forms of Western domination, including slavery, colonialism, capitalism, and patriarchy” (Boogaard, 2021, p. 30). Like the CIFSRF examples above, Boogaard highlights examples of norm-changing instances in her project, of the expectation for human participants to want to begin commercializing their goats in markets and taking animal training courses. She states that these are examples of development undermining local knowledge:

[34] A CIFSRF example I would consider reflecting injustice to people is a yogurt-making project in East Africa which performed testing on children – where skin checks for rashes and measurements were taken at school. The project used language that assumed superiority of their knowledge about the goodness the yogurt would provide, and wrote critically of parents who removed their children from the program: “The number of students involved in the study decreases from 202 to 177 due to absenteeism and *wrong perceptions of the parents who prohibited their pupils* to consume yoghurt” (IDRC, 2018b, p. 11).

> "it was assumed that goat keepers needed to change their mind-set and become more commercially oriented**. *It means that their current mind-set was not good (enough) and that another mind-set was better.*** The promoted mind-set of a more commercial attitude reflects a Western-based agricultural development ideology: commercialization of agriculture are seen as the best pathway for agricultural development in Africa" (Boogaard, 2021, p. 36). *And* "another important assumption underlying these trainings was the idea that there is something like 'improved' goat keeping. The point here is not that there cannot be any improvements in goat keeping. ***The point is that when starting with such assumptions, it is suggested that Indigenous ways of doing and knowing are inferior***" (Boogaard, 2021, pp. 39–40).

She addresses development's clutch on agricultural modernization as a pathway to development, food security, and poverty reduction, and explores how this approach is problematic as it continuously undermines and supplants Indigenous knowledge and practices with Western ideas of what agriculture should be (commercialization, intensification). Reflecting Boogaard's arguments back to think about Canada's international development encounters, we can consider once more how Canada entered the international stage of development: as a settler colonial state, in a global order directed by the victors of colonialism.[35] And it did so towing along its colonial baggage; with the perspective that because Canada modernized its food production system to be highly productive and industrialized in modern livestock and fishing systems, then it could help transform other nations struggling with 'development' (ie. modernization theory). That the Canadian way of 'producing' food animals was the best way.

We can reflect on how Canada's colonial relationships to animals and development was founded on spurning Indigenous ontologies and knowledges. All the while, the state emphasized the exploitation of fish from the waters of the Atlantic, and the importation of European livestock – literally molding how Canada would begin to engage in development programming; heavy investments in global fisheries

[35] Though I speak in generalizing terms, Canada and development as a practice are not homogenous, neither are CIFSRF and Canada. They are composed of many actors who bring their own assumptions and prior experiences. You have Canada as a state, composed of ideas of what domestic and international governance looks like, you have NGOs shaped by domestic and international mandates and agendas, progressive research agencies like IDRC, as well as individual human actors (typically well-educated and knowledgeable), all of whom have their own assumptions about how animals should be and are enrolled in development. You also have in-country local actors and institutions, and project participants shaping animals in projects. Participatory projects have been used to counter these critiques, but Boogaard (2021) cautions that these approaches when not done thoughtfully can exclude local and Indigenous epistemologies.

production and introducing 'superior' animal genetics and knowledge surrounding animal care. Canada has continued its interest in funding projects that focus on agriculture modernization; that animals in food production systems are tools that can be shaped for human benefit. A reminder that Montford and Taylor (2021) assert that "the use of animals and the institution of speciesism have been integral to colonization, with humans continuing to deploy animals to achieve colonial ends" (p.3). While the impacts of Canada's colonial relationships with animals inform development, so too does its dedication to neoliberalism. Next, I will explore how these assumptions are intertwined in how development genuinely sees animals: *as machines.*

5.1.2 Animal Machines and Productivity

A dichotomy exists; while development understands that food animals (*i.e.* the collective animal) are significant, it *does not see the animal (ie.* singular, individualized animal) as consequential. The overwhelming narrative arising from this statement is that *animals in development are only as important as their collective contributions to improving human wellbeing*; and it is this perspective, upheld by development, that enshrines *animals as machines,* measured in outputs and productivity to achieve human outcomes at the animal's expense. The animal machine creates an image of a non-living production machine – and that is what Ruth Harrison intended when she first used the term in her 1964 book *Animal Machines.* As an animal welfare activist, her influential book demonstrated how industrial farming reduced animals to units of production, devoid of emotional requirements, and intended for human profit and benefit (Kirchhelle, 2021). While her book looked at British large-scale farms, and my research is about food animals in impacted by Canadian development initiatives (primarily in small-scale subsistence farms and fishing settings), her concept of the animal machine shines light on how animals in development are also treated as machines primed for productivity optimization. Look to Table 10 to see examples of how animals are reduced to their productivity in development-contexts.

Across CIFSRF, every single project referenced animal productivity; lack of animal productivity used to justify interventions, challenges to productivity were a hurdle needing to be overcome, and improvements to productivity a marker of project success. With CIFSRF's food security aims, the initiative viewed productivity as a measure to increase the "availability of and access to nutritious food" (Shaxson et al., 2018), and thus productivity was a measurable and reported in each project. It is measured by counting the number of offspring that were born and survived, by how fast animals gained weight in respond to new feeding regiments, total weight of fish 'harvested', and by the amount of milk and meat produced. The language of production and productivity makes it evident that the individual animal is not significant to project interventions, for example, "gastrointestinal parasite burden was demonstrated to

be a serious constraint to sheep production" (Phillip & Francis-Granderson, 2014, p. 30). Note the emphasis on the parasites negatively impacting the production system, not the sheep. And, "the increased straw yield is appreciated for animal feed (which benefits the family with increased dairy production)", in this case, the emphasis is on the family benefiting from the animal feed, not the animals (Orsat et al., 2013, p. 18).

Table 10

Quotes demonstrating the reduction of animals in development to productivity.

Source	Quote
Academic Article	"The **roles of livestock are directly linked to production** systems used and subsequent productivity" (Banda & Tanganyika, 2021, p. 7).
CIFSRF Technical Report 106314	"The increased *straw yield is appreciated for animal feed* (which **benefits the family with increased dairy production**)" (Orsat et al., 2013, p. 18).
CIFSRF Technical Report 107985	"Fisheries **(Paiche) production more than doubled** after the start of the first Amazon fish for Food project (*from 305 t/year to 724 t/year*)" (Carolsfeld et al., 2018, p. 41)

The emphasis on productivity is, however, not unique to CIFSRF, but rather has been entrenched in the lexicon and measurables of development. Think back to the Green and Livestock revolutions seeking to maximize the amount of food grown on as little land as possible. Looking at IDRC, their earliest livestock projects sought "to increase the productivity of lands and water, food crops, terrestrial and aquatic animals, and trees and other vegetation" (IDRC, 1981, p. 10). While Stephen Brown's (2012) investigation into CIDA's development policies found that their emphasis on productivity stemmed from the perspective of a necessity to meet the global demands of the Earth's ever-increasing population:

> "The main objective of CIDA's land policies is to increase production and productivity of small farms. Because the world's population is constantly growing, CIDA argues, 'global food production must increase by 2050 to keep pace with increasing demand'" (p. 173).

Even projects that appear to be intended to benefit animals, such a vaccination projects, follow similar perspectives in that human prosperity is the overarching goal, and improved animal outcomes secondary. For example, while the Novel Livestock Vaccine project in Southern Africa (106930/107848) acknowledged the negative outcomes to animals infected by illness, the Technical Report centered the

problem not on animal suffering, but rather of economic hardship: “outbreaks impact animal producers by hampering local and international trade” and that the development of novel vaccines for six infectious diseases of livestock, all with significant economic impacts, will have direct positive effects on food productivity by reducing losses due to the diseases in cattle, sheep, goats and pigs. The risk of losses due to both mortality or loss of animal production quality and volume will be reduced.” (Babiuk & Wallace, 2018, pp. 4, 22).

So why, then, should we interrogate *productivity*? Because while we have established that development is human-centric (Srinivasan, 2022), when animals are included in interventions productivity is the hegemonic lens for which their participation is analyzed. This is no coincidence; neoliberalism has gripped development for over four decades, and the emphasis on productivity and commercialization represents its legacy. This is visible in CIFSRF projects which employed market-orientated approaches to address food security; engaging the private sector in creating new industries – such as the Paiche fishing project in Bolivia, and oyster farming in Sri Lanka. As well as in other projects funded by Global Affairs Canada – such as the $ 11.5 million they provided to the United Nations Industrial Development Organization in funding the “Upgrading the Fishery Sector in South Sudan”, which sought to “increase fish harvests and to introduce commercially oriented fishing practices in fishing communities”(Global Affairs Canada, 2023a). The justification for productivity-focused approaches is that simple changes can be made to increase the amount of food available to people, and the efficiency of this food. Within this lens, animals are defined and valued by their ability to provide for humans and quantified in their capacity to do so. Productivity therefore reduces animals to their collective contributions and are valued within this system as commodities to serve human outcomes. Thus, changemaker status is tied to neoliberalism’s productivity and profit orientated approach (Bandinelli & Arvidsson, 2013). However, post-development thinking critiques this perspective, in that the push for modernity has reduced animals to resources, and not living beings (Escobar, 2019). This domination, of human over resource, makes justifying acts of harm easier to rationalize (Srinivasan, 2022). Animal welfare is seen as a solution to mitigate the worst effects of this harm (Srinivasan, 2022), which we will explore in the next section.

5.2 Animal Welfare & Development

This section responds to Objective 3 by presenting a discussion on the synergies and tensions of animal welfare in international development initiatives. Thus far, we have established that development is human-centric, prioritizing human outcomes and wellbeing (Srinivasan, 2022). Through the CIFSRF case study and key-informant interviews it became clear that while animal welfare is not prioritised in

development interventions, moments of animal welfare considerations do occur. This section builds on these findings to imagine what a future of development practice and theory would look like if animals and their welfare were considered. I begin by detailing the tensions that arise in its implementation, followed by a discussion on the synergies. This is not an exhaustive list of all possible outcomes of including animal welfare in development, but rather important ideas that arose from the findings of this research.

5.2.1 Tensions

When reflecting on the inclusion of animal welfare in development interventions, three tensions arose in my research that I will now address. They include 1) does development want to think about animal welfare, 2) whose animal welfare would be implemented, and finally, 3) which animals would be included in welfare paradigms. I provide a rationale for each tension and expand on each below.

The first tension, *does development want to think about animals and their welfare,* arises from the visible gap in development theory and practice about animals beyond their utility to people. We have established that this gap of critically engaging with animals arises from development's neoliberal and colonial origins, which see animals as resources that serve (or hinder, such as in the case of pests) humans. However, the recent "animal turn" in social sciences (Buller, 2014a) (where disciplines have adopted trans-species approaches) has yet to occur in development studies. Theoretically, post-development has made the most space for the inclusion of non-human animals, with these approaches leaning to Indigenous and Global South perspectives that acknowledge the global issues that modernization/development has caused to people and animals alike (including climate change, industrial agriculture, and global inequities) (Escobar, 2019; Quijano, 2007; Srinivasan, 2022).

Regarding development practice, there exists a wide range of actors with varying roles, responsibilities, and capabilities in shaping global development outcomes (from intergovernmental organizations, states, civil society organizations, to citizens). Currently, the United Nations Sustainable Development Goals guide global development interventions, and they fare poorly in regards to addressing animals (other than fish) in food production systems (Verniers, 2021; Visseren-Hamakers, 2020). Thus, without reference to food animals and animal welfare in the SDGs, global donors have little incentive to address food animal-issues, let alone their welfare. From a Canadian perspective, only the international trade arm of Global Affairs Canada has (recently) engaged with animal welfare under the Comprehensive Economic and Trade Agreement (CETA); wherein as a result of the EU's heightened animal welfare regulations in international trade (which are guided by the World Organizations for Animal Health's [Woah]) One Health approach), Canada shared its intention to continue dialogue

surrounding animal welfare, highlighting the "importance of integrating human and animal health and welfare, as part of a productive and sustainable agriculture and food system" (Global Affairs Canada, 2021b). While this does present an opportunity of optimism surrounding Canada's future approach to international relationships with food animal welfare, this is trade-related and not development-focused. Money matters, and this was repeated to me by several interviewees when asked if animal-issues and welfare should be included in development practice. One individual I interviewed shared that the human-centered approach of development means that animal-centered projects would be very unlikely to receive funding in today's development climate:

> "The cynical perspective is that you get more money if you are helping people than if you are helping animals. And that's a very strong reality. I would not have gotten the development funding money (that I did) if I had gone to do conservation work. Even though I know keeping a healthy and viable ecosystem is directly linked to human wellbeing. But if I didn't have a direct human problem, we wouldn't have gotten the money".

This perspective (that for development to consider animals they must be framed in the context of how they serve humans) is also shared by Elien Verniers (2021), who emphasizes that "animal welfare concerns can be included [in sustainable development interventions] as long as it is clearly stressed what the benefits are for humans" (p. 354). However, they (2021) build on this argument to state that One Health and One Welfare discourses are "practical examples of how an anthropocentric perspective eventually can result in addressing non-human concerns" (p.354).

The second tension, *whose animal welfare interpretations should be considered,* addresses that while animal welfare is a science, cultural applications and interpretations are important, especially in the context of development. Globally, animal welfare continues to be culturally, temporally, spatially, and animal-specific (Garcia & McGlone, 2022; Pinillos, 2018). With one interviewee stating, "you can't escape the cultural and historical impacts on how we view and enforce welfare". I find this statement particularly important to reflect on, especially, once again, in the context of development's colonial and neoliberal origins; with modernity a result of intensification and commodification in agriculture, and industrial food production being a result of this system. Thus, animal welfare paradigms, which were created to react to the mistreatment of animals in Western industrial agriculture systems, cannot be implemented globally in a one-size-fits all approach. Firstly, because animal lives and their welfare requirements (and that of their humans) are specific to the food production systems they are part of. On

an industrial farm (land-based and aquaculture), major animal welfare challenges may include lack of adequate space and poor housing conditions, while on a subsistence small-holder farm, making sure animals have enough food to eat or access to medicine (resource provision) may be the major challenge (Molomo & Mumba, 2014; Qekwana et al., 2019; Rault et al., 2022). The intent behind the food production is important to evaluate when addressing animal welfare concerns. While subsistence and small-holder farms look to maintain household human wellbeing, industrial animal production is not about nutrition, it is about wealth generation (and further enshrines animals as machines, justifying harm – as demonstrated in the previous section) (Srinivasan, 2022).[36]

Secondly, to this point, animal welfare paradigms which fail to acknowledge local contexts risk participating in what Escobar (2019) refers to as the One-World World view - the Eurocentric perspective that there exists only one global truth. This is an act of epistemic injustice that undermines local animal-human relationships, realities, histories and knowledges (Boogaard, 2021). This is not to say that local and subsistence-based animal-human relationships can't be harmful.[37] But rather, that animal welfare concerns have to be locally-led. Animal welfare scientists Arlene Garcia and John McGlone (2022) caution against forcing non-culturally relevant animal welfare measures, stating that: "Our view, which is not common among animal welfare scientists, is that people from countries with developing economies should have an equal voice in determining how animals are treated. A certain human society should not be forced to apply animal welfare standards that they do not believe in, are unimportant in their view, or are unable to adopt. To force people to adhere to Western animal ethics is a way of destroying other cultures" (p.473). They (2022) state that "Often, but not always, science is used to set animal welfare rules. However, science sometimes conflicts with cultural values" (p.474). This sentiment is also shared by Sinclair and Phillips (2018), who find that for the implementation of international animal welfare programming to be successful, it must not attack cultural identity. They shared a quote from an interview with a leader of an international animal welfare organization to reflect this sentiment: "pointing that finger from the outside doesn't work; who likes being told what to do? Who would like a bunch of Koreans, Vietnamese and Chinese coming into the UK and saying you shouldn't be badger baiting… It's a very dangerous circumstance to be that imperialistic and arrogant to tell another country what to do"

[36] Canada does appear to be engaging industrially orientated development assistance, such as the "Supporting Dairy Business Development" project in Ukraine (Global Affairs Canada, 2023).
[37] The example of ritual sacrifice is one that often comes up as a contentious topic between welfare and culture (see Govindrajan, 2018; Qekwana et al., 2019).

(Sinclair & Phillips, 2018, p. 10).[38] Interestingly, however, every animal-expert interviewee stated that they rarely, if ever, encounter cross-cultural cohesions over conceptualizations of animal welfare. Rather, one interviewee stated that "international cooperation enriches what animal projects can achieve", and that across his career working with Canadian and other Northern institutions has resulted in "mutual knowledge sharing" on animal welfare and care.

Lastly, is the tension of, *welfare for who?* Krithika Srinivasan (2022) prompts the reflection of *which* animals are included in perceptions of wellbeing and welfare, and how human exceptionalism allows us to view ourselves as above every other animal (while not seeing ourselves as animals). Across CIFSRF projects, and development as a whole, care is provided to the animals that live in beneficial relationships with humans (such as goats and chickens). While animals who are viewed as nuisances and counter to development (such as pests like locusts and intestinal worms), do not fit into any contemporary understanding of animal welfare, despite also being animals. Choosing which animals suffer, and which thrive (including humans), presents an ontological debate about which lives humans (and which humans) value more.

5.2.2 Synergies

When reflecting on the inclusion of animal welfare in development interventions, three synergies arose in the research that I will address here. They are: 1) to some degree, animal welfare is already taking place, 2) the COVID19 pandemic has heightened interest in animal issues, and 3) One Welfare presents a promising future.

The first synergy, that *to some degree, animal welfare is already taking place,* acknowledges that while attention to animal welfare is not universal, considerations for animal welfare are upheld in everyday interactions of care and intimacy, as well as by development practitioners trained in animal issues. The CIFSRF findings demonstrate that while animal welfare does not exist in its entirety (as in meeting all the Five Freedoms), the incorporation of animal welfare into development practice is possible because to some degree, animal welfare considerations are already taking place. As previously stated, this is bolstered by the fact that project participants actively wanted to participate in animal care training. Showing that people care about their animals and want to learn new ways on how to best care for them. Animal welfare was visible throughout other moments in CIFSRF as well; it was 1) enforced by

[38] Similar conversations haven taken place regarding the mainstreaming of gender and environment into development practice – issues of cultural interpretation, colonial legacies, and neoliberal inclinations (Baines, 2010). In Suteera Tomson's (1980) report analyzing CIDA interventions across the 1970s, they addressed the apparent gap of gender and environmental issues in projects, and advocated that the two be mainstreamed in development interventions. And, over the past fifty years, gender and environment are now central to how Canada engages in development today (such as the through the Feminist International Assistance Policy).

institutions and recipient countries when animal testing was present, and 2) influenced by individual practitioners working on the projects, predominately veterinarians. Veterinarians and veterinary associations play a global role in shaping animal welfare knowledge and outcomes (Huertas et al., 2014; Molomo & Mumba, 2014). While being an animal-expert does not guarantee animal welfare-competency, the four I interviewed all claimed to incorporate welfare considerations into their work, which they attributed to their training in animal sciences and veterinary medicine. [39] On the other hand, the human-centered development practitioners had little to no knowledge of animal welfare. This demonstrates that while animal welfare considerations do exist, the gap exists on the end of human-centered development practitioners in animal-centered projects.

Secondly, the *COVID19 pandemic, which was a zoonotic disease, presents an opportunity of heightened global interest in animal health and wellbeing as a measure to prevent the future spread of diseases from animals to people* (Brozek & Falkenberg, 2021; Sellars et al., 2021). This has translated into an increased adoption and funding of One Health centered projects. This is evident through the Global Affairs Canada's 2022 "One Health at the Community Level" funding invitation (totalling 20 million dollars) (Global Affairs Canada, 2022), as well as IDRC's "Collaborative One Health Research Initiative on Epidemics (COHRIE)" which has funded five projects since 2021 (20 million dollars) (IDRC, 2023b). Looking internationally, the One Health Joint Plan of Action (2022-2026) was adopted by the Quadripartite (a partnership including the Food and Agriculture Organization [FAO], the United Nations Environment Programme [UNEP], the World Health Organization [WHO], and the World Organisation for Animal Health [WOAH] (UNEP, 2022). All with the aim for global cross-disciplinary collaboration emphasizing the connection between human health, environmental health and animal health for sustainable development. Importantly, while the continued momentum for One Health programming since the start of the COVID19 pandemic also brings hope for the inclusion of animal welfare, as WOAH (a supporter of One Welfare) is the global champion of animal welfare and includes welfare within its One Health framework. Looking to One Welfare, the framework sees itself as inherently complementary to One Health, in that "you cannot have positive welfare without good health" (Pinillos, 2018, p. 13). The ultimate goal of both frameworks, One Health and One Welfare, is to foster and increase the efficiency of interdisciplinary collaboration across animal, human, and environmental sciences, "going far beyond what is possible from a silo approach" (Pinillos, 2018, p. 41).

[39] This could always be a bias as to who spoke with me – in that when recruiting for emails I was most often directed to animal-experts of the team.

Finally, *One Welfare presents a promising framework with practical applications to development practice that aligns with current sustainable development frameworks.* One Welfare emphasizes that when food animal welfare conditions are optimized, the wellbeing of humans and environment also improve, resulting overall, in a more sustainable global food production system. Firstly, One Welfare is a promising framework for which to engage in development practice because it speaks the language of development. Meaning, that despite including animal welfare and wellbeing, the framework is still framed in how it improves human outcomes (Verniers, 2021). For example, "it is necessary to ensure human welfare aspects are considered if we are to achieve effective animal welfare improvements" (Pinillos, 2018, p. 1). This is crucial to its application in development because of the industry and discipline's human-centric approach, and as we learned through the key-informant interviews, is pertinent to receiving development funding in today's climate. This could potentially allow human-centered spaces in development to justify including One Welfare as it still seeks to benefit people, while still making space to centre animals and their welfare. This is further emphasized by the framework's acknowledgement of animal welfare as to a means to achieve increased productivity and financial gains: "improvements in meat quality and productivity margins" as well as the "direct financial benefits as a result of reduced mortality" (Pinillos, 2018, p. 15).

However, what the framework does present beyond speaking the language of development is that it makes space for the intimacies of animal-human relationships that aren't currently central to development. In particular, the idea that wellbeing and thriving (and not just health) are interconnected through the social fabrics of the environment, animals, and humans (and mutually represented in moments of non-thriving). For example, Section 1 of the framework acknowledges the connection between perpetrators of animal abuse and interpersonal violence. Under Canada's Feminist International Assistance Policy, "preventing and responding to all forms sexual and gender based violence, including harmful practices is a priority" (Global Affairs Canada, 2017). A One Welfare training can provide an important lens and skills in international gender-based violence programs.

One Welfare emphasizes collaborative, flexible, and empathetic approaches to implementing animal welfare on all levels (such as through practitioner training, institutional adoption of the framework, regionally and nationally). As highlighted by high participation in CIFSRF animal care courses, and interviewees stating that animal care brings together positive collaborative action – animals have the power to bring people together. One Welfare provides a name for the transspecies social networks that are already taking place globally. Ultimately – One Welfare signals that we need to look critically

and deeply into interconnections of animals, peoples, and their homes. As we have learned, systems approaches are not new to development – but looking at animals is.

This concludes the Discussion. In this chapter I responded to Objective 2, in seeking to detail the significance of animals in development studies, as well as Objective 3, contextualizing the tensions and synergies of an animal welfare paradigm in development. *The Animal Changemaker* section explored how animals are enrolled as changemakers in development practice, where collectively, animals in development are makers of positive change for humans and animals alike. This status, however, entangles animals in development's mission of social norm change, challenging existing animal-human relationships and behaviours. At times, this can be positive, however, it can also undermine local knowledges and perspectives. Interrogating Canada's role in changing and shaping animal-human relationships is critical because as a settler colonial state, Canada's current perspectives in development (such as agriculture modernization and neoliberal development) are founded on its own animal-development histories of exploitation and harm in an effort to maximize profits and (select) human wellbeing. Animal welfare is a response to the harm committed to animals by these systems. The *Animal Welfare and Development* section investigated the tensions and synergies in implementing animal welfare in development practice and theory. Concerns include the risk of cultural interpretations and hegemonies, and which animals would be considered as worthy of having their welfare upkept. While synergies include acknowledging that animal welfare considerations are being met, even if not fully, that the COVID19 pandemic amplified conversations about One Health, leading to more space for One Welfare, and that One Welfare really can provide a pathway to thinking about animals in development.

Chapter 6: Conclusion

This chapter concludes my research. I summarize my findings and demonstrate how I addressed my original research aim and goals. I then provide evidence of how this research contributes to scholarly discourse in both animal geographies and development studies. Afterwards, I provide my concluding thoughts.

6.1 Summary of Key Findings

This thesis aimed to explore and untangle the animal-human relationships in Canada's international development initiatives. To do so, I united animal geographies and development studies to investigate Canada's past, present, and future of animal-human relationships in development. Canada is one of the largest international donors of foreign aid; looking to alleviate global poverty, improve gender equity, and enhance food security. Yet, the lives of the animals in these projects are often obscured and provided little critical reflection as to their role, life outcomes, and how they contributed and are impacted by development interventions themselves. This research brought the animals from behind the scenes of Canada's development projects to the center stage, investigating their roles, significance and lives. In this section, I present my research findings in response to each of my three research objectives.

Objective 1 was to *explore food animals in Canadian international development initiatives over the past 70 years (1950s to 2020s).* Through this objective, I mapped the story of animals in Canada's international development programs in order to contextualize the current and future space for animals in development. The findings for this objective are presented in Chapter 1.2.2 *History of Animals in Canadian International Development.* The rationale for historizing animals in Canada's development history arises from 1) animal geographies approach to situating contemporary animal-relationships through historical analyses (Montford & Taylor, 2020; Seymour & Wolch, 2010), and 2) the emphasis in critical development studies in addressing colonial histories and how they impact current global realities (Escobar, 2019; Quijano, 2007). Methodologically, this objective employed a secondary data collection and analysis from both academic and grey literature, as well as a digital archival search through Library and Archives Canada and the International Development Research Centre's Digital Library. This objective looked to Canada's history to establish how Canada has engaged with animals and development to orient how the state is currently engaging with animals on a global scale.

I found that Canada's origins as a settler colonial state continue to influence its relationships with animals; setting precedence to which animals are to be exploited (such as fish), which animal life is to be exterminated (pests), which animal life is to be sustained and fostered (livestock animals), and

which ontologies shape modern Canada's relationship with animals. Canada has carried its perceptions of modernity and industrial agriculture into the international arena when it began participating in development assistance in the 1950s. Local Canadian actors have been incredibly influential in shaping Canada's relationship with international aid; including unions, politicians, and lobbyists encouraging the government to participate in supporting local industries (fishing, meat and dairy cattle rearing) as deliverables to global food aid programmes, demonstrating that Canada's participation in international aid has never been founded on altruism alone.

Development assistance programming has varied over the past 70 years, but the Green and Livestock revolutions have been instrumental in shaping current global agriculture realities. Founded on Canada's relationship with cattle, the state began heavily participating in development programming seeking to introduce superior cattle genetics to developing countries to help establish dairy industries – many of these programs industrially-focused and met with controversial outcomes. Fishing and aquaculture have been another major avenue of animal development, and while some have been in support of small-scale subsistence farmers, large-scale fishing has also been targeted. This section also highlighted that despite the prevalence of animals in development interventions, their presence has long been difficult to trace, and their involvement has been to serve human outcomes in improving Canadian economic prosperity and global human wellbeing.

Objective 2 was to *identify the actors, roles, and significance of food animals in a case study of the Canadian International Food Security Research Fund (CIFSRF) to contextualize Canada's contemporary use of food animals in international development.* CIFSRF was an impressive initiative, jointly funded by the International Development Research Centre and Global Affairs Canada, that supported 39 applied-research projects in 25 countries and sought to address global food insecurity issues. CIFSRF was not an animal-focused initiative, meaning it was the perfect example for which to examine how animals are and are not present in development. I performed a Qualitative Content Analysis of the initiative, identifying 27 projects of CIFSRF's 39 to have incorporated food animals in some capacity, whose technical report and online media postings were included in my dataset. Methodologically, I analyzed the CIFSRF case study through a qualitative content analysis, reviewing project technical reports, and media content in search of how animals were represented and their roles and significance in the project. The findings to the animal actors and roles were presented in Chapter 4.

In total, 113 counts of animals were observed across the 27 projects, with 62 of these animals being unique animal-types. The most prevalent animal across all projects were fish, with a total of 25 species listed across 9 projects. The diversity of animals included in the projects was impressive, and

encounters with animal pests prompted me to expand my research analysis to look at all animal actors in the projects, not just food animals.

The way animals were represented in CIFSRF also shone through in this section, and I demonstrated this through the visualization of a stage: with Lead actors, Supporting actors, and Background actors. Lead actors represent the animals that are most visible and prominent across the projects, i.e. the "food animals" of development projects: the fish, cattle, poultry, sheep, goats, and pigs. Lead actor animals have entire development projects centered on them. Supporting actors, on the other hand, are animals who are not the main topic of the project but are nonetheless crucial to the success and performance of the project. Often these animal encounters are incorporated into the projects through direct human manipulation, meaning that they were introduced into the project to support the outcomes of the lead actors, or core project (if it was plant-based). And finally, Background actors receive the least acknowledgement for their roles, and are animals that participate in the projects out of their own choice (knowingly or not), but their encounters are intercepted with measures to prevent or deter them. These animals are most often the pests and parasites of the projects, and in technical reports, these background actors are made most obvious in the "challenges" section, steering the project off course or in a new direction. I also identified ten different animal roles in the CIFSRF projects. These roles are not intended to be limiting categorizations of all that animals do in and for development initiatives, but rather as a jumping point to spark further research. The roles are not static, nor species-specific, and provide an interesting lens through which to evaluate how animals are entangled in development.

In Chapter 5, I presented a discussion on the significance of animals in development. I found that animals are changemakers in development; collective bodies enrolled in the process of improving human outcomes. Within this perspective, animals are agents of social norm change; embroiled in development's political desire to change both individual behaviours and larger socio-cultural norms. Changemaker status also entrenched animals deeper into the narrative that they are machines programmed for production and productivity optimization, demonstrating how the individual animal is not important to the system of development. The dominant narrative of animals and their productivity is a result of neoliberalism's market-based solutions to development. As a result, productivity reduces animals to commodities, and not living beings, thus justifying actions of harm against animals to uplift people.

Objective 3 was to *investigate the tensions and/or synergies that exist between international development and animal welfare paradigms.* This objective rationalized what a future of development

could look like if animals and their welfare considerations are met. Methodologically, in addition to a scholarly literature review presented in Chapter 2, this objective combined findings from the CIFSRF case study and key-informant interviews. The findings of which are presented in Chapter 4, and extrapolated on in the Discussion chapter.

I found that animal welfare is an uncomfortable topic for development practitioners, especially for non-animal experts, but that ultimately, people are interested in providing space for animals in development but that the current climate in development funding is not conducive to animal welfare centered projects. I explored the tensions in implementing an animal welfare paradigm, including development's human-centric approach and disinclination to think about animals, the varied cultural applications of animal welfare, and reflecting on which animals would be provided welfare (and which would be left out). Alongside these tensions exist encouraging synergies for the inclusion of animals and their welfare. This was made clear through the evidence that animal welfare exists in moments of intimacy, research, and implemented through practitioners– particularly veterinarians. Additionally, the rise in One Health programming in response to the COVID19 pandemic presents heightened global interest in animal health and wellbeing. While One Health is primarily health based, it presents an opportunity to continue the push for One Welfare approaches. At large, I found One Welfare to be a dynamic and appropriate pathway for which the development community could learn to incorporate animals from. Global wellbeing is not capable by just focusing on improving outcomes for people. Rather, One Welfare can genuinely lead to the "progressive coexistence of the planet's life forms" (Pinillos, 2018, p. 3).

6.2 Contributions and Future Research

This thesis united animal geographies and development studies to investigate Canada's past, present, and future of animal-human relationships in development. Development studies has so-far neglected the recent "animal turn" that has been taking placed across the social sciences. While other disciplines, like geography and history have begun to entangle the rich interconnections in animal-human relationships, development studies still need to take the animal-leap. Thus, this research represents the first of such leaps, marrying the two disciplines in a fruitful conversation, intertwining the lives of animals, people, the Canadian state, and the One Welfare framework. Therefore, the findings of this research present an exciting and important thought-experiment and body of evidence for future animal geographers and development studies researchers to build on. This is an emerging topic, and I foresee interest in untangling the spaces and outcomes of animals in development to continue to grow.

In particular, I see the following spaces as sites to continue this research: firstly, while my research looked at the small-scale and subsistence applications applied in CIFSRF, there is space for future research to investigate the rise in industrial livestock agriculture development in the Global South, as there are reports that development banks are funding industrial livestock farms (see Wasley & Heal, 2020). Secondly, while not explored in this paper, there are some interesting parallels to be made and lessons to learn regarding the historic progression of how gender was eventually mainstreamed into development (from Women in Development approaches to Gender and Development), and what could potentially, one day inform the mainstreaming of animals into development. Thirdly, there is so much to uncover about the non-charismatic animals of development. Such as fish, especially thinking about Canada's fishy histories and the role of departments like Fisheries and Oceans Canada in international fish development projects. As well as insects, which are equally a fascinating and understudied animal geographies site within development. Insects are pests, but also lead actors in a recent IDRC project, encouraging "insect entrepreneurs" to feed poultry and fish (IDRC, 2021).[40] There are so many perspectives waiting to unfold in future research, and I am excited to see where future animal-development geographers take this journey next.

6.3 Conclusion

My idea for this research began during the semester before the COVID19 pandemic. After four years of studying Global Development studies, an elective course in Animal Histories revealed to me that the discipline I had been studying *never once meaningfully looked at animals.* It also revealed to me one of my most valued academic lessons to date, and one that I hope to share with other development studies students: *it's okay to think about animals, and more so, I encourage you to.* This paper clearly revealed that lives of animals in development are worthy of investigation. Animal-human relationships in development are more than moments of consumption or the incomes gained. Rather, these relationships are interwoven in the everyday occurrences of care, they are enmeshed in ecosystems of life, they are entwined in the larger social climates, and they are entangled in the larger socio-political global forces. Importantly, investigating animals in development reveals how our collective ideas, priorities and worldviews as a society make and re-make material relations and wellbeing – for animals and humans alike.

[40] "Insect feed for poultry and fish in Kenya and Uganda (INSFEED)" is a Cultivate Africa's Future Fund (CultiAF) project, which was built on the lessons learned from CIFSRF.

References

Abdulhaleem, M. (2022). Animal Welfare in the Developing Countries. *Acta Scientific Veterinary Sciences*, *4*(2), 17–20.

Abitbol, E., Horton, D., Paskal, A., Rouleau, E., Picard, M., Ackatia, N., Hellrung, V., Pompilus, Y., & Daïeff, L. (2016). *Evaluation of the Canadian International Food Security Research Fund (CIFSRF)* (p. 312) [Evaluation Report]. Universalia.

Anderson, K. (2000). 'The Beast within': Race, Humanity, and Animality. *Environment and Planning D: Society and Space*, *18*(3), 301–320. https://doi.org/10.1068/d229

Aparicio Tovar, M. A., & Vargas Giraldo, J. D. (2006). Considerations on ethics and animal welfare in extensive pig production: Breeding and fattening Iberian pigs. *Livestock Science*, *103*(3), 237–242. https://doi.org/10.1016/j.livsci.2006.05.010

Arseneault, J., & Collard, R.-C. (2022). The Resilience of the Pest. *Resilience: A Journal of the Environmental Humanities*, *9*(3), 89–110. https://doi.org/10.1353/res.2022.0012

Ashley, S., Holden, S., & Bazley, P. (1999). *Livestock in Poverty-Focused Development.* Crewekerne: Livestock in Development.

Ayanwale, A., Baco, M., Oluwagbenga Alao, T., Adesiyan, O., Ikuteyijo, L. O., Ajeigbe, N., Ouidoh, F., Adechian, S., Akponikpe, P. I., Oyedele, D., & Adebooye, O. C. (2017). *Synergizing fertilizer micro-dosing and indigenous vegetable production to enhance food and economic security of West African farmers: Final report*. IDRC. https://idl-bnc-idrc.dspacedirect.org/handle/10625/57128

Babiuk, L., & Wallace, D. (2014). *Livestock Vaccines Against Viral Diseases for Developing Farmers in sub-Saharan Africa: Final technical report (March 2012 - August 2014)*. IDRC. https://idl-bnc-idrc.dspacedirect.org/handle/10625/53604

Babiuk, L., & Wallace, D. (2018). *Novel livestock vaccines for viral diseases in Africa towards improved food security(CIFSRF Phase 2)—107848* [Final Technical Report]. IDRC. https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/57295/IDL-57295.pdf

Baines, D. (2010). Gender Mainstreaming in a Development Project: Intersectionality in a Post-Colonial Un-doing? *Gender, Work & Organization*, *17*(2), 119–149. https://doi.org/10.1111/j.1468-0432.2009.00454.x

Banda, L. J., & Tanganyika, J. (2021). Livestock provide more than food in smallholder production systems of developing countries. *Animal Frontiers: The Review Magazine of Animal Agriculture*, *11*(2), 7–14. https://doi.org/10.1093/af/vfab001

Bandinelli, C., & Arvidsson, A. (2013). Brand Yourself a Changemaker! *Journal of Macromarketing*, *33*(1), 67–71. https://doi.org/10.1177/0276146712465186

BBC. (2012, April 16). Violence breaks out at Indian beef-eating festival. *BBC News*. https://www.bbc.com/news/world-asia-india-17727379

Bedard, B. G. (1987). Canadian Holstein Cattle in “The Warm Heart of Africa.” *The Canadian Veterinary Journal*, *28*(8), 459–461.

Belcourt, B.-R. (2015). Animal Bodies, Colonial Subjects: (Re)Locating Animality in Decolonial Thought. *Societies*, *5*(1), Article 1. https://doi.org/10.3390/soc5010001

Bennett, E., Blencowe, E., Brandon, K., Brown, D., Burn, R., Cowlishaw, G., Davies, G., Dublin, H., Fa, J. E., Milner-Guilland, E., Robinson, J. G., Rowcliffe, J. M., Underwood, F. M., & Wilkie, D. S. (2007). Hunting for Consensus: Reconciling Bushmeat Harvest, Conservation, and Development Policy in West and Central Africa. *Conservation Biology*, *21*(3), 884–887. https://doi.org/10.1111/j.1523-1739.2006.00595.x

Bernstein, H. (1971). Modernization theory and the sociological study of development. *The Journal of Development Studies*, *7*(2), 141–160. https://doi.org/10.1080/00220387108421356

Biswas, P. K., Uddin, G. M. N., Barua, H., Roy, K., Biswas, D., Ahad, A., & Debnath, N. C. (2006). Causes of loss of Sonali chickens on smallholder households in Bangladesh. *Preventive Veterinary Medicine*, *76*(3), 185–195. https://doi.org/10.1016/j.prevetmed.2006.05.001

Blair, R. (1987). Canadian Involvement in International Animal Agriculture Programs. *Journal of Animal Science*, *64*(5), 1560–1567. https://doi.org/10.2527/jas1987.6451560x

Blattner, C. E., Coulter, K., & Kymlicka, W. (2019). *Animal Labour: A New Frontier of Interspecies Justice?* Oxford University Press.

Bobier, C. (2019). Varieties of the Cruelty-Based Objection to Factory Farming. *Journal of Agricultural and Environmental Ethics*, *32*(3), 377–390. https://doi.org/10.1007/s10806-019-09779-y

Boogaard, B. (2021). Epistemic injustice in agricultural development: Critical reflections on a livestock development project in rural Mozambique. *Knowledge Management for Development Journal*, *16*(1), Article 1.

Broom, D. M. (2011). A History of Animal Welfare Science. *Acta Biotheoretica*, *59*(2), 121–137. https://doi.org/10.1007/s10441-011-9123-3

Broom, D. M. (2019). Animal welfare complementing or conflicting with other sustainability issues. *Applied Animal Behaviour Science*, *219*, 104829. https://doi.org/10.1016/j.applanim.2019.06.010

Brown, L., & Strega, S. (2015). *Research as Resistance: Revisiting Critical, Indigenous, and Anti-Oppressive Approaches* (2nd ed.). Canadian Scholars’ Press.

Brown, S. (2012). *Struggling for effectiveness: CIDA and Canadian Foreign Aid*. McGill-Queen’s University Press. https://books-scholarsportal-info.ezproxy.library.yorku.ca/en/read?id=/ebooks/ebooks3/upress/2013-08-23/1/9780773587083#page=186

Brownhill, L., Bukania, Z., Bothi, K., Mungube, E., Muhammad, L., & Njuguna, E. (2014). *Resilient poultry management for women in Kenya*. https://www.mcgill.ca/globalfoodsecurity/files/globalfoodsecurity/resilient_poultry_management_for_women_in_kenya_-_rgb_-_small.pdf

Brownhill, L., Pelletier, B., Kamau, G., Bothi, K., & Murithi, F. (2014). *Enhancing Ecologically Resilient Food Security through Innovative Farming Systems in the Semi-Arid Midlands of Kenya: Final technical report (March 2011 - August 2014)*. IDRChttps://idrc-crdi.ca/en/initiative/canadian-international-food-security-research-fund. https://idl-bnc-idrc.dspacedirect.org/handle/10625/53590

Brozek, W., & Falkenberg, C. (2021). Industrial Animal Farming and Zoonotic Risk: COVID-19 as a Gateway to Sustainable Change? A Scoping Study. *Sustainability*, *13*(16), Article 16. https://doi.org/10.3390/su13169251

Brugere, C., Troell, M., & Eriksson, H. (2021). More than fish: Policy coherence and benefit sharing as necessary conditions for equitable aquaculture development. *Marine Policy*, *123*, 104271. https://doi.org/10.1016/j.marpol.2020.104271

Buller, H. (2014a). Animal geographies I. *Progress in Human Geography*, *38*(2), 308–318. https://doi.org/10.1177/0309132513479295

Buller, H. (2014b). Animal geographies II: Methods. *Progress in Human Geography*, *39*(3), 374–384. https://doi.org/10.1177/0309132514527401

Buller, H., Blokhuis, H., Jensen, P., & Keeling, L. (2018). Towards Farm Animal Welfare and Sustainability. *Animals (Basel)*, *8*(6), 81-. https://doi.org/10.3390/ani8060081

Buller, H., & Roe, E. (2018). *Food and Animal Welfare*. Bloomsbury Publishing.

Carenzi, C., & Verga, M. (2009). Animal welfare: Review of the scientific concept and definition. *Italian Journal of Animal Science*, *8*(sup1), 21–30. https://doi.org/10.4081/ijas.2009.s1.21

Carolsfeld, J., Rainville, T., Daza, R., Van Damme, P., & Badani Fernandez, L. E. (2018). *CIFSRF final technical report: Amazon fish for food (CIFSRF Phase 2)*. https://idl-bnc-idrc.dspacedirect.org/handle/10625/56960

Catley, A., Lind, J., & Scoones, I. (Eds.). (2013). *Pastoralism and Development in Africa: Dynamic Change at the Margins*. Taylor & Francis. https://doi.org/10.4324/9780203105979

Cattle flown by plane to Cuba. (1946). In *Reuters*. https://www.britishpathe.com/asset/

Chakravarti, A. K. (1985). Cattle development problems and programs in India: A regional analysis. *GeoJournal*, *10*(1), 21–45. https://doi.org/10.1007/BF00174664

Charlton, M. (1992). *The making of Canadian food aid policy*. McGill-Queen's University Press. https://books-scholarsportal-info.ezproxy.library.yorku.ca/en/read?id=/ebooks/ebooks0/gibson_crkn/2009-12-01/2/403858#page=2

Clark, D. A. (2006). *The Elgar Companion to Development Studies*. Edward Elgar Publishing.

Cohn, T. (1978). Canadian Aid and Trade in Skim Milk Powder: Some Recent Issues. *Canadian Public Policy / Analyse de Politiques*, *4*(2), 213–226. https://doi.org/10.2307/3549345

CUSO. (2022). *New Cuso International project prioritizes supports for vulnerable youth and women in the Democratic Republic of the Congo*. Cuso International. https://cusointernational.org/news/new-cuso-

international-project-prioritizes-supports-for-vulnerable-youth-and-women-in-the-democratic-republic-of-the-congo/

Damme, P. V., Salas, R., & Perez, T. (2014). *Food Security, Fisheries, and Aquauculture in the Bolivian Amazon*. IDRC.

Davies, G., Greenhough, B., Hobson-West, P., & Kirk, R. G. W. (2018). Science, Culture, and Care in Laboratory Animal Research: Interdisciplinary Perspectives on the History and Future of the 3Rs. *Science, Technology, & Human Values*, *43*(4), 603–621. https://doi.org/10.1177/0162243918757034

Delgado, C., Rosegrant, M., Steinfeld, H., Ehui, S., & Courbois, C. (2001). Livestock to 2020: The Next Food Revolution. *Outlook on Agriculture*, *30*(1), 27–29. https://doi.org/10.5367/000000001101293427

Devendra, C. (2013). Investments on Pro-poor Development Projects on Goats: Ensuring Success for Improved Livelihoods. *Asian-Australasian Journal of Animal Sciences*, *26*(1), 1–18. https://doi.org/10.5713/ajas.2013.r.01

Devendra, C. (1988). *Efficiency in feed resource utilisation and animal production*. https://idl-bnc-idrc.dspacedirect.org/handle/10625/124

Dogra, N. (2007). 'Reading NGOs visually'-Implications of visual images for NGO management. *Journal of International Development*, *19*(2), 161–171. https://doi.org/10.1002/jid.1307

Doshi, V. (2023, April 8). To protest Modi, these Indians are cooking beef in public. *Washington Post*. https://www.washingtonpost.com/world/asia_pacific/protests-against-the-governments-anti-beef-laws-spread-in-india/2017/06/05/8aa05dfc-489e-11e7-bcde-624ad94170ab_story.html

Elysha, E. (2016, December 23). Almost eaten in China, 32 dogs arrive in Montreal to start new life | CBC News. *CBC*. https://www.cbc.ca/news/canada/montreal/dog-meat-montreal-saved-1.3910596

Escobar, A. (2019). Thinking-Feeling with the Earth: Territorial Struggles and the Ontological Dimension of the Epistemologies of the South. In *Knowledges Born in the Struggle*. Routledge.

Estévez-Moreno, L. X., Miranda-de la Lama, G. C., & Miguel-Pacheco, G. G. (2022). Consumer attitudes towards farm animal welfare in Argentina, Chile, Colombia, Ecuador, Peru and Bolivia: A segmentation-based study. *Meat Science*, *187*, 108747. https://doi.org/10.1016/j.meatsci.2022.108747

FAO. (2015). *Climate change and food security: Risks and responses*.

FAO. (2022). *Livestock Systems*. Food and Agriculture Organization of the United Nations. https://www.fao.org/livestock-systems/en/#:~:text=Livestock%20are%20domesticated%20terrestrial%20animals,%2C%20hides%2C%20fibres%20and%20feathers

Ferguson, J. (1994). *The anti-politics machine: "development," depoliticization, and bureaucratic power in Lesotho*. University of Minnesota Press.

Fisheries and Oceans Canada. (1984). *Canada and World Fisheries*. Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/40613513.pdf

Forth, C. E. (2015). *On Fat and Fattening: Agency, Materiality and Animality in the History of Corpulence*.

Garcia, A., & McGlone, J. J. (2022). Animal Welfare and the Acknowledgment of Cultural Differences. *Animals*, *12*(4), Article 4. https://doi.org/10.3390/ani12040474

Gardner, B. (2009). Are livestock a troublesome commodity? *Geoforum*, *40*(5), 781–783. https://doi.org/10.1016/j.geoforum.2009.10.002

Geiger, M., & Hovorka, A. (2015a). Donkeys in development: Welfare assessments and knowledge mobilisation. *Development in Practice*, *25*(8), 1091–1104. https://doi.org/10.1080/09614524.2015.1078776

Geiger, M., & Hovorka, A. J. (2015b). Using physical and emotional parameters to assess donkey welfare in Botswana. *Veterinary Record Open*, *2*(1), e000062. https://doi.org/10.1136/vetreco-2014-000062

Gibbs, L. (2021). Animal geographies II: Killing and caring (in times of crisis). *Progress in Human Geography*, *45*(2), 371–381. https://doi.org/10.1177/0309132520942295

Gillespie, K., & Collard, R.-C. (2015). *Critical animal geographies: Politics, intersections, and hierarchies in a multispecies world*. Routledge, Taylor & Francis Group.

Global Affairs Canada. (2017, February 21). *Elimination of violence against women and girls*. GAC. https://www.international.gc.ca/world-monde/issues_development-enjeux_developpement/gender_equality-egalite_des_genres/violence_against_women-violence_contre_femmes.aspx?lang=eng

Global Affairs Canada. (2018, September 12). *History of Global Affairs Canada*. GAC. https://www.international.gc.ca/gac-amc/history-histoire/index.aspx?lang=eng

Global Affairs Canada. (2021a, July 21). *Global Affairs Canada's Action Plan on Reconciliation with Indigenous Peoples – 2021-2025*. GAC. https://www.international.gc.ca/transparency-transparence/indigenous-reconciliation-autochtones/index.aspx?lang=eng

Global Affairs Canada. (2021b, August 5). *Joint statement by regulators on animal welfare*. GAC. https://www.international.gc.ca/trade-commerce/trade-agreements-accords-commerciaux/agr-acc/ceta-aecg/joint-statement-aw-declaration-commune-ba.aspx?lang=eng

Global Affairs Canada. (2022, June 13). *One Health at the Community Level – Funding opportunity by invitation only*. GAC. https://www.international.gc.ca/world-monde/funding-financement/health-community-sante-communautaire.aspx?lang=eng

Global Affairs Canada. (2023a). *Project profile—Upgrading the Fishery Sector in South Sudan*. Government of Canada. https://w05.international.gc.ca/projectbrowser-banqueprojets/project-projet/details/A035522001

Global Affairs Canada. (2023b, April 5). *Report to Parliament on the Government of Canada's International Assistance 2021-2022*. GAC. https://www.international.gc.ca/transparency-transparence/international-assistance-report-rapport-aide-internationale/2021-2022.aspx?lang=eng

Goldberg, A. M. (2016). Farm Animal Welfare and Human Health. *Current Environmental Health Reports*, *3*(3), 313–321. https://doi.org/10.1007/s40572-016-0097-9

Goldsmith, E. (2002). Development As Colonialism. *World Affairs: The Journal of International Issues*, *6*(2), 18–36.

Gopal, N., Hapke, H. M., Kusakabe, K., Rajaratnam, S., & Williams, M. J. (2020). Expanding the horizons for women in fisheries and aquaculture. *Gender, Technology and Development*, *24*(1), 1–9. https://doi.org/10.1080/09718524.2020.1736353

Government of Canada, C. F. I. A. (2022). *Provincial and territorial legislation concerning welfare of livestock* [Reference material]. https://inspection.canada.ca/animal-health/terrestrial-animals/humane-transport/provincial-and-territorial-legislation-concerning-/eng/1358482954113/1358483058784

Government of Canada, S. C. (2017, November 20). *Other livestock and poultry in Canada*. https://www150.statcan.gc.ca/n1/pub/96-325-x/2017001/article/54874-eng.htm

Govindrajan, R. (2018). *Animal Intimacies: Interspecies Relatedness in India's Central Himalayas*. University of Chicago Press,. https://doi.org/10.7208/9780226560045

Green, T., Talukder, Z., Michaux, K., & Moumin, N. (2018). *"Scale up of Homestead Food Production for improved household food security and nutrition in Cambodia" FISH ON FARMS PHASE 2: FAMILY FARMS FOR THE FUTURE* (Final Technical Report 107982). IDRC.

Gruen, L. (2018). *Critical terms for animal studies*. The University of Chicago Press.

Haelewaters, D., Hofmann, T. A., & Romero-Olivares, A. L. (2021). Ten simple rules for Global North researchers to stop perpetuating helicopter research in the Global South. *PLOS Computational Biology*, *17*(8), e1009277. https://doi.org/10.1371/journal.pcbi.1009277

Halteman, M. C. (2011). Varieties of Harm to Animals in Industrial Farming. *Journal of Animal Ethics*, *1*(2), 122–131. https://doi.org/10.5406/janimalethics.1.2.0122

Hanna, S. (1985). *Fisheries Development Branch: Newfoundland Region* [Canadian Government]. Fisheries and Oceans Canada. https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/144317.pdf

Hardeman, E., & Jochemsen, H. (2012). Are There Ideological Aspects to the Modernization of Agriculture? *Journal of Agricultural & Environmental Ethics*, *25*(5), 657–674. https://doi.org/10.1007/s10806-011-9331-5

Hårstad, R. M. B. (2023). The politics of animal welfare: A scoping review of farm animal welfare governance. *Review of Policy Research*, *0*(0). https://doi.org/10.1111/ropr.12554

Herrero, M., Grace, D., Njuki, J., Johnson, N., Enahoro, D., Silvestri, S., & Rufino, M. C. (2013). The roles of livestock in developing countries. *Animal*, *7*, 3–18. https://doi.org/10.1017/S1751731112001954

Hinton, J., Schouten, C., Austin, A., & Lloyd, D. (2020). An Overview of Rural Development and Small-Scale Beekeeping in Fiji. *Bee World*, *97*(2), 39–44. https://doi.org/10.1080/0005772X.2019.1698104

Hovorka, A. (2008). Transspecies urban theory: Chickens in an African city. *Cultural Geographies*, *15*(1), 95–117. https://doi.org/10.1177/1474474007085784

Hovorka, A. (2019). Animal geographies III: Species relations of power. *Progress in Human Geography*, *43*(4). https://journals.sagepub.com/doi/abs/10.1177/0309132518775837

Hovorka, A. J. (2012). Women/chickens vs. men/cattle: Insights on gender–species intersectionality. *Geoforum*, *43*(4), 875–884. https://doi.org/10.1016/j.geoforum.2012.02.005

Hovorka, A. J. (2017). Animal geographies I: Globalizing and decolonizing. *Progress in Human Geography*, *41*(3), 382–394. https://doi.org/10.1177/0309132516646291

Hovorka, A. J. (2020). Animal Geographies. In A. Kobayashi (Ed.), *International Encyclopedia of Human Geography (Second Edition)* (pp. 127–132). Elsevier. https://doi.org/10.1016/B978-0-08-102295-5.10775-9

Hovorka, A., McCubbin, S., & Patter, L. V. (2021). Introduction to A Research Agenda for Animal Geographies: Visioning amidst socio-ecological crises. In *A Research Agenda for Animal Geographies* (pp. 1–20). Edward Elgar Publishing. https://www.elgaronline.com/display/edcoll/9781788979986/9781788979986.00006.xml

Huertas, S. M., Gallo, C., & Galindo, F. (2014). Drivers of animal welfare policy in the Americas. *Scientific and Technical Review*, *33*(1).

IDRC. (1977). *Agriculture, Food and Nutrition Sciences Division: The first five years*. IDRC, Ottawa, ON, CA. https://idl-bnc-idrc.dspacedirect.org/handle/10625/911

IDRC. (1981). *Decade of learning: International Development Research Centre, Agriculture, Food and Nutrition Sciences Division; the first ten years*. IDRC. https://idl-bnc-idrc.dspacedirect.org/handle/10625/4059?locale-attribute=fr

IDRC. (1992). *One hundred and one technologies: From the South for the South*. International Development Research Centre (IDRC).

IDRC. (2014a). *Accroître la sécurité alimentaire en associant étroitement élevage, arbres et cultures par la pratique de l'agroforesterie au Mali: Rapport technique final (1er mars 2011 - 1er septembre 2014)*. https://idl-bnc-idrc.dspacedirect.org/handle/10625/53593

IDRC. (2014b). *Integrating Dairy Goat and Root Crop Production for Increasing Food, Nutrition and Income Security of Smallholder Farmers in Tanzania* [106515]. IDRC.

IDRC. (2018a). *Contributions to end global hunger*. IDRC.

IDRC. (2018b). *Fermented food for life* (Final Technical Report 108122). IDRC. https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/57268/IDL-57268.pdf

IDRC. (2020). *Improving food security in Africa with novel livestock vaccines: Project story*. https://idl-bnc-idrc.dspacedirect.org/handle/10625/58597

IDRC. (2013, June 24). *New animal vaccines could keep more African farmers in business | IDRC - International Development Research Centre*. https://www.idrc.ca/en/research-in-action/new-animal-vaccines-could-keep-more-african-farmers-business

IDRC. (2019, January 22). *Farm Shop: Scaling access to agricultural inputs in Kenya | IDRC - International Development Research Centre*. Farm Shop: Scaling Access to Agricultural Inputs in Kenya. https://www.idrc.ca/en/research-in-action/farm-shop-scaling-access-agricultural-inputs-kenya

IDRC. (2021). *CultiAF builds on successes and launches new innovations | IDRC - International Development Research Centre*. https://idrc-crdi.ca/en/research-in-action/cultiaf-builds-successes-and-launches-new-innovations

IDRC. (2023a). *CIFSRF*. https://idrc-crdi.ca/en/initiative/canadian-international-food-security-research-fund

IDRC. (2023b). *Collaborative One Health Research Initiative on Epidemics (COHRIE) | IDRC - International Development Research Centre*. https://idrc-crdi.ca/en/initiative/collaborative-one-health-research-initiative-epidemics-cohrie

IFAD. (2023). *Livestock and rangeland*. IFAD. https://www.ifad.org/en/livestock-and-rangeland

Jackson, L. A. (1992). Canadian Bilateral Aid to Jamaica's Agricultural Sector from 1972-86. *Social and Economic Studies*, *41*(2), 83–101.

Jahnke, H. (1983). Livestock production systems and livestock development in tropical Africa. *Agricultural Systems*, *12*(3), 188–190. https://doi.org/10.1016/0308-521X(83)90080-X

Kabuga, J., & Agyemang, K. (1984). Performance of canadian holstein-friesian cattle in the humid forest zone of Ghana: I. Milk production. *Tropical Animal Health and Production*, *16*(2), 85–94. https://doi.org/10.1007/BF02239851

Kamerow, D., & Graham, R. (2014). *The world's deadliest animal*. https://www-jstor-org.ezproxy.library.yorku.ca/stable/26514797?sid=primo

Kanji, A. (2017). Colonial Animality: Canadian Colonialism and the Human-Animal Relationship. *E-International Relations*, *Critical Epistemologies of Global Politics*. https://www.e-ir.info/2017/07/03/colonial-animality-canadian-colonialism-and-the-human-animal-relationship/

Kelly, M. (2016). Animals in International Development, Ethics, Dilemmas and Possibilities. In H. P. Gaisbauer, G. Schweiger, & C. Sedmak (Eds.), *Ethical Issues in Poverty Alleviation* (pp. 113–132). Springer International Publishing. https://doi.org/10.1007/978-3-319-41430-0_7

Kirchhelle, C. (2021). *Bearing Witness: Ruth Harrison and British Farm Animal Welfare (1920–2000)*. Springer Nature. https://doi.org/10.1007/978-3-030-62792-8

Kohut, T. (2016). *110 pooches rescued from dog meat festival arrive in Canada | Globalnews.ca*. https://globalnews.ca/news/3145821/110-pooches-rescued-from-dog-meat-festival-arrive-in-canada/

Kreutzmann, H. (2012). Pastoral Practices in Transition: Animal Husbandry in High Asian Contexts. In H. Kreutzmann (Ed.), *Pastoral practices in High Asia: Agency of "development" effected by modernisation, resettlement and transformation* (pp. 1–29). Springer Netherlands. https://doi.org/10.1007/978-94-007-3846-1_1

Lakshmi, R. (2015). A lynching over beef-eating is part of a rising tide of Hindu nationalism in Modi's India. *Washington Post*. https://www.washingtonpost.com/news/worldviews/wp/2015/08/17/how-life-in-india-has-changed-under-modi-and-why-some-muslims-arent-happy-about-it/

Lal, R. (2020). Integrating Animal Husbandry With Crops and Trees. *Frontiers in Sustainable Food Systems*, *4*. https://www.frontiersin.org/articles/10.3389/fsufs.2020.00113

Lekule, F. P., Lyimo-Macha, J., Mosha-Kilave, D., & Shayo, D. D. (2014). *Bridging gender gaps with dairy goats and root crops*.

Letters. (1977, June 12). *The New York Times*. https://www.nytimes.com/1977/06/12/archives/letters-letters.html

Lowder, S. K., Skoet, J., & Raney, T. (2016). The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide. *World Development*, *87*, 16–29. https://doi.org/10.1016/j.worlddev.2015.10.041

Mack, S., Hoffmann, D., & Otte, J. (2005). The contribution of poultry to rural development. *World's Poultry Science Journal*, *61*(1), 7–14. https://doi.org/10.1079/WPS200436

Mangurkar, B. R., & Joshi, A. L. (1994). *Recent Advances in Livestock Production Technologies: Proceedings of a national workshop, May 21-22, 1993*. https://idl-bnc-idrc.dspacedirect.org/handle/10625/15331

Marchant, J. N., Doyle, R. E., Hötzel, M. J., Iyasere, O. S., & Sinclair, M. (2023). Editorial: The emergence of animal welfare science and policy in Africa, Asia and Latin America. *Frontiers in Veterinary Science*, *10*. https://www.frontiersin.org/articles/10.3389/fvets.2023.1171229

McKague, K., McPherson, J., Harji, K., Jiwa, F., Ng, G., & Amarelo, S. (2018). *Farm Shop: Scaling a Social Franchise Final Technical Report*. IDRC. https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/57032/IDL-57032.pdf?sequence=4&isAllowed=y

Meyer-Rochow, V. B. (2009). Food taboos: Their origins and purposes. *Journal of Ethnobiology and Ethnomedicine*, *5*(1), 18. https://doi.org/10.1186/1746-4269-5-18

Mitchell, T. (2019). Can the Mosquito Speak? In *Rule of Experts* (pp. 19–53). University of California Press. https://doi.org/10.1525/9780520928251-005

Mkenda-Mugittu, V. (2003). Measuring the invisibles: Gender mainstreaming and monitoring experience from a dairy development project in Tanzania. *Development in Practice*, *13*(5), 459–473. https://doi.org/10.1080/0961452032000125848

Molomo, M., & Mumba, T. (2014). Drivers for animal welfare policies in Africa: -EN- Drivers for animal welfare policies in Africa -FR- Les moteurs des politiques du bien-être animal en Afrique -ES- Motores de las políticas de bienestar animal en África. *Revue Scientifique et Technique de l'OIE*, *33*(1), 47–53. https://doi.org/10.20506/rst.33.1.2265

Montford, K. S., & Taylor, C. (2020). *Colonialism and Animality: Anti-Colonial Perspectives in Critical Animal Studies*. Routledge. https://doi.org/10.4324/9781003013891

Morrison, D. (1998). *Aid and Ebb tide: A History of CIDA and Canadian Development Assistance*. Wilfrid Laurier University Press. https://books-scholarsportal-info.ezproxy.library.yorku.ca/en/read?id=/ebooks/ebooks0/gibson_crkn/2009-12-01/2/402443#page=24

Muirhead, B., & Harpelle, R. (2010). *IDRC 40 Years of Ideas, Innovation, and Impact*. Wilfrid Laurier University Press. https://books-scholarsportal-

info.ezproxy.library.yorku.ca/en/read?id=/ebooks/ebooks3/upress/2013-08-30/1/9781554583164#page=20

Nelson, I. L. (2017). Interspecies care and aging in a gorilla 2.0 world. *Geoforum*, *79*, 144–152. https://doi.org/10.1016/j.geoforum.2016.02.007

Neo, H. (2017). *Geographies of meat: Politics, economy and culture*. Routledge. https://doi.org/10.4324/9781315584386

Neuman, W. L. (2014). Social Research Methods: Qualitative and Quantitative Approaches. *Teaching Sociology*, *30*(3), 380. https://doi.org/10.2307/3211488

Njuki, J., Waithanji, E., Lyimo-Macha, J., Kariuki, J., & Mburu, S. (2013). *Women, Livestock Ownership and Markets: Bridging the Gender Gap in Eastern and Southern Africa*. Routledge.

O'Brien, M. (2000). *The Implementation Of CIDA's China Program: Resolving The Disjuncture Between Structure And Process* [York University]. https://www.nlc-bnc.ca/obj/s4/f2/dsk2/ftp03/NQ56251.pdf

OECD. (2021). *What is ODA?* https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/What-is-ODA.pdf

Orsat, V., Yenagi, N., King, O., & Kumar, R. (2013). *Enhancing food security of rural families through production, processing, and value addition of regional staple food grains in India* (Final Technical Report). https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/52738/IDL-52738.pdf

Otter, C., O'Sullivan, S., & Ross, S. (2012). Laying the Foundations for an International Animal Protection Regime. *Journal of Animal Ethics*, *2*(1), 53–72. https://doi.org/10.5406/janimalethics.2.1.0053

Parikh, A., & Miller, C. (2019). Holy Cow! Beef Ban, Political Technologies, and Brahmanical Supremacy in Modi's India. *ACME an International E-Journal for Critical Geographies*, *18*(4), 835-.

Parlasca, M., Knößlsdorfer, I., Alemayehu, G., & Doyle, R. (2023). How and why animal welfare concerns evolve in developing countries. *Animal Frontiers*, *13*(1), 26–33. https://doi.org/10.1093/af/vfac082

Patel, S. J., Patel, M. D., Patel, J. H., Patel, A. S., & Gelani, R. N. (2016). *Role of women gender in livestock sector: A review*.

Perry, B., & Grace, D. (2009). The impacts of livestock diseases and their control on growth and development processes that are pro-poor. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *364*(1530), 2643–2655. https://doi.org/10.1098/rstb.2009.0097

Phillip, L. E., & Francis-Granderson, I. (2014). *Final Technical Report—Improving the Nutrition and Health of CARICOM Populations* (106525). IDRC. https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/53596/IDL-53596.pdf?sequence=1&isAllowed=y

Pinillos, R. G. (2018). *One welfare: A framework to improve animal welfare and human well-being*. CABI.

Pocol, C. B., & McDonough, M. (2015). Women, Apiculture and Development: Evaluating the Impact of a Beekeeping Project on Rural Women's Livelihoods. *Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Horticulture*, *72*. https://doi.org/10.15835/buasvmcn-hort:11423

Project Browser—Canada.ca. (2023). https://w05.international.gc.ca/projectbrowser-banqueprojets/

Pudasaini, R., Chapagain, T., & Raizada, M. (2018). *CIFSRF final technical report: Innovations for terrace farmers in Nepal and testing of private sector scaling up using sustainable agriculture kits and stall-based franchises*. https://idl-bnc-idrc.dspacedirect.org/handle/10625/57031

Purcell, N. (2011). Cruel Intimacies and Risky Relationships: Accounting for Suffering in Industrial Livestock Production. *Society & Animals*, *19*(1), 59–81. https://doi.org/10.1163/156853011X545538

Qekwana, D. N., McCrindle, C. M. E., Cenci-Goga, B., & Grace, D. (2019). X Animal welfare in Africa: Strength of cultural traditions, challenges and perspectives. *Science to Law*.

Quijano, A. (2007). COLONIALITY AND MODERNITY/RATIONALITY. *Cultural Studies (London, England)*, *21*(2–3), 168–178. https://doi.org/10.1080/09502380601164353

Radostits, O. M., Leslie, K. E., & Fetrow, J. (1994). Herd health: Food animal production medicine. *Herd Health: Food Animal Production Medicine.*, *Ed. 2*. https://www.cabdirect.org/cabdirect/abstract/19942208204

Rainville, T. (2018). *Amazon Fish for Food 2015-2018: Improving Food Security in Bolivia*. IDRC. https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/56959/IDL-56959.pdf?sequence=2&isAllowed=y

Ramankutty, N., Mehrabi, Z., Waha, K., Jarvis, L., Kremen, C., Herrero, M., & Rieseberg, L. H. (2018). Trends in Global Agricultural Land Use: Implications for Environmental Health and Food Security. *Annual Review of Plant Biology*, *69*(1), 789–815. https://doi.org/10.1146/annurev-arplant-042817-040256

Randolph, T. F., Schelling, E., Grace, D., Nicholson, C. F., Leroy, J. L., Cole, D. C., Demment, M. W., Omore, A., Zinsstag, J., & Ruel, M. (2007). Invited Review: Role of livestock in human nutrition and health for poverty reduction in developing countries1,2,3. *Journal of Animal Science*, *85*(11), 2788–2800. https://doi.org/10.2527/jas.2007-0467

Rault, J.-L., Sandøe, P., Sonntag, Q., & Stuardo, L. (2022). Positive Animal Welfare: Bridging the Gap or Raising Inequalities Worldwide? *Frontiers in Animal Science*, *3*. https://www.frontiersin.org/articles/10.3389/fanim.2022.825379

Reardon, T., & Barrett, C. B. (2000). Agroindustrialization, globalization, and international development: An overview of issues, patterns, and determinants. *Agricultural Economics*, *23*(3), 195–205. https://doi.org/10.1111/j.1574-0862.2000.tb00272.x

Reddy, V., Goga, S., Timol, F., Molefi, S., Mather, A., Chetty, T., & Wallace, D. (2015). *Gender, small-scale livestock farming and food security: Policy implications in the South African context*. https://doi.org/10/1974

Rewe, T. O., Ogore, P. B., & Kahi, A. K. (2002). *Integrated Goat Projects in Kenya: Impact on Genetic Improvement*. 7th World Congress on Genetics Applied to Livestock Production, Montpellier, France.

Rosete, Yaima A., Diallo, T. H. A., & Konan Konan, J. L. (2017). *CIFSRF-IDRC /DFATD FINAL TECHNICAL REPORT, Project Title: 'Improving livelihoods of resource-poor coconut smallholder farmers threatened by*

an emerging lethal yellowing disease of coconut in the coastal region of Côte d'Ivoire—'Fighting lethal disease for coconut farmers' (IDRC Final Rechnical Report 107789).

Rota, A., & Sperandini, S. (2010). *Gender and livestock: Tools for design* [Thematic Paper: Tools for Design]. IFAD. https://www.ifad.org/documents/38714170/39148759/Gender+and+livestock.pdf/67c6dca9-4a11-4f53-931e-2ccb46105a3c

Sanger, C. (1969). *Half a loaf: Canada's semi-role among developing countries.* Ryerson Press.

Sargison, N. D. (2020). The critical importance of planned small ruminant livestock health and production in addressing global challenges surrounding food production and poverty alleviation. *New Zealand Veterinary Journal*, *68*(3), 136–144. https://doi.org/10.1080/00480169.2020.1719373

Schouten, C., & Lloyd, D. J. (2019). Considerations and Factors Influencing the Success of Beekeeping Programs in Developing Countries. *Bee World*, *96*(3), 75–80. https://doi.org/10.1080/0005772X.2019.1607805

Schreier, M. (2012). *Qualitative Content Analysis in Practice*. SAGE Publications. https://uk.sagepub.com/en-gb/eur/qualitative-content-analysis-in-practice/book234633

Scoones, I. (2021). Pastoralists and peasants: Perspectives on agrarian change. *The Journal of Peasant Studies*, *48*(1), 1–47. https://doi.org/10.1080/03066150.2020.1802249

Sellars, L., Bernotas, K., & Sebo, J. (2021). One Health, COVID-19, and a Right to Health for Human and Nonhuman Animals. *Health and Human Rights*, *23*(2), 35–47.

Sen, A. (2000). A Decade of Human Development. *Journal of Human Development*, *1*(1), 17–23. https://doi.org/10.1080/14649880050008746

Seymour, & Wolch. (2010). "A little bird told me …": Approaching animals through Qualitative Methods. In *The SAGE Handbook of Qualitative Geography* (pp. 305–320). SAGE.

Shaxson, L., Löwe, A., Keats, S., & Wiggins, S. (2018). *Understanding the CIFSRF Phase Two portfolio's contribution to sustainable increases in productivity*. Overseas Development Institute. https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/57231/IDL-57231.pdf?sequence=2&isAllowed=y

Sinclair, M., Fryer, C., & Phillips, C. J. C. (2019). The Benefits of Improving Animal Welfare from the Perspective of Livestock Stakeholders across Asia. *Animals*, *9*(4), Article 4. https://doi.org/10.3390/ani9040123

Sinclair, M., Lee, N. Y., Hötzel, M. J., de Luna, M. C. T., Sharma, A., Idris, M., Derkley, T., Li, C., Islam, M. A., Iyasere, O. S., Navarro, G., Ahmed, A. A., Khruapradab, C., Curry, M., Burns, G. L., & Al, E. (2022). International perceptions of animals and the importance of their welfare. *Frontiers in Animal Science*, *3*, 960379. https://doi.org/10.3389/fanim.2022.960379

Sinclair, M., & Phillips, C. J. C. (2017). The Cross-Cultural Importance of Animal Protection and Other World Social Issues. *Journal of Agricultural and Environmental Ethics*, *30*(3), 439–455. https://doi.org/10.1007/s10806-017-9676-5

Sinclair, M., & Phillips, C. J. C. (2018). Key Tenets of Operational Success in International Animal Welfare Initiatives. *Animals*, *8*(6), Article 6. https://doi.org/10.3390/ani8060092

Slater, J. (2022). Eating Insects: A Christian Ethic of Farmed Insect Life. *Studies in Christian Ethics*, *35*(1), 155–171. https://doi.org/10.1177/09539468211045030

Smalley, A. L. (2017). *Wild by Nature: North American Animals Confront Colonization*. JHU Press.

Smith, L. (2019). *Aquaculture Development In Less Developed Countries: Social, Economic, And Political Problems*. Routledge.

Srinivasan, K. (2022). Re-animalising wellbeing: Multispecies justice after development. *The Sociological Review*, *70*(2), 352–366. https://doi.org/10.1177/00380261221084781

Srinivasan, K., & Kasturirangan, R. (2016). Political ecology, development, and human exceptionalism. *Geoforum*, *75*, 125–128. https://doi.org/10.1016/j.geoforum.2016.07.011

Stamp Dawkins, M. (2021). *The Science of Animal Welfare*. Oxford University Press. https://books-scholarsportal-info.ezproxy.library.yorku.ca/en/read?id=/ebooks/ebooks6/oso6/2021-01-25/1/oso-9780198848981-StampDawkins#page=15

Standing Committee on Foreign Affairs and International Trade. (2000). https://www.ourcommons.ca/DocumentViewer/en/36-2/FAIT/meeting-59/evidence

Stephen, C., DeJager, T., Daniel, S., Jayakody, S., & Dawson, J. (2013). *Promoting rural income from sustainable aquaculture through social learning in Sri Lanka: Final technical report (August 2010 - December 2012)*. https://idl-bnc-idrc.dspacedirect.org/handle/10625/50891

Subramanian, J., Subramanian, K. S., Hewajulige, I. G. N., Hutchinson, M. J., Wickham, L. D., & Mwatawala, M. (2018). *Enhanced preservation of fruits using Nanotechnology* [IDRC Final Rechnical Report]. IDRC.

Szűcs, E., Geers, R., Jezierski, T., Sossidou, E. N., & Broom, D. M. (2012). Animal Welfare in Different Human Cultures, Traditions and Religious Faiths. *Asian-Australasian Journal of Animal Sciences*, *25*(11), 1499–1506. https://doi.org/10.5713/ajas.2012.r.02

Tagawa, K., Hosoya, T., Hyakumura, K., Suzuki, D., Yoshizawa, S., & Praxaysombath, B. (2022). The effects of season, geography, and urbanization on the diversity of edible insects at food markets in Laos. *PLoS ONE*, *17*(4). https://doi.org/10.1371/journal.pone.0267307

Talukder, Z., & Green, T. (2014). *Fish on Farms: Final technical report*. IDRC. https://idl-bnc-idrc.dspacedirect.org/handle/10625/53602

Tang, C., Ding, Y., Liao, H., Link to external site, this link will open in a new window, Sun, H., Liu, C., Wei, L., & Li, F. (2019). Edible insects as a food source: A review. *Food Production, Processing and Nutrition*, *1*, 1–13. https://doi.org/10.1186/s43014-019-0008-1

Tarawali, S., Herrero, M., Descheemaeker, K., Grings, E., & Blümmel, M. (2011). Pathways for sustainable development of mixed crop livestock systems: Taking a livestock and pro-poor approach. *Livestock Science*, *139*(1–2), 11–21. https://doi.org/10.1016/j.livsci.2011.03.003

Thomson, S. (1980). *Food for the poor: The role of CIDA in agricultural, fisheries and rural development, a discussion paper*. Science Council of Canada.

Thornton, P. K., & Gerber, P. J. (2010). Climate change and the growth of the livestock sector in developing countries. *Mitigation and Adaptation Strategies for Global Change*, *15*(2), 169–184. https://doi.org/10.1007/s11027-009-9210-9

Todd, Z. (2014). Fish pluralities: Human-animal relations and sites of engagement in Paulatuuq, Arctic Canada. *Etudes Inuit*, *38*(1/2), 217–238. https://doi.org/10.7202/1028861ar

UBC. (n.d.). *Fish on Farms Case Study: Gender and Nutrition*. Retrieved June 29, 2023, from https://studylib.net/doc/8174761/fish-on-farms-case-study--gender-and-nutrition

Uddin, A. H. M. M., Petrovski, K. R., Song, Y., Garg, S., & Kirkwood, R. N. (2023). Application of Exogenous GnRH in Food Animal Production. *Animals*, *13*(12), Article 12. https://doi.org/10.3390/ani13121891

Ugás, R., & Van den Eeckhout, H. (2014). *Ecological and socioeconomic intensification of smallholder agriculture in the Andes* [IDRC Final Rechnical Report]. https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/53597/IDL-53597.pdf

UNEP. (2022, October 17). *One Health Joint Plan of Action (2022—2026)*. UNEP - UN Environment Programme. http://www.unep.org/resources/publication/one-health-joint-plan-action-2022-2026

Unknown. (1946). *Digital Collections—First air shipment of Holstein cattle from Canada to Latin America, Calgary, Alberta.* Univeristy of Calgary. https://digitalcollections.ucalgary.ca/CS.aspx?VP3=DamView&VBID=2R3BXZ7GH06FE&PN=12&DocRID=2R3BF1SEY8XG&FR_=1&W=960&H=911

Urbanik, J. (2012). *Placing animals: An introduction to the geography of human-animal relations*. Rowman & Littlefield Publishers.

Verniers, E. (2021). Bringing animal welfare under the umbrella of sustainable development: A legal analysis. *Review of European Community & International Environmental Law*, *30*(3), 349–362. https://doi.org/10.1111/reel.12414

Visseren-Hamakers, I. J. (2020). The 18th Sustainable Development Goal. *Earth System Governance*, *3*, 100047-. https://doi.org/10.1016/j.esg.2020.100047

Wanyoike, F., & Baker, D. (2013). Pro-poor development performance of livestock projects: Analysis and lessons from projects' documentation. *Development in Practice*, *23*(7), 889–907.

Wasley, A., & Heal, A. (2020, July 2). Revealed: Development banks funding industrial livestock farms around the world. *The Guardian*. https://www.theguardian.com/environment/2020/jul/02/revealed-development-banks-funding-industrial-livestock-farms-around-the-world

White, S. (2013). Into the Void: International Law and the Protection of Animal Welfare. *Global Policy*, *4*(4). https://doi.org/10.1111/1758-5899.12076

White, T. (2020). Domesticating the Belt and Road: Rural development, spatial politics, and animal geographies in Inner Mongolia. *Eurasian Geography and Economics*, *61*(1), 13–33. https://doi.org/10.1080/15387216.2020.1720761

Wolch, J. R., & Emel, J. (1998). *Animal Geographies: Place, Politics, and Identity in the Nature-culture Borderlands*. Verso.

Woods, A., Bresalier, M., Cassidy, A., & Mason Dentinger, R. (2017). *Animals and the Shaping of Modern Medicine: One Health and Its Histories*. Springer Nature. https://doi.org/10.1007/978-3-319-64337-3

World Bank. (2001). *Livestock development: Implications for rural poverty, the environment, and global food security*. https://openknowledge.worldbank.org/server/api/core/bitstreams/28146333-cdaa-53af-bd62-ed507cb3734a/content

Young, E. M. (2012). *Food and Development*. Routledge. https://www.routledge.com/Food-and-Development/Young/p/book/9780415498005

Young, J. R., Rast, L., Suon, S., Bush, R. D., Henry, L. A., Windsor, P. A., Young, J. R., Rast, L., Suon, S., Bush, R. D., Henry, L. A., & Windsor, P. A. (2013). The impact of best practice health and husbandry interventions on smallholder cattle productivity in southern Cambodia. *Animal Production Science*, *54*(5), 629–637. https://doi.org/10.1071/AN13033

Ziai, A. (2015). *Development Discourse and Global History: From colonialism to the sustainable development goals* (1st ed.). Routledge. https://doi.org/10.4324/9781315753782

Appendix 1

ID Number	Project Name	Inclusion
106314	Enhancing food security of rural families through production, processing, and value addition of regional staple food grains in India	Indirect
106342	Phase 1: Promoting Rural Income from Sustainable Aquaculture through Social Learning in Sri Lanka	Direct
106505	Alleviating Poverty and Malnutrition in Agro-Biodiversity Hotspots	Direct
106506	Phase 1: Revalorizing Small Millets in Rainfed Regions of South Asia	Indirect
106510	Enhancing Ecologically Resilient Food Security through Innovative Farming Systems in the Semi-Arid Midlands of Kenya	Direct
106512	Integrating Dairy Goat and Root Crop Production for Increasing Food, Nutrition, and Income Security of Smallholder Farmers in Tanzania	Direct
106515	Accroître la sécurité alimentaire en associant étroitement élevage, arbres et cultures par la pratique de l'agroforesterie au Mali	Direct
106516	Integrated Nutrient and Water Management for Sustainable Food Production in the Sahel	Indirect
106524	Phase 1: Food Security, Fisheries and Aquaculture in The Bolivian Amazon	Direct
106525	Improving the Nutrition and Health of CARICOM Populations	Direct
106928	Phase 1: Fish on Farms: Integration of Small-Scale Aquaculture with Homestead Food Production for Improved Household Food Security and Nutrition in Rural Cambodia	Direct
106929	Phase 1: Development of a Vaccine to Eradicate Contagious Bovine PleuroPneumonia in Africa	Direct
106930	Phase 1: Livestock Vaccines Against Viral Diseases for Developing Farmers in sub-Saharan Africa	Direct
106931	Phase 1: Enhanced Preservation of Fruits in South Asia	Indirect
107519	Phase 2: Scaling Up Sustainable Aquaculture Development in Sri Lanka	Direct
107789	Improving livelihoods of resource-poor coconut smallholder farmers threatened by an emerging lethal yellowing disease of coconut in the coastal region of Côte d'Ivoire - 'Fighting lethal disease for coconut farmers'	Indirect
107791	Phase 2: Innovations for terrace farmers in Nepal and Testing of private sector scaling up using Sustainable agriculture kits and stall-based	Indirect
107847	Phase 2: Enhanced Preservation of Fruits Using Nanotechnology	Indirect
107848	Phase 2: Novel livestock vaccines for viral diseases in Africa towards improved food security	Direct
107849	Phase 2: Development of a subunit vaccine for contagious bovine pleuropneumonia in Africa	Direct
107982	Phase 2: Scale Up of Homestead Food Production for Improved Household Food Security and Nutrition In Cambodia – 'Fish On Farms Phase 2: Family Farms For The Future'	Direct
107983	Phase 2: Scaling Up Fertilizer Micro-Dosing and Indigenous Vegetable Production and Utilization in West Africa	Indirect
107984	Scaling Up Pulse Innovations for Food and Nutrition Security in Southern Ethiopia	Indirect
107985	Phase 2: Amazon Fish For Food "Peces Para La Vida" Bolivia	Direct

108122	Fermented Food for Life	Indirect
108126	Farm Shop: Scaling a Social Franchise	Indirect
108127	Scaling-up improved legume technologies in Tanzania (SILT)	Indirect

Appendix 2

Animal	Project ID	Animal	Project ID
Fish*	106505	Poultry*	108126, 107789, 107982
Ornamental	106342	Chicken	108127, 106928
Catla (catla catla)	106342/107519	Indigenous chicken Kenya	106510
Common Carp (Cyprinus carpio)	106342/107519	Country chicken India	106505
Rohu (Labeo Rohita)	106342/107519, 106928/107982	Sheep	106525, 106930/107848
Nile Tilapia - Genetically improved farm tilapia (GIFT)	106342/107519	Djallonké (sheep)	106515
Paiche (Arapaima gigas) introduced	106524/107985	Maure (sheep)	106515
Catfish buchere (Hopolosternum littorale)	106524	Goat	106525, 106930/107848
Hatchet fish (Trichopterus spp)	106524	“Local goat breeds” -India	106505
Astyanax altiparanae	106524	Toggenburg (goat)	106512
Lisa (Leporinus trifasciatus)	106524	Norwegian Breeds (goat)	106512
Pacu/Tambaqui (Colossoma macropomum)*	106524/107985	Cattle	106928, 106930/107848, 106516, 107791, 108126
Pacu/Tambaqui (Piaractus brachypomus)*	106524/107985	Boran (cattle)	106929/107849
Sábalo (Prochilodus nigricans)	106524	Zebu (cattle)	106929/107849
Surubi catfish (Pseudoplatystoma sp.)	106524	Angus (cattle)	106929
Mapara catfish (Hypophthalmus marginatus)	106524	Pig	106930/107848
Silver Carp (Hypophthalmichthys molitrix)	106928	Wild Pigs - India	106506
Tilapia (not specific)	107982	Earthworms	106314, 106505, 106931/107847
Snakehead fish	106342	African bollworm	107984
Silver barb (Barbonymus gonionotus)	106928/107982	Weevil	106931/107847
Mrigal (Cirrhinus mrigala)	106928/107982	Bee	106505, 106931/107847, 108122
Flying barb (Esomus longimanus)	106928	Fruit Fly	106931/107847
Croaking gourami (Trichopsis vittata)	106928	Leaf Hopper (Nedotepa curta Dimitriev)	107789
Minnow (Amblypharyngodon chulaborna)	106928	Unspecified Insects	106510, 106525, 106928, 106931 107983, 107789, 107984
Zebra Fish	106931/107847	mosquitoes & biting flies	106930
Shrimp	106342/107519	Donkey	106510
Oyster	106342/107519	Rabbit	106930
Lobster	106342/107519	Monkey	106525

Zooplankton	106928	Rat	106506
Unknown - 107982 (predator), 108122 (milk producer), 106505 (animal traction), 107983 (lab animal model, and manure producer)		Wild Birds	106510, 107984
		gastrointestinal nematodes	106512
		fairyfly (Anagrus nedotepae)	107789