

Should New Zealand Do More to Uphold Animal Welfare?

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Abstract: Governmental and industry representatives have repeatedly claimed that Aotearoa New Zealand leads the world on animal welfare, largely based on an assessment by global animal protection charity World Animal Protection (WAP). New Zealand's leading ranking rested primarily on favourable comparisons of its animal welfare legislation with that of 50 other nations, within WAP's 2014 Animal Protection Index. Unfortunately, however, review of welfare problems extant within the farming of meat chickens and laying hens, pigs, cows and sheep, reveals the persistence of systemic welfare compromises within most New Zealand animal farming systems. These are contrary to good ethics, to our duty of care toward these animals, to the wishes of domestic and international consumers, and to the interests of New Zealand's animal production industries, which make an unusually large contribution to New Zealand's national economy. Accordingly, and despite progress to date, this study finds that significant further resource investment and policy reform within the field of animal welfare are clearly warranted within New Zealand.

Keywords: Animal welfare, animal law, animal policy, animal ethics, Animal Protection Index, Voiceless Animal Cruelty Index, New Zealand

Claims about New Zealand leadership in animal welfare

New Zealand's government has repeatedly asserted that the nation leads the world in animal welfare. In 2017, then Minister for Primary Industries Nathan Guy asserted that 'In 2014, New Zealand's animal welfare system was ranked 1st equal [sic.] out of 50 countries assessed by the global animal protection charity World Animal Protection'. Later that year, New Zealand's Ministry for Primary Industries expanded on this claim: 'New Zealand's animal welfare systems are world-class, as demonstrated by our "A" grading for animal welfare, alongside the United Kingdom (UK), Switzerland and Austria, in the Animal Protection Index produced by World Animal Protection' (*Animal Welfare in New Zealand*).

The Animal Protection Index (API), produced by World Animal Protection (WAP) in 2014, considers the 50 nations that produce the most beef, poultry, pork, sheep and goats, milk and eggs, when considering 2012 statistics published by the Food and Agriculture Organisation of the United Nations. The API ranked these nations according to their legislation and policy commitments to protecting animals. The 2014 rankings were based on the extent to which countries considered animal sentience and the importance of animal protection as a societal value; their governance structures and commitments to improving animal protection; the extent of incorporation of the World Organisation for Animal Health (OIE)'s animal welfare standards within law or policy; the inclusion of animal care and protection within the national education system; and the level of government consultation and engagement with relevant stakeholders on animal protection issues. The second edition of the API was released in 2020. It examined 10 indicators similarly addressing key animal welfare issues. The focus on animal legislation also increased, with four indicators removed from assessment, because they were not directly assessing legislation. Scoring also became more stringent, reflecting evolving societal expectations and updated scientific evidence concerning animal welfare (WAP, 'Animal Protection Index, Methodology').

The 2014 rankings did indeed give New Zealand an A-Grade ranking (albeit revised to a C in 2020), along with the other nations mentioned above (WAP). Such claims about New Zealand leadership in animal welfare have been repeated by organisations representing its animal

production industries. Dairy NZ, which represents New Zealand's dairy sector, refers to them, adding that animal care provided by New Zealand's dairy industry is 'world leading' (Dairy NZ).

Given such governmental and industry positions, it might be presumed that New Zealand has made sufficient progress within the domain of animal welfare, and that investments of time, energy and money aimed at further progress are not currently warranted, given competing demands for these social and private resources.

Accordingly, this article examines the welfare concerns that continue to be associated with the farming of the main animal species (poultry, pigs, cattle and sheep) within New Zealand, through a thorough examination of relevant veterinary, other scientific, governmental and industry literature. It then considers whether ongoing welfare problems are sufficient to warrant substantial further resource investment and policy reform. The article begins by examining the rise of animal agriculture to a position of unusual national prominence.

An agricultural economy

New Zealand's unique ecological history has contributed to its status as a global biodiversity hotspot. Its geographic isolation combined with a near-total absence of terrestrial mammalian predators or competitors allowed its birds and invertebrates to become unusually large and flightless. Examples include the moa, wētā and giant land snails (Keegan).

However, anthropogenic extinctions began with the arrival of Polynesian explorers, who would later become New Zealand's indigenous Māori people, settling New Zealand around 700 years ago. The fire they brought – which had previously been rare – resulted in approximately 50% of the native forest being lost in a matter of decades (McWethy *et al.* 2013). Thirty to forty native bird species became extinct, including all species of moa, and the New Zealand fur seal population was severely depleted (Anderson 20).

The pace of ecological change was greatly accelerated around 180 years ago by European colonisation. Andrews describes the process:








In the first few decades of the nineteenth century the remaining fur seals were hunted almost to extinction for fur and oil, and the southern right whales for baleen and oil, to clothe the citizens and lubricate the factories and illuminate the streets of northern hemisphere cities. By the end of that century half the remaining native forest had been cut for timber, or burnt off (along with the protective fern and scrub cover in areas already deforested by Māori) to make space for pastureland. Eighty-five per cent of New Zealand's wetlands were drained for the same purpose. Virtually no terrain, other than the higher mountains, was left untouched by agriculture: today 60 per cent of the total landmass of New Zealand is taken up by farms or production forests. (140; see also Potts, Armstrong and Brown)

By 1840, the sealing and shore whaling industries were in demise, being replaced with a new primary export: wool. During the 1830s and 1840s, merinos were imported from Australia in great numbers (Belich, *Making Peoples* 341-343). The commencement of the refrigerated shipping industry in the 1880s stimulated a vast expansion of meat and dairy production for export to the British market. As Belich states, this 'fundamentally shaped the social, political and economic character of New Zealand over the ensuing century' (*Paradise Reforged* 53). One hundred years after refrigerated shipping commenced, the country's sheep population peaked at 70 million (Stringleman and Peden).

By 2005, over 60% of New Zealand's earnings derived from the agricultural sector (Rahman et al.). By 2009 nearly half of its export income was derived from farmed animals and their products (MAF, *Animal Welfare in New Zealand*). By 2017, New Zealand was the world's 12th largest agricultural exporter (by value), the number one exporter of sheep meat and dairy produce, and the number two exporter of wool (MPI, 'Growing Exports'). These industries continued to grow, and by June 2019 dairy products were New Zealand's greatest primary industry source of export revenue, worth NZD 18.1 billion, up from 14.0 billion in 2015. Meat and wool were second, worth NZD 10.2 billion, up from 9.0 billion in 2015 (table 1). The growth in the dairy sector has been particularly pronounced. By 2017 there had been a 70% increase in dairy cattle, compared with 1994 (Stats NZ, 'Livestock Numbers'), and by 2009 New Zealand's dairy co-operative company Fonterra had become the world's largest

dairy exporter, responsible for approximately 30% of global dairy exports. With revenue of NZD 16.7 billion, by 2010 it was New Zealand's largest company (Fonterra 4).

Table 1
2015 – 2021 export revenue from New Zealand primary industries, NZD

	Actual					Forecast	
	2015	2016	2017	2018	2019	2020	2021
 Dairy	14,050	13,289	14,638	16,655	18,107	19,630	19,450
 Meat and Wool	9,000	9,200	8,355	9,542	10,176	10,430	10,680
 Forestry	4,683	5,140	5,482	6,382	6,883	6,000	6,600
 Horticulture	4,185	5,000	5,165	5,392	6,111	6,400	6,530
 Seafood	1,562	1,768	1,744	1,777	1,963	2,090	2,210
 Arable	181	210	197	243	236	260	255
 Other primary sector*	2,417	2,714	2,639	2,709	2,852	3,060	3,140
Total	36,079	37,323	38,220	42,700	46,329	47,870	48,865
% Change year on year	-6.8%	+3.4%	+2.4%	+11.7%	+8.5%	+3.3%	+2.1%

Source: Stats NZ and MPI.

* Other Primary Sector Exports and Foods includes live animals, honey, and processed food.

Source: MPI, *Situation and Outlook 4*.

The impacts of large-scale land clearing for pastoral production have been similarly profound. By 2011 New Zealand's forest ecosystems were reportedly equal second most endangered worldwide, with only 7% of natural habitat remaining according to Conservation International ('NZ's Forests').

The unusual prominence of New Zealand's animal-based agricultural sector has also increased concerns about animal welfare. Welfare challenges are prevalent within the modern farming of animals, being created by management factors, such as space and environment, nutrition, husbandry, access to veterinary care, and degree of opportunities to express normal

behaviour, including social behaviour, and also created by animal factors such as genetics and temperament. Welfare problems may occur when animals are farmed, transported and slaughtered.

Evolving conceptualisations of animal welfare

Understanding of animal welfare has significantly evolved over recent decades. Initial definitions focused solely on animal health, but affective states (feelings and emotions) have recently become important considerations. Additionally, Rollin has revived the Aristotelian concept of telos: the essence of an animal, or the ‘constellation of functions constitutive of its nature’. Today, an animal is considered to have good welfare if he or she enjoys physical and mental wellbeing and has the ability to engage in most natural behaviours (not all are beneficial).

The Five Freedoms proposed by the UK’s Brambell Committee (1965) provided a fundamental framework for assessing animal welfare. These comprise Freedom from hunger and thirst, Freedom from discomfort, Freedom from pain, injury and disease, Freedom to express normal behaviour and the Freedom from fear and distress. Provision of all five is considered essential for safeguarding welfare, so these Five Freedoms underpin much applicable policy and legislation worldwide. However, modern recognition that positive experiences are also important for animals, as well as avoidance of negative states (Mellor, ‘Enhancing Animal Welfare’), has led to an updated concept of Five Provisions, which may be succinctly summarised as Good nutrition, Good environment, Good health, Appropriate behaviour and Positive mental experiences (Mellor, ‘Updating Animal Welfare Thinking’).

Quality of life has also been conceptually developed. For lifetime welfare to be good, positive experiences should predominate, and the UK Farm Animal Welfare Council (FAWC) developed a continuum extending from ‘a life not worth living”, through ‘a life worth living’ to ‘a good life’. FAWC asserted that the minimum socially acceptable standard should be a life worth living, and that we should always aim to provide good lives for the animals in our care (*Farm Animal Welfare in Great Britain*).

Methodology

To ascertain whether New Zealand's main farmed animal species experience acceptable standards of welfare, relevant veterinary and other scientific literature was retrieved, summarising the welfare concerns associated with the farming of poultry, pigs, cattle and sheep in New Zealand. This was sourced from appropriate bibliographic databases, texts, governmental and industry reports, between 2017-2020. The analysis provided is that of a veterinary professor and specialist in animal welfare, accredited within New Zealand, Europe, the UK and US.

Specific studies of New Zealand animals are relatively few, do not cover all welfare aspects, and are sometimes dated. This is because New Zealand is a small nation, despite being heavily dependent on its agricultural sector. With an estimated 4.8 million human inhabitants in 2020, it ranked 126th in terms of national population (World Population Review 2019). Unsurprisingly therefore, most studies examining farmed animal welfare are international. Where appropriate, these have been utilised. This could theoretically result in errors, however such risks are very small, because animals of a common species, sex, age, and medical history (such as vaccinations and parasiticides), housed in similar confinement system, or subjected to similar management procedures, are likely to be similarly affected – even in nations designated as different by humans.

Poultry

Very large numbers of chickens (particularly), turkeys and ducks are farmed in New Zealand. By 2018, around 125 million 'broiler' (meat) chickens were killed, with numbers increasing around 16% annually for most of the previous decade (fig. 1) (Figure.NZ). By mid 2019, around 3.8 million laying hens also produced 1.1 billion eggs, and around 2.1 million turkeys and ducks were slaughtered (Stats NZ, 'Infoshare, Industry sectors, Agriculture, Variable by total New Zealand (Annual-Jun)').

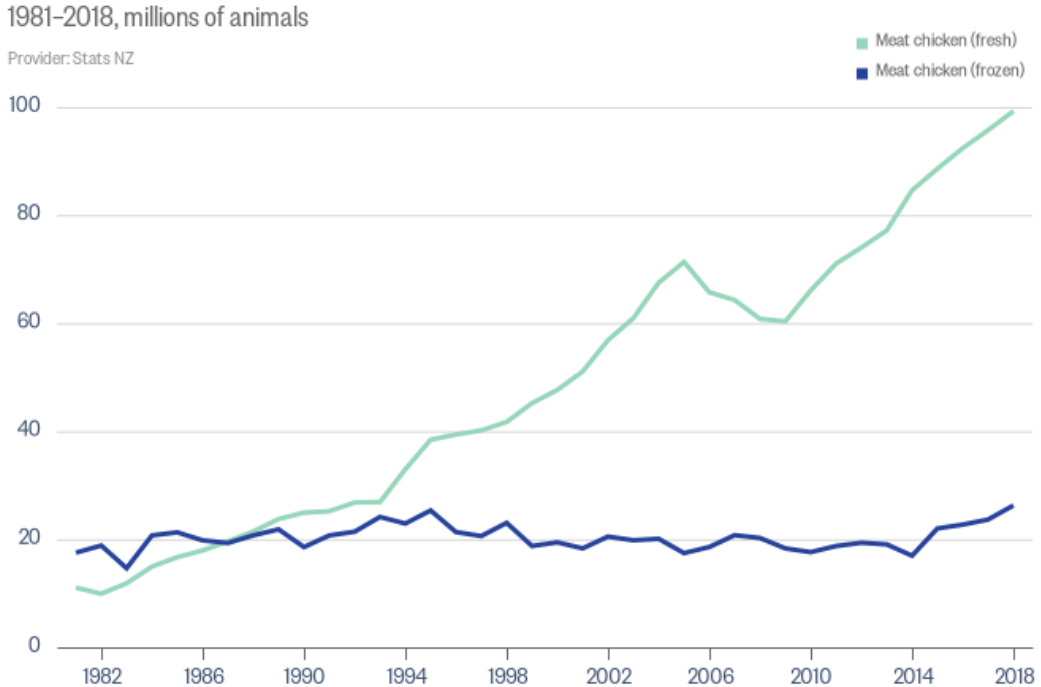


Figure 1. Meat chickens processed in New Zealand (Figure.NZ).

Meat chickens

Meat chickens are normally confined within giant, windowless sheds, at very high stocking densities. Single sheds may hold over 50,000 birds (Stafford, *Animal Welfare in New Zealand* 107). Genetic selection for increased growth rates had dramatically decreased the time needed to achieve a marketable body weight of around 1.5 kg, from 120 days in 1925, to just 30 days by 2005 (Albers). However, such very rapid rates of muscular growth predispose to serious skeletal and cardiovascular problems, causing painful lameness, and even sudden death. Bagshaw et al. found that average mortality for 36 batches of birds on a number of New Zealand farms was 3.8%. For the 2016 national meat chicken population, this equated to 500 birds dying every hour of the year (in Stafford, *Animal Welfare in New Zealand* 111).

In their final weeks and days, the surviving chickens struggle to move their increasingly heavy bodies around overcrowded sheds, on increasingly painful legs and feet. It becomes ever

more difficult to perform highly motivated natural behaviours, such as wing-stretching, dustbathing and foraging. Affected birds spend ever longer lying on substrates increasingly contaminated with urine and faeces – because sheds are not cleaned until the entire flock is removed to slaughter. This causes chemical burns and lesions to breasts and hocks, and predisposes them to hock infections, all of which further increases the pain and suffering these chickens endure. Bagshaw et al. recorded that 29% of birds had foot pad lesions, and 28% had hock burns, on the New Zealand farms studied. Using a gait scoring system devised by Kestin et al. with 0 normal and 5 immobile, the average gait score was 2.14, and 8% of all mortalities resulted from culling for leg problems (Bagshaw et al.).

Poultry may also experience significant stress during catching (which may be manual or mechanical, in the case of meat chickens). Raised in windowless sheds with minimal human contact or stimulation of any kind, stress and panic are common when birds encounter human or mechanical chicken catchers. After capture, the birds are crammed into crates and loaded en masse onto trucks for transport to the abattoir. The unfamiliar bumps, sounds, sights and smells, and sometimes injuries and thermal stressors (heat or cold) they experience, compound substantial existing stress levels.

On arrival at the abattoir, poultry are shackled and hung upside down from their feet, which is also extremely stressful and can cause injuries. The production line normally delivers the birds to a water bath electrical stunning system, which aims to render them unconscious prior to throat-cutting and subsequent scalding, plucking and processing. However, these systems are known to fail in a significant minority of cases (AHAW; Berg and Raj), resulting in levels of suffering that are both difficult to contemplate, and violate New Zealand's Animal Welfare Act 1999 (updated 2015) (AWA). With over 125 million chickens passing through this system annually in NZ, the multiple stressors and significant suffering these birds endure create one of New Zealand's greatest animal welfare concerns.

Laying hens

By 2019, New Zealand had around 146 egg farms. Conventional or 'battery' cages accounted for 75% of eggs produced, with the remainder from laying hens farmed in barns (5%), free range (19%) or organic systems (1%) (Te Arawa Primary Sector). These 'battery cages' typically house 4-8 hens, providing about 500 cm² per bird. One sheet of A4 paper provides 624cm².

The close confinement and lack of environmental enrichment within caged systems inhibit many behaviours hens are highly motivated to perform, including wing-stretching, perching, nesting, foraging and dust bathing. This violates New Zealand's Animal Welfare Act, which requires animal owners to ensure that animals' basic needs – including behavioural needs – are met.

Battery cages will be outlawed in New Zealand in 2022, with colony cages housing up to 60 birds already being introduced. While such cages do provide extremely limited perching, scratching and nesting areas, they remain very barren environments, and severe crowding inhibits the use of such enrichment devices (for example, a single nest box may be provided for up to 60 birds).

Insufficient opportunity to express highly motivated natural behaviours can result in behavioural pathologies, such as feather pecking, and outbreaks of cannibalism. Rather than modifying environments and stocking densities through introduction of more natural, but more expensive systems, producers usually seek to minimise such adverse impacts through beak trimming. Although this frequently results in substantial pain, painkillers are not normally used, due to cost – even though costs are not high. Chronic pain as a result of beak trimming is also common (AVMA, 'Literature Review').

Egg production drops after one to two years of intensive production. Most New Zealand hens are killed after a single cycle of laying, well short of their natural lifespan of seven to 15 years. The flock is replaced by new chicks. However, half of all chicks born are male and cannot lay eggs. These chicks are usually killed by mechanical maceration on their first day of life.

Alternative housing systems for laying hens and other fowl include modifications to cage design, as well as cage free systems such as barns, free range and organic systems. However, animal welfare concerns such as crowding, behavioural restriction, inadequate hygiene, disease and parasitism exist in virtually all confinement systems, to various degrees (Hartcher and Jones).

Pigs

By 2019, there were 25,500 breeding sows (aged one or more) in New Zealand (Stats NZ, 'Agricultural Production Statistics'). By 2015 most sows were housed in larger farms, that had an average of 349 sows each (Yap and Bell 20). During the year ending September 2019, 621,248 pigs were slaughtered (MPI, *Animal Situation and Outlook*).

Industry intensification

Historically, farmed pigs lived outdoors in sties and loose boxes. Today however, specialised housing, diets and management systems are the norm. Productivity and efficiency are maximised by housing larger herds in more limited spaces, and by genetic selection for greater litter sizes and growth rates. By 2014 sows weighed a staggering 260 kg on average (Calderón et al.), and the average litter size had increased from under 11 to over 13 (Einarsson et al.).

However, such unnatural housing and management regimes result in a range of serious welfare problems. These include stresses associated with early weaning; painful husbandry procedures such as castration, tail docking, tooth clipping (Sutherland) and nose ringing; transmissible diseases; lameness and other physical problems; and movement, behavioural and social restriction associated with close confinement. Increased aggression, tail and vulva biting, and stereotypical behaviours (repetitive, apparently purposeless behaviours, believed to indicate profound and chronic stress), are all common (Stafford, *Animal Welfare in New Zealand*). These may be both symptoms and causes of poor welfare. Piglet mortality is heavily dependent on

management factors and is highly variable between farms, but the New Zealand average was a very substantial 12.9% in 2010 (Chidgey).

Farrowing crates

Within New Zealand, the most serious sow welfare concerns currently result from their close confinement within farrowing crates. Larger sows, oversize litters, and highly confined spaces, which limit sow opportunities to exercise and develop natural agility, have all increased the risk that sows will accidentally smother and suffocate their numerous tiny offspring, resulting in productivity losses. Accordingly, spatially restrictive farrowing crates were developed in the 1940s to limit sow access to her piglets. Under New Zealand's *Code of Welfare (Pigs)* (NAWAC 19) sows may be confined within these crates from one week prior, until four to five weeks after farrowing.

These sows experience particularly severe deprivations. They can barely take one step forwards or backwards and cannot even turn around. They cannot meet their highly motivated behavioural needs to build nests, or to interact socially with other pigs. The near-total lack of stimulation in barren environments results in unremitting weeks of boredom and frustration (Andersen et al.), and sows are reduced to repetitive chewing on the bars of their cages (stereotypical behaviours). The hard concrete, plastic or wooden surfaces on which they're forced to lie cause pressure sores, joint injuries and lameness. And unfortunately, despite all of this, piglet mortality remains significant (Calderón Díaz et al.; Einarsson et al.).

Pigs are highly intelligent, social animals, and New Zealand's *Code of Welfare (Pigs)* acknowledges that these conditions violate New Zealand's Animal Welfare Act (NAWAC 19). Nevertheless, the Act allows such violations when economic and practical considerations for the industry are considered more important.

Cows

Driven by market pressures, over time sheep and beef farming is giving way to dairy farming (Stafford, *Animal Welfare in New Zealand*). By 2019, New Zealand had 6.4 million dairy cattle, and 3.9 million beef cattle (Stats NZ, 'Agricultural Production Statistics'). Cattle welfare concerns relate to the intensification of dairy farming, and to housing and management, physical problems, painful husbandry procedures, and the welfare of calves.

Intensifying production

As with the farming of several other species, dairy farming has intensified over time (Stafford and Gregory). By the 2016-2017 season, the average New Zealand dairy herd size was 414 cows, with 611 in the South Island, where dairy production was increasing most rapidly (SIDDC). Genetic selection has resulted in a 2-3% annual increase in milk production per cow in Western countries (Von Keyserlingk et al.). New Zealand dairy cows are typically connected to a milking machine twice (or, increasingly, once) daily, and produced, on average, over 4,200 L of milk annually by 2014-2015.

This was 18% more than a decade previously (Dairy NZ, 'New Zealand's Five Million'). Genetic selection for increased productivity has resulted in the diversion of a greater proportion of biological resources into milk and muscle production, in dairy and beef cattle respectively. This means that fewer resources are available for maintenance (which results in many dairy cows being chronically hungry), or for immune function, to support tissue repair, or to respond to stressful stimuli. Unsurprisingly, therefore, rates of some diseases appear to be increasing, including reproductive problems (such as failure to conceive), mastitis (udder inflammation), lameness and metritis (uterine inflammation) (Von Keyserlingk et al.).

After about five years of pregnancy and lactation, cows' milk production declines and they are slaughtered, having lived only a quarter of their normal lifespan. More than 20% of dairy cows are killed each year (Stafford, *Animal Welfare in New Zealand*).

Housing and management

As part of production intensification over time, the trend has been towards larger herds, larger farms, more indoor housing, and more concentrated diets (including adding palm kernel expeller – a by-product of palm oil production – to cattle feed) (Knaus). Indoor housing can provide protection from inclement weather. However, it can also result in crowding, and can restrict freedom of movement and the expression of natural social and grazing behaviour (Laven and Holmes). These restrictions can cause stress, which can weaken the immune system. Build-up of urine and manure can also result in less hygienic housing. All of these factors combined can facilitate the spread of infectious diseases. Prolonged standing on hard surfaces such as concrete can also increase problems such as sole ulcers and digital dermatitis, which cause lameness (Laven and Lawrence).

Outdoor farming systems often lack sufficient trees, hedges or other forms of shelter, especially when cattle are grazed intensively. This is increasingly common, with pasture growth assisted by artificial irrigation, which depletes water supplies. High stocking densities can also compact soils, increasing effluent run-off into rivers and streams (Stafford, *Animal Welfare in New Zealand*).

Cattle in such outdoor systems are often exposed to excessive wind, rain, snow and sunshine, which can be stressful and can decrease their welfare (Fisher et al.; Webster et al.). Cattle are particularly vulnerable to snowfall during winter. They have a large body surface area, which may not be well insulated (Gregory).

Physical problems

Numerous physical problems cause pain and suffering for farmed cattle. In some cases, pain can be severe. These problems may also lead to premature death, when farmers choose to kill affected animals rather than invest time and money treating them, or because their productivity is reduced.

Lameness

Lameness has been described as the ‘most important animal welfare problem for the dairy cow’ (FAWC, *Report on the Welfare of Dairy Cattle*). It is increased by wet or unhygienic conditions, or when cattle must walk long distances, along poorly maintained tracks. Cases last 4-6 weeks on average (Tranter and Morris) and can cause severe pain. Hoof sensitivity increases, and stimuli that are not normally painful, may become so.

Large-scale, prospective studies assessing lameness prevalence in New Zealand are scarce; however, Fabian et al. locomotion scored 23,949 cows on 59 farms, using the DairyCo mobility scoring system to estimate lameness prevalence. The mean lameness prevalence was 8.3% (median, 6.7%; range, 1.2%– 36%). In contrast, mean lameness prevalence as estimated by farmers was 2.3% (median, 1.4%; range, 0–20%). Hence, only 27.3% (range 0–95%) of cows with reduced mobility were identified as such by New Zealand farmers – a detection rate broadly similar to that of farmers in the US (Espejo et al.) and UK (Leach et al.). Hence, identification and treatment in the case of this very important welfare problem presently appears inadequate.

Nutrition

Beef cattle may suffer nutritional stress when pasture cover is insufficient, or their metabolic needs are increased, for example, during cold winter weather. For dairy cows, foetal growth is most rapid during the last trimester of pregnancy, and lactation after birth also consumes a very high level of biological resources. Modern dairy cows are so highly productive that they are often physically unable to consume sufficient calories to replace what they use during this period, resulting in a negative daily energy balance, chronic hunger, and a weakened immune system. Cows lose body condition during late gestation and for six to 10 weeks after calving (Roche, Berry and Kolver). On a typical, well managed New Zealand dairy farm, Roche, Macdonald et al. assessed 23% of cows as being thin. Such cows are at significant risk of metabolic and infectious diseases (Ingvarsen et al.; Goff), which can result in serious welfare problems.

Dystocia

In the New Zealand dairy herd, as many as 15% of heifers and 10% of cows suffer from dystocia (birthing difficulties) annually (Holmes et al.). Among beef cattle, average calf mortality during birth ranges from 0-15% depending on the bull and cow size and breed, and on management factors, and is probably responsible for two thirds of all calf deaths (Stafford, *Animal Welfare in New Zealand*).

The pain or distress experienced by such mothers and calves can be substantial. Sometimes veterinarians or farmers may assist, but not always, especially in large herds (Mee; Stafford, 'Welfare Implications'). Birthing difficulties can also damage hind leg nerves, resulting in 'downer' cows who are unable to rise. If these cows do not recover, they will die. When birthing is unsuccessful, the cow initially experiences great distress, followed by depression. The foetus will die and decompose, which can lead to the death of the mother.

With beef cattle, the major calving problem relates to lack of supervision. Problems may not be seen or addressed in time, and the calf and cow may die or require euthanasia as a result. Another problem is the breeding of beef cows who require caesarean sections to give birth. The Belgian Blue breed is notorious for this problem (Stafford, *Animal Welfare in New Zealand*).

Mastitis

The large, heavy udders of modern, highly producing dairy cows are at increased risk of mastitis (udder inflammation). This is exacerbated by stress and unhygienic conditions. In a large New Zealand-wide study in 2007, the average mastitis rate was 12.7 cases per hundred cows (McDougall et al.). Acute mastitis is painful, and also contaminates milk with white blood cells (which, combined with bacteria and tissue debris, exudes as pus). Mastitis cases can last for two months or longer.

Husbandry procedures

Several husbandry procedures routinely applied to cattle are frequently painful. These include dehorning and disbudding (Stafford and Mellor), tail tip amputation (Eicher et al.), ear tagging, freeze branding and castration (Stafford, *Animal Welfare in New Zealand*). Unfortunately, these are often performed without painkillers or anaesthetics, mainly to minimise costs (Laven et al.).

Calves

In the year ending 30 June 2019, 4.5 million dairy calves were born (Stats NZ, 'Agricultural Production Statistics'). Dairy calves are either slaughtered, raised for beef, or raised as dairy herd replacements. In the year ending September 2019, 1.8 million calves were slaughtered (MPI, *Situation and Outlook*). Almost all would have been dairy calves. These 'bobby calves' are normally slaughtered at the legal minimum of four days of age to allow harvesting of their mothers' milk.

Calf-cow separation

Cows, like humans, are pregnant for nine months, and they too bond strongly with their babies. A strong maternal bond is formed after only five minutes of contact, following calf birth (Hudson and Mullord). Calves would naturally suckle five to eight times a day for the first few weeks and stay with their mothers for up to two years. However, dairy calves are generally taken from cows within 12 hours of birth, and cows may show signs of extreme distress (Stafford, *Animal Welfare in New Zealand*), searching for their lost calves for days. Both cow and calf may exhibit altered behaviour and prolonged bellowing (Rushen et al.). Numerous studies have shown that early weaning causes stress to cows, and mood depression in calves appears similar to that caused by pain following hot-iron dehorning (Daros et al.).

Transportation

Although bobby calves must be healthy and fed on the morning of transport, Donovan found that 3-4% died daily on trucks, in yards, or were condemned as unfit for human consumption due to disease or weakness. Rough and abusive treatment of calves during transportation and slaughter is also evident in New Zealand video footage from 2015 and 2016 (<https://safe.org.nz/our-work/animals-in-need/cows/>).

Sheep

By mid 2019, 26.7 million sheep were farmed in New Zealand for their meat and wool (Stats NZ, 'Agricultural Production Statistics'). Like other mammals, sheep are sentient, capable of feeling pain, stress and fear.

Lamb morbidity and mortality

Problems begin at birth. Disturbing numbers of lambs die from cold and inadequate nutrition during their first few days of life. Adverse weather, lack of shelter, winter lambing, ewes with twins or triplets, and poor management, all contribute (Stafford, 'Welfare of Sheep and Goats'). West et al. documented mortality rates of 10-17%, 6-20% and 22-41% for single, twin and triplet lambs respectively, depending on the breed. An extensive study carried out in 1999-2000 (Goodwin et al.) demonstrated that over 42% of New Zealand lambs had pneumonic lung lesions.

Painful husbandry

Lambs also face painful husbandry procedures such as tail-docking, castration and ear-tagging, usually in their first six months of life. These are acutely painful, with tail-docking and ear-tagging resulting in severe pain for hours to days (FAWC, 'Report on the Implications'; AVMA,

‘Welfare Implications’; Windsor and White). Many animals continue to experience these procedures without adequate pain relief, because it is cheaper and quicker not to administer it.

Sheep also experience varying levels of nutrition, hunger and exposure to the weather, throughout their lives, and many become lame, suffering from painful conditions, such as footrot (FAWC, ‘Opinion on Lameness’; Raadsma and Dhungyel).

Shearing

Shearing is stressful for sheep. The animals are herded by sheepdogs or humans, whom sheep are naturally fearful of. Then individuals are isolated from their flock. This stresses these highly social animals, who are naturally a prey species, fearful of separation and capture. The sheep are then manhandled into awkward and uncomfortable postures, often on their backs, to have their wool coat shorn.

Most shearers are skilled, but the job is very physical and paid by volume rather than hourly. As a result, shearers handle as many sheep as possible in a working day. Tired shearers may become frustrated. When frightened, animals balk. 2015 video footage (<https://vimeo.com/100782999>) has shown Australian shearers punching sheep in the face, kicking them, and subjecting them to other abuses.

After shearing, sheep experience the shock of cold – particularly in cold climates such as New Zealand’s southern or mountainous regions.

Transport and slaughter

As with other farmed animals, sheep are rounded up by humans and sheepdogs, taken off normal feed (Fisher et al.), and crowded into trucks, enduring the stresses associated with transportation, before arriving at the slaughterhouse. Further welfare problems and stress are experienced there.

Perhaps the most serious concern centres on those sheep that are unsuccessfully stunned prior to being shackled and hung upside-down, and having their throats cut, because of failures of equipment or technique. This affects a small but significant proportion of all animals slaughtered (Grandin 2010). For ruminants that are not successfully stunned, time to insensibility after exsanguination (throat-cutting) is at least 2–8 seconds in sheep, but may be 8–20 seconds in duration. For cattle the mean duration is similar but can commonly be extended to longer than 60 seconds, and occasionally, even longer. All of these animals are likely to experience significant pain, as well as other forms of suffering (Johnson et al.).

Is animal welfare adequately safeguarded within New Zealand?

Unfortunately, examination of the main animal species farmed within New Zealand indicates that animal welfare problems remain prevalent. Violations of welfare Provisions such as good environment, appropriate behaviour and positive mental experiences appear common, and for many of New Zealand's farmed animals it is reasonable to question whether they have 'a life worth living,' let alone 'a good life'.

As repeatedly noted by New Zealand's government and animal production industries, WAP's 2014 Animal Protection Index did indeed rank the nation as one of the leading in the world for animal welfare, primarily on the basis of its animal welfare legislation. On the face of it, New Zealand's animal welfare legislation does compare favourably with that of many other countries. Its Animal Welfare Act recognises that animals are sentient and requires owners and others in charge of animals to safeguard their welfare, by considering their needs, which are described in terms that closely parallel the Five Freedoms and Provisions above. Protected animals include all vertebrates (and some of their foetal or early life stages), octopi, squid, crabs, lobsters and crayfish.

Protections are enhanced by animal welfare regulations created under the Animal Welfare Act. The first were released in 2016, covering the treatment of bobby calves and certain changes to the rules about exporting live animals. Around 60 others introduced by a different government came into force in 2018, covering cattle, dogs, goats, horses, laying hens,

llamas and alpacas, pigs, sheep, transportation, rodeos, surgical or painful procedures, and certain other matters (New Zealand Government 2018). Other regulations remain forthcoming. These regulations are more specific than the Animal Welfare Act, more directly enforceable, and also provide penalties for violations of animal welfare considered low to medium in severity.

A large number of codes of practice provide additional guidance in relation to all farmed animal species, as well as companion animals, circus animals, zoo animals, transportation, slaughter and other matters (MPI, 'Codes of Welfare'). These are not in themselves legally enforceable, although compliance or lack thereof may be used to support prosecutions or defences.

In some respects, New Zealand's animal welfare legislation is internationally progressive – as evidenced by specific mention of animal sentience, and by the protection of some non-vertebrates and early developmental stages. A much-touted example has been the specific restrictions on the use of great apes (gorillas, chimpanzees, bonobos and orangutans) in research under its Animal Welfare Act. Any use must be in the best interests of the individual animal or its species (Rahman et al.).

However, as Morris notes:

[T]he few nonhuman hominids residing in New Zealand are all in zoos, and there have been no plans to conduct any intrusive experiments on them. The reputation of the Animal Welfare Act therefore appears to be based on protecting a few animals who do not require it. It is far more constructive to look at the way the Act protects the animals who are caused to suffer in New Zealand farms, since this would present a far more realistic indicator of its effectiveness. (369-70)

In this respect, it seems clear that favourable animal welfare legislation alone is far from adequate to safeguard the welfare of New Zealand's animals. Unfortunately, major, systematic welfare compromises persist within most New Zealand animal farming systems, and instances of severe neglect, and even abuse, are regularly reported by New Zealand's media outlets and animal advocacy organisations (see, for example, under calf transportation, above).

This conclusion is consistent with the Animal Cruelty Index created by Voiceless (VACI) in 2017. This Index ‘evaluates and ranks countries based on the nature, extent and intensity of cruelty associated with farm animal production and consumption in a sample of fifty countries that together account for almost 80 percent of the world’s farm animal population’. It focuses on ‘the origins, scope, and intensity of human-induced animal suffering’. Voiceless asserts that ‘While the [WAP] API focused on the quality of animal welfare legislation across countries, the VACI seeks to measure actual farm animal cruelty’ (Voiceless, ‘About the VACI’). The VACI incorporates metrics such as the number of farm animals annually slaughtered and consumed (on a per capita basis), as well as societal and cultural attitudes to farm animals, as reflected in the quality of regulatory frameworks for their protection.

The predominant focus on animal-based, rather than regulatory, indicators, resulted in markedly different national assessments, between the VACI and 2014 API: ‘only three of the nine high income countries that qualified as more than adequate performers under the API were also so rated under the VACI’. And tellingly, ‘Whereas New Zealand was listed as the world leader in animal welfare in the [2014] API it now ranks 30th under the VACI’ (Voiceless, ‘About the VACI’).

Voiceless noted that:

New Zealand slaughters the third highest number of animals on a per capita basis globally, with around 29.3 land-based animals slaughtered per person / year (compared with a global average of 9.7). The country also has the highest dependency on farm animals, with around 13 farm animals per person (compared with a global average of around 4). (‘New Zealand: Overall Cruelty Rank 30’)

New Zealand was not alone in the reversal of its API ranking: ‘Similarly, the United Kingdom, listed as among the best performers in the API, ranks as a marginal performer (rank 20) on the VACI’ (Voiceless, ‘About the VACI’).

Voiceless noted that ‘due to data limitations, [the VACI] does not account for the duration of animal suffering. Reliable country-based animal welfare indicators that address behaviour, physiology, reproduction, immunology and health for example, are not available’. It

also noted that only terrestrial animals were included, despite far greater numbers of fish and other marine animals slaughtered and consumed globally, and the lack of availability and inclusion of surveys of public attitudes (Voiceless, ‘The Index Logic’). However, the same criticisms apply to the API.

Nevertheless, it is clear that – contrary to the impression provided by the 2014 API which ranked New Zealand as a world leader in animal protection – the nation is in fact one of the world’s leading per capita producers and consumers of farmed animals, and that substantial welfare problems remain prevalent within the farming of all main species within New Zealand. New Zealand’s regulatory framework is stronger than that of some other nations and is improving, but clearly still has a long way to go, before it becomes adequate to ensure the welfare of New Zealand’s farmed animals.

These conclusions are affirmed by the 2020 API, which downgrades New Zealand to a ‘C’ ranking. The 2020 API notes the persistence of a range of animal uses and husbandry practices that are inherently cruel and that cause pain, distress and suffering to animals, as well as deficiencies within its legislative framework. It also highlights conflicts of interest and marked funding deficits within its national inspection and enforcement system, that allow such practices to persist (WAP, ‘Animal Protection Index, New Zealand’).

Improving welfare

Much could and should be done to address these deficiencies. As Grandin identified, the selection of farm staff who genuinely care about welfare is essential, as well as providing them with the time, resources and equipment needed to adequately safeguard welfare (‘Welfare Problems’). Notwithstanding existing efforts, further continuing education and support for the achievement of higher welfare standards is also clearly warranted, among stakeholder groups such as farmers, transporters and meat processors (Seng and Laporte). Greater inspection and enforcement of welfare regulations are also needed – which in turn requires greater resourcing.

On farms, in abattoirs, markets and elsewhere, quantitative and qualitative assessment using simple, practical welfare assessment frameworks, in some cases combined with adequate

record-keeping and traceability, can highlight animals, properties, truck drivers or other causes of welfare concern (Sandøe et al.; Wemelsfelder and Mullan; Laven and Fabian). Providing benchmarking data from such assessments can incentivise producers and others to improve welfare rankings against those of their peers. Continuing education of consumers is also vital, along with providing labelling schemes – preferably, independently accredited – that are optimal to facilitate their informed purchasing choices (Toma et al.).

More fundamental reforms have also been proposed by some. Grandin calls for an end to segmented marketing chains where producers are not held financially accountable for losses resulting from poor body condition or handling and transportation practices ('Welfare Problems' 1-4). Instead of paying employees per number of animals processed (which encourages speed), she proposes financial incentives for low levels of bruises, injuries and premature deaths. Morris calls for greater consideration of scientific evidence and inputs from non-industry stakeholders, within policy deliberations, and for the establishment of a body responsible for animal welfare, separate from the Ministry of Agriculture (now the Ministry for Primary Industries – MPI), such as an independent Ministry for Animal Welfare or a 'truly independent Commissioner for Animal Welfare, reporting to Parliament and not the executive government' (378-379).

Good animal welfare benefits industry, but is also a public good. Accordingly, resourcing for many of these measures should be provided by government (albeit potentially funded by industry levies), rather than relying on industry directly for funding disbursements. The latter would create significant conflicts of interest, potentially undermining the effectiveness and credibility of the system.

Conclusions

Ethical and animal welfare considerations alone justify such steps to improve the welfare of Aotearoa New Zealand's farmed animals. Additionally, they are in the interests of New Zealand's agricultural sector. Consumers are increasingly concerned about animal welfare both domestically and internationally. Within New Zealand, comparison of surveys conducted in

1994 and 2008 showed consumers have become more concerned about the confinement of pigs and poultry, and about common husbandry procedures such as tail-docking (Loveridge 333, 335).

New Zealand is strongly economically reliant on export income from farmed animal products. New Zealand's MPI recognises the importance of animal welfare to international markets: 'New Zealand's animal welfare practices add value to our exports by contributing to our reputation as a responsible agricultural producer. Animal welfare is increasingly important for accessing premium markets and differentiating New Zealand's products' (MPI, *Animal Welfare Matters* 3). In a similar vein, 'Primary industry leaders believe that New Zealand must do more to protect the significant financial benefit derived from New Zealand's reputation for quality, sustainable, and trustworthy agricultural products' (KPMG in MPI, *Animal Welfare Matters* 3).

The growing importance of animal welfare to international consumers has been demonstrated by sociological research, such as that of Zhao and Wu, who investigated factors influencing the willingness of Chinese consumers to pay for higher welfare standards. 89.5% of survey participants confirmed willingness to pay for higher levels of animal welfare, with age, level of education and annual income influencing participant positions.

Conversely, as stated by the MPI, 'Cases of poor animal welfare can have a negative impact on our reputation and result in a loss of export markets, inability to gain access to new markets, or additional conditions and checks being placed on our products or production processes' (*Animal Welfare Matters* 3).

It is clear that substantial, ongoing welfare problems remain prevalent within the farming of poultry, pigs, cattle and sheep within New Zealand, and that this is contrary to good ethics, our duty of care toward these animals, the wishes of domestic and international consumers, and the interests of New Zealand's animal production industries. The latter provide an unusually large contribution to New Zealand's national economy. Accordingly, and despite progress to date, significant further resource investment and policy reforms within the field of animal welfare are indeed warranted within New Zealand.

These serious animal welfare concerns only add to substantial and growing existing concerns about the environmental and public health impacts created by New Zealand's animal agricultural sector. In combination, these factors warrant a fundamental reconsideration of New Zealand's unusual level of reliance on its animal agricultural sector (De Boo and Knight).

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