

Review

Costs and Benefits of Improving Farm Animal Welfare

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Abstract: It costs money to improve the welfare of farm animals. For people with animals under their care, there are many factors to consider regarding changes in practice to improve welfare, and the optimal course of action is not always obvious. Decision support systems for animal welfare, such as economic cost–benefit analyses, are lacking. This review attempts to provide clarity around the costs and benefits of improving farm animal welfare, thereby enabling the people with animals under their care to make informed decisions. Many of the costs are obvious. For example, training of stockpeople, reconfiguration of pens, and administration of pain relief can improve welfare, and all incur costs. Other costs are less obvious. For instance, there may be substantial risks to market protection, consumer acceptance, and social licence to farm associated with not ensuring good animal welfare. The benefits of improving farm animal welfare are also difficult to evaluate from a purely economic perspective. Although it is widely recognised that animals with poor welfare are unlikely to produce at optimal levels, there may be benefits of improving animal welfare that extend beyond production gains. These include benefits to the animal, positive effects on the workforce, competitive advantage for businesses, mitigation of risk, and positive social consequences. We summarise these considerations into a decision tool that can assist people with farm animals under their care, and we highlight the need for further empirical evidence to improve decision-making in animal welfare.

Keywords: animal welfare; evidence-based decision-making; social licence



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1. Introduction

Animal welfare is of increasing concern to society, and many people with farm animals under their care, such as farmers, stockpeople, truck drivers, and abattoir (slaughterhouse) workers, are striving to improve the welfare of those animals. Since the Brambell Committee established by the British Government outlined the five aspects of animal welfare under human control in 1965, giving rise to the “five freedoms” framework [1], various other frameworks have been developed to assess animal welfare [2,3]. For the purposes of this review, we define animal welfare as *a transient state within an animal that relates to what the animal experiences*. This definition builds upon the definitions of animal welfare put forth by the World Organisation for Animal Health (OIE) and the French Agency for Food, Environmental and Occupational Health and Safety (ANSES) and builds on the work of Mellor, Patterson-Kane, and Stafford [4–6]. Irrespective of which definition one may use to assess animal welfare, it is important to acknowledge that there is a continuum of welfare for animals, ranging from negative to positive (Figure 1). Improving animal welfare means ensuring that the experiences of the animal are as positive as they possibly can be, which often requires changes to infrastructure and practices by the people responsible for the care and handling of the animals.

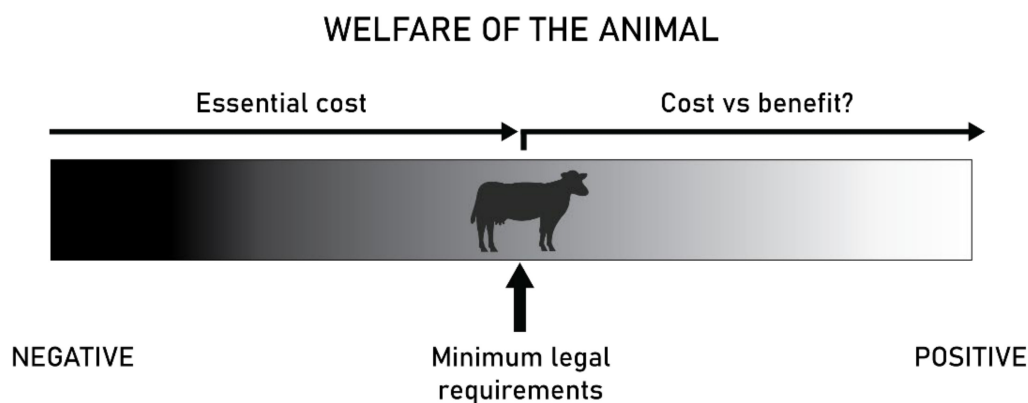


Figure 1. Continuum of animal welfare. The state of an animal’s welfare can vary from negative to positive. While these terms may be considered subjective, with the potential for meaning to change between people and over time, the principle is that there is a continuum of levels of animal welfare. The cost to ensure that the welfare of animals is not negative may be considered an essential cost. The economic advantage from investment to move the level of animal welfare to more positive states on the continuum is challenging to evaluate, although market protection afforded by gaining and maintaining consumer and community support may well justify the costs to ensure positive states of animal welfare.

Despite their desire to improve the welfare of farm animals, those with animals under their care may be prevented from taking action because of the complexity of deciding which practices to improve and by how much. There are many factors for them to consider, including costs associated with changing practices, possible benefits to the animal, projected benefits to the business, and other less tangible implications for society. On the other hand, there may also be a cost associated with not improving animal welfare. The costs and benefits of improving farm animal welfare are not always obvious. Considerable effort towards understanding the economic value of improving animal welfare has come from the works of John McNerney, who said that the question is not what the improvement in animal welfare costs, but what it is worth and, importantly, whether this sufficiently exceeds the cost, making it a good thing to do [7]. In this review, we attempt to further clarify the costs and benefits associated with improving farm animal welfare, with the view that this may enable people with animals under their care to make informed decisions.

2. The Cost of Doing Nothing

When it comes to addressing farm animal welfare, possibly the easiest option is to do nothing at all, but there may be a cost associated with doing nothing. This cost comes in the form of a risk. Public concern about farm animal welfare has been researched over a considerable period [8–13], and there is some evidence to indicate that public concern is growing [8,11]. The risk to those with farm animals under their care is that if they do not adequately address the public’s concerns about the welfare of the animals, their right to own and use the animals for their commercial purposes may come into question.

This “... latitude that society allows to its citizens to exploit resources for their private purposes” is what Martin, Shepherd, and Williams (2011, p. 4) refer to as social licence [14]. Social licence is granted when industries behave in a manner that is consistent, not just with their legal obligations, but also with community expectations [15–17]. Animal welfare issues, together with issues relating to climate change, water scarcity, and declining biodiversity, have all been recognised as potential threats to a farmer’s social licence to operate, but some argue that animal welfare has recently become the most crucial consideration underpinning social licence for Australian animal use industries [18].

There are few economic estimates of the risk of losing social licence to operate in the farming sector. In 2015, the Australian red meat industries estimated that the downside risk of not maintaining consumer and community support for the industries would result in a potential accumulated loss of AUD 3.9 billion (USD 3.0 billion) by 2030 [19]. Addressing public concern over animal welfare was identified as the major component of

maintaining consumer and community support. This loss is compared with potential gains in productivity resulting in AUD 0.22 billion (USD 0.17 billion) to the industry [19].

To know whether social licence is in fact being lost, it may be useful to measure a more tangible parameter, such as public trust in the farming sector. Coleman et al. (2019) investigated the engagement of the Australian community in a range of behaviours to express opposition to the livestock industries. These oppositional behaviours included actions that required relatively little investment of effort, such as talking to family, colleagues, and friends, and those that required greater investment, such as writing to a politician, calling talk-back radio, or donating money to a welfare organisation. When comparing these behaviours between 2013 and 2019, most oppositional behaviours, particularly those that required some effort, increased in prevalence. Furthermore, the more oppositional activities that were undertaken, the greater the mistrust tended to be, with the correlation growing stronger between 2013 and 2019. For instance, the correlation between these oppositional behaviours and “trust in people involved in the Australian livestock industries” changed from -0.37 to -0.44 . [20]. These survey findings indicate that trust in the Australian livestock industries may be on the decline. Public attitudes around farm animal welfare are certainly shifting, but the extent to which these changes in attitude are having an economic impact on the industries that rely on farm animals is still unknown.

Even if livestock industries do not lose public trust generally, specific welfare issues can raise concern with other stakeholders who have an influence on the supply chain. Public attitudes to specific livestock husbandry practices, such as beak trimming, tail docking, and castration, are generally negative [21], and targeted awareness campaigns can raise the profile of an issue to such an extent that it has an impact on an industry. For example, about half of Australian wool farmers surveyed in 2011 believed that consumers did not care about the issue of mulesing [22], a practice that involves cutting crescent-shaped flaps of skin from around a lamb’s breech and tail such that when it heals, it creates an area of bare scar tissue with no folds or wrinkles, making the animal less susceptible to flystrike [23]. Farmers’ beliefs about mulesing were consistent with a public attitudes survey in 2000, which found that Australians’ disapproval of mulesing was low (3%) [12]. Nevertheless, a widespread media campaign in 2004 by People for the Ethical Treatment of Animals (PETA) prompted certain foreign buyers to boycott the purchase of Australian wool [24,25], and by 2006, Australians’ disapproval of mulesing had grown to 39% [26]. Similarly, space allowance for farm animals has been the subject of significant adverse media coverage. For example, the Viva! “Happy Eggs” investigation in Great Britain in 2016 against caged hens led to widespread media coverage targeting enriched cages [27]. A similar campaign in Australia against sow stalls, the 2014 “Save Babe” campaign by Animals Australia, led directly to industry changes, whereby the revised Australian Code of Practice now includes changes to the duration that gestating sows can be housed in stalls [12].

Another way in which trends in public concern about farm animal welfare can quickly impact industries that rely on farm animals is through government action. Adverse media coverage, for instance filming of badly compromised sheep welfare and mortality during live animal sea transport from Australia to the Middle East and filming of housing conditions by animal welfare groups [28], can lead to expressions of public concern that subside fairly quickly. Even though the effect of these episodes on public attitudes is often short lived, governments may react to these expressions of public concern with such speed that it may not give the livestock industries much time to adapt. There have been numerous examples where extensive media coverage of animal mistreatment has led to widespread community discussion; demands by retailers for suppliers to satisfy welfare audits; and, in at least one case, immediate government intervention [12]. There is also evidence that failure to maintain social license can lead to increased litigation, increased regulations, and increasing consumer demands, all of which hamper the success of industries [15].

Interestingly, there is some evidence that extensive publicity of an adverse event may not have an immediate impact on public attitudes [29]. In this case, there was an Australian media campaign exposing animal cruelty in live export of sheep by sea. Attitudes to red

meat farming, acceptability of the red meat industry, and trust in farmers in the red meat industry were assessed before and after this campaign and did not change. However, it is not known whether repeated campaigns of this kind would have an incremental effect over time on community attitudes and behaviour. According to Martin, Shephard, and Williams (2011), working with the community, understanding their opinions towards important issues such as animal welfare and the environment, and cooperating rather than working against them in a defensive manner are the most successful means of addressing threats to social licence [14].

3. Costs of Improving Farm Animal Welfare

Many people assume that if there is a risk to social licence, those with farm animals under their care should undertake any necessary changes to their businesses to improve the welfare of the animals. There are costs associated with these changes, however. Some of the costs are one-time costs associated with changing infrastructure and switching practices, some are ongoing operational costs, and some are costs to which all businesses in an industry must contribute indirectly. All of these costs are likely important factors in the decision about which improvements should be made.

One-time costs associated with improving farm animal welfare can be significant, especially if major changes to infrastructure are required. For instance, when the Australian pork industry chose to voluntarily phase out sow stalls by 2017, the reconfiguration of infrastructure to accommodate group housing and manage aggression of pregnant sows in pork production facilities was estimated to cost the industry AUD 50–95 million (USD 38–73 million) [30,31]. Another example is the decision of some cattle feedlots to install shade infrastructure to reduce the intensity of the heat load experienced by the cattle. In 2011, Sullivan et al. found that cost of shade cloth plus structural support and fittings was AUD 59.75 (USD 45.99) for 2.0 m² (21.5 ft²) of shade per animal and AUD 69.74 (USD 53.68) for 4.7 m² (50.6 ft²) of shade per animal [32]. On the basis of these figures, a technical services officer from the Australian beef industry compared the benefit of improvements to feed intake and carcass weight relative to cost of installing shades in feedlots. He determined that on the basis of a AUD 450/tonne (USD 314/ton) diet at AUD 3.05/kg (USD 1.07/lb) feeder cattle price, and AUD 6.10 (USD 4.69) forward contract price, feeding cattle under shade over summer would result in at least a AUD 20/head (USD 15.39/head) increase in profit, not taking into account any heat-induced mortality or morbidity [33]. Purchase and configuration of technologies to monitor animals (e.g., digital agriculture) is another example of an infrastructure cost. Apart from infrastructure costs, changes in practice to improve farm animal welfare often require additional training of personnel. For instance, the use of cognitive behavioural training, which involves targeting key attitudes and behaviour of stockpeople, has been found to reduce fear and increase productivity in dairy cattle and pigs [34–36]. Given that the costs associated with changes in infrastructure and staff training can be significant, access to capital is an important consideration in improving farm animal welfare.

Even after changes to infrastructure have been made and staff have been trained, there may be ongoing costs associated with improvements to farm animal welfare. For instance, any intervention to improve animal welfare that could have a negative effect on production (e.g., slower weight gain or increased time during routine handling or at slaughter) would equate to an ongoing cost to the business. Some interventions to improve farm animal welfare may require ongoing additional personnel, and there may be ongoing costs associated with supplies, such as the purchase of pain relief or enrichment materials, or additional veterinary expertise. These ongoing costs must all be incorporated into the cost of the product, and thus they must ultimately be financed by consumers.

Where there are gaps in knowledge about farm animal welfare, investment in research, development, and extension of knowledge is required. On an international scale, much of this investment comes from taxpayers. Many governments invest in research to improve the agricultural industries of their respective countries, and some of this investment may

go into research to improve animal welfare. In addition, the industries themselves may contribute to research funding through levies imposed on their sales, as is the case in Australia [37]. Therefore, costs associated with research, development, and extension represent an ongoing indirect cost to businesses with farm animals under their care. For example, the Australian wool industry has invested in alternatives to mulesing, such as suitable analgesics and genetic research to develop sheep that are less susceptible to flystrike. The current breech flystrike strategy published by Australian Wool Innovation (AWI) says in its preamble, “The Breech Flystrike Strategy provides direction for AWI investment in sound, scientific solutions for the management of breech flystrike to improve lifetime animal welfare, address supply chain expectations and increase the demand for Australian wool” [38]. In Australia, research and development corporations such as AWI are funded through a combination of industry levies and taxes [39].

Given the costs involved with improving the welfare of farm animals, there are trade-offs for businesses to consider. Those with animals under their care are often in a position in which they must assess whether these costs will be offset by any potential benefits resulting from improvements to animal welfare. These benefits are often less certain than the costs, however, and can be more difficult to assess in financial terms.

4. Benefits of Improving Farm Animal Welfare

4.1. Benefits to the Animal

Before considering any benefits to the business that result from a change in infrastructure or practices, it is important to consider whether the animal is in fact benefitting from these changes. The benefits will likely manifest in the animal’s physiological and behavioural functioning, although these may not always be obvious. Behavioural changes in the animal are the most readily assessed indicators of welfare, whether by direct observation or with the assistance of monitoring technologies. Although rigorous experimental approaches to evaluate behaviour exist, ultimately those with animals under their care (or society at large) must make a value judgement about whether the observed behavioural changes are desirable or not, and therefore whether they can be considered “improvements”. Some behavioural changes have been correlated with physiological changes in the animal, giving further support to the interpretation that welfare has improved. For example, specific forms of human contact appear to elicit positive emotional responses in animals. Stroking the ventral region of the neck of dairy cattle has been shown to reduce the heart rate and results in relaxed body postures and increased approach to humans in cattle [40–43], while stroking combined with speaking to dairy cattle has been shown to increase high-frequency heart rate variability [44]. Similar effects have been found in foals, adult horses, and lambs [45]. Intraspecific social licking is very common in cattle, a behaviour considered to be an expression of positive emotions in cattle [46]. Using these indicators of welfare, we can make inferences about how an animal’s experiences have changed over time.

It is important to assess the experiences of an animal as objectively as possible in order to make informed decisions about the animal’s welfare. There are many technologies and practices that claim to result in positive welfare, but without physiological and behavioural evidence from the animal, we have no way of knowing whether these claims are valid, and we cannot compare these technologies and practices. Animal welfare science has provided an evidence base for assessing animal welfare, including the use of multiple indicators of physiology and behaviour, but the relative importance of these indicators has yet to be defined [47–49]. What is generally acknowledged is that assessing only one indicator of animal welfare is unlikely to provide a complete understanding of the animal’s experiences [3,49,50].

It also important to acknowledge that an improvement to one aspect of an animal’s welfare may sometimes result in compromised welfare in another aspect. A pertinent example of this is feather pecking in laying hens, which is a major negative welfare situation [51–54]. Feather pecking can result in pain and threats to pecked birds and can

result in decreased feed conversion, leading to poor feathering [53]. Furthermore, if the feather pecking develops into cannibalism, it can lead to mortalities as high as 25–30% of the flock [51,53]. The application of beak trimming can reduce feather pecking, with savings of up to AUD 240,000 (USD 185,000) for a flock of 100,000 birds. However, beak trimming itself presents as a controversial welfare issue [51,52,54]. In such cases, where there are trade-offs between different aspects of welfare, the objective assessment of animal welfare becomes even more important in informing management decisions.

Out of all the benefits of improving farm animal welfare, the benefits to the animal are possibly the most difficult to assess. Where there is high uncertainty around the benefits to the animal's welfare, objective assessment of welfare using multiple physiological and behavioural indicators could reduce some of this uncertainty, making the decision of which infrastructure and management practices to change more straightforward.

4.2. Benefits to the Business

The most readily assessed benefits of improving farm animal welfare are the benefits to the business, which take the form of tangible gains in productivity or of competitive advantage and market premiums. It is often taken for granted that improving farm animal welfare will improve productivity of the animals. There are numerous examples in the literature of positive correlations between farm animal welfare and various measures of productivity (e.g., weight gain and reproduction) [35,55–58], but often the benefits of improving welfare are not expressed in economic terms. Furthermore, not all improvements to farm animal welfare result in these benefits, and thus below we discuss the circumstances under which the business may benefit.

It is widely acknowledged that poor animal welfare often has implications for productivity metrics, such as fertility and body condition. This may be because the adaptive responses that animals use to cope with their environments can sometimes contribute to chronic stress and poor physiological and behavioural functioning [2–4,59–62]. For example, it is known that prolonged or sustained stress can disrupt reproductive processes in female pigs [63]. Suboptimal physiological and behavioural functioning is thought to accompany negative subjective experiences, such as hunger, pain, fear, helplessness, frustration, and anger, and these experiences may be associated with lower productivity. For instance, fear of humans in pigs, induced by brief but regular slaps, hits, or shocks with a battery-operated prod, has been shown to reduce growth, feed conversion efficiency, and reproduction in comparison with positive handling, consisting of a pat or stroke [56,57,64–68]. Similarly, frequent but brief human contact with meat chickens of an apparent positive nature, such as gentle touching, talking, and offering food from the hand, can improve growth rates, feed conversion, and immune function in comparison with minimal human contact [69–75]. Furthermore, it has been shown that dairy farms that handle cows in negative or neutral ways produce less milk [76], whereas positive handling of calves has been correlated with higher feed conversion efficiency and growth rates [35,77]. A recent comprehensive review clearly articulated that there are financial benefits of good animal welfare through, for example, reduced mortality, improved health, improved resistance to disease and reduced medication, and lower risk of zoonoses and animal-borne infections [78]. All of these parameters directly affect the profitability of businesses with farm animals under their care.

Farm animal welfare may also affect the quality of the end product. Temple Grandin and others have done extensive research demonstrating that meat quality improves when you reduce stress in cattle at slaughter [79–85]. Poor animal welfare occurring during transport and lairage can also result in reduced quality of product [78].

Perceived product quality may also improve with improved farm animal welfare, which may generate a competitive advantage for the business. Although attitude towards farm animal welfare is only one of the predictors of consumer purchasing behaviour, with price, healthiness, and local production being more important for consumers [26,86,87], sales of “welfare-friendly” animal products, such as free-range eggs, have increased in

recent years [88,89]. In 1998, Worsley and Skrzypiec found that an “Animal Welfare” factor (a negative attitude factor that involved a concern with the well-being of animals) accounted for 10% of the variance in red meat consumption by young Australians aged 18 to 32 [90]. Although a direct comparison is not possible, Coleman et. al. (2019) found a similar correlation between “welfare ratings” of beef cattle and beef consumption in 2013 ($r = 0.29$) and 2018 ($r = 0.25$) [20]. These results suggest that while the amount of variance in consumption accounted for by welfare attitudes has not changed over the past 20 years, the fact that attitudes are becoming more negative, at least for some industries [20], suggests that public concerns about farm animal welfare may begin to affect consumption. If this is the case, those businesses that are able to demonstrate improvements in farm animal welfare could expect to have a market advantage, with more consumers choosing their products.

The extent to which consumer attitudes about farm animal welfare translate into price premiums is highly variable. The possibility of earning a market premium varies by product. For instance, whereas participants, on average, were willing to pay extra for a scoop of humane animal care-labelled ice cream above the price of conventional ice cream, there was no such willingness to pay for humane animal care-labelled cheese [91]. Willingness to pay may also depend on consumers’ knowledge of standard industry practices and on how the information about animal welfare is presented [92]. For instance, Lusk (2019) found that when American consumers were provided with graphics explaining both cage and cage-free systems of egg production, their willingness to pay for cage-free eggs decreased, perhaps because the graphics removed misperceptions that cage-free implied free range or small farm [93]. There may also be a confounding effect of quality, and thus information about standards of animal welfare may be associated with products that present good eating quality [92]. Given these mixed findings on consumer willingness to pay for animal welfare attributes, product-specific market research that takes into account the perceived product quality, consumer demographics, and the presentation of animal welfare claims is likely needed to verify whether a business can expect a price premium for any given product.

While ethical arguments exist for businesses to continuously invest in the improvement of farm animal welfare, the benefits to businesses in terms of increased returns from this investment are not necessarily clear. This is especially true when considering any benefits that may come from improving the standard of animal welfare beyond the minimum legal requirements (Figure 1). For instance, an animal may be producing optimally, thereby providing maximal fiscal returns, but there may still be scope to increase the welfare state of the animal. In this instance, the greatest driver to invest in improving animal welfare may not be increased productivity but rather increased community acceptance or market protection for the business. While these drivers may be sufficiently strong to offset the costs of improving certain aspects of farm animal welfare (e.g., those that are of most concern in the community), for other aspects of farm animal welfare, financial incentives for businesses may be lacking.

Where financial incentives for businesses are missing, other stakeholders in animal welfare may have to consider “bridging the gap” by offsetting the costs associated with improving farm animal welfare beyond the current limits of profitability. One example of an alternative model to financing improvements in animal welfare is a trend that started in Germany in 2015, whereby pig and poultry farmers began to cooperate with retailers to develop welfare schemes that would pay farmers an extra allowance for welfare-friendly production [94]. The scheme, called Initiative Tierwohl, supports farmers financially in implementing measures for the welfare of their livestock that go beyond the legal standards. Currently, 70% of chicken and turkey and 31% of pork produced in Germany is produced under the Initiative Tierwohl standards of animal welfare [95]. This initiative underscores the important role that retailers can play in providing farmers with the financial means and incentives for improvements to farm animal welfare.

4.3. Benefits to Society

In areas of farm animal welfare that are of ethical concern to the community, there may be societal benefits to improving farm animal welfare, even when there is no clear benefit to businesses. For instance, improving the welfare of farm animals may result in social benefits, such as creating jobs and sustaining industries in rural areas. Certain individuals may benefit psychologically from more positive interactions with animals. For example, interviews of several hundred stockpeople in the pig and dairy industries in Australia revealed that the majority of stockpeople (86% and 76% of pig and dairy stockpeople, respectively) enjoyed working with the animals under their care [96]. Therefore, there may be societal benefits associated with improving the quality of human–animal interactions and with the knowledge that the farm animals in one’s society are being treated well. Conversely, improved welfare standards may also result in a societal cost due to negative impacts on small businesses. For instance, when the European Union banned the use of individual sow stalls in pork production in 2013, many small, family-owned pig farms in Europe were unable to make the substantial investment required to modify conventional housing systems for pigs and went out of business, leaving a smaller number of larger-scale industrial pork producers [97,98]. Where the potential benefits to society are expected to outweigh the costs, there may be an incentive for government and community organisations to support businesses to undertake changes that will improve the welfare of farm animals.

On a national level, the welfare of farm animals is one of many factors determining a nation’s reputation in the international community. For example, one organisation, World Animal Protection, has developed an Animal Protection Index, which assigns rankings to countries according to their legislation and policy commitments to protecting animals [99]. Other benchmarking systems for cross-country comparison in animal welfare have recently been proposed [100]. Although it is unclear whether policymakers currently rely on benchmarking tools to inform policy and trade decisions, the emergence of cross-country comparisons indicates that animal welfare is a growing component of national reputation. Therefore, there may be an argument for governments to support businesses in improving the welfare of farmed animals when there are no clear financial incentives for the businesses to do so.

The value placed on farm animal welfare by multiple members of society underscores the notion that animal welfare is a public good, and accordingly, the responsibility for improving it is one that is shared by all of society. Whereas in the past there have been cases of adversarial interactions between the businesses that farm animals and certain facets of the community, going forward it would seem advantageous to bring all stakeholders to the same table around their shared interest in and responsibility for improving the welfare of farm animals [101]. As mentioned in the discussion on social licence, some businesses have become aware of the need to engage with the community in explaining their practices on the one hand and responding to public concerns on the other. This will necessarily involve a transition away from defensiveness and a greater emphasis on engagement and transparency. It will also entail a willingness to treat dialogue with members of the public as a constructive exercise for all parties involved rather than a method of appeasing or educating the public. Some spaces are being created for this constructive dialogue to occur. For example, in Australia, The Animal Welfare Collaborative (TAWC) has created a forum for members of the public, community groups, industry bodies, animal protection organisations, companies, academic institutions, and government agencies to engage constructively around ways to improve animal welfare [102]. EUWelNet is a similar model to TAWC in Europe [101,103], and the Global Coalition for Animal Welfare is an example of an industry-led collaborative initiative in animal welfare [104]. Other participatory initiatives will likely emerge in the future if interest in civic participation continues to grow.

Another potential benefit of proactive engagement with the community is that it could remove some of the uncertainty from the decisions faced by people with animals under their care. Proactive engagement could give businesses a better idea of where market incentives exist, and where they do not exist, businesses could ask other institutions,

such as government and community organisations, to support their activities to improve farm animal welfare. Where there are community concerns about specific aspects of farm animal welfare, community members could work directly with the people with animals under their care to understand these aspects in greater detail and collectively develop novel solutions. Evolving ethical underpinnings of animal welfare in society and scientific understanding of animal cognition will inevitably lead to continuous revision of the ways in which society would like animals to be treated, but as long as open and constructive dialogue is maintained, businesses and people with animals under their care should have enough information to adapt to these changes.

5. Making Evidence-Based Decisions about Farm Animal Welfare

As demonstrated in this review, there are many factors to consider when making decisions about improvements to farm animal welfare, and the optimal course of action is not always clear to the decision maker. Figure 2 is a decision tool to assist those businesses facing the dilemma of which practices to change in order to improve farm animal welfare without adversely affecting their profitability.

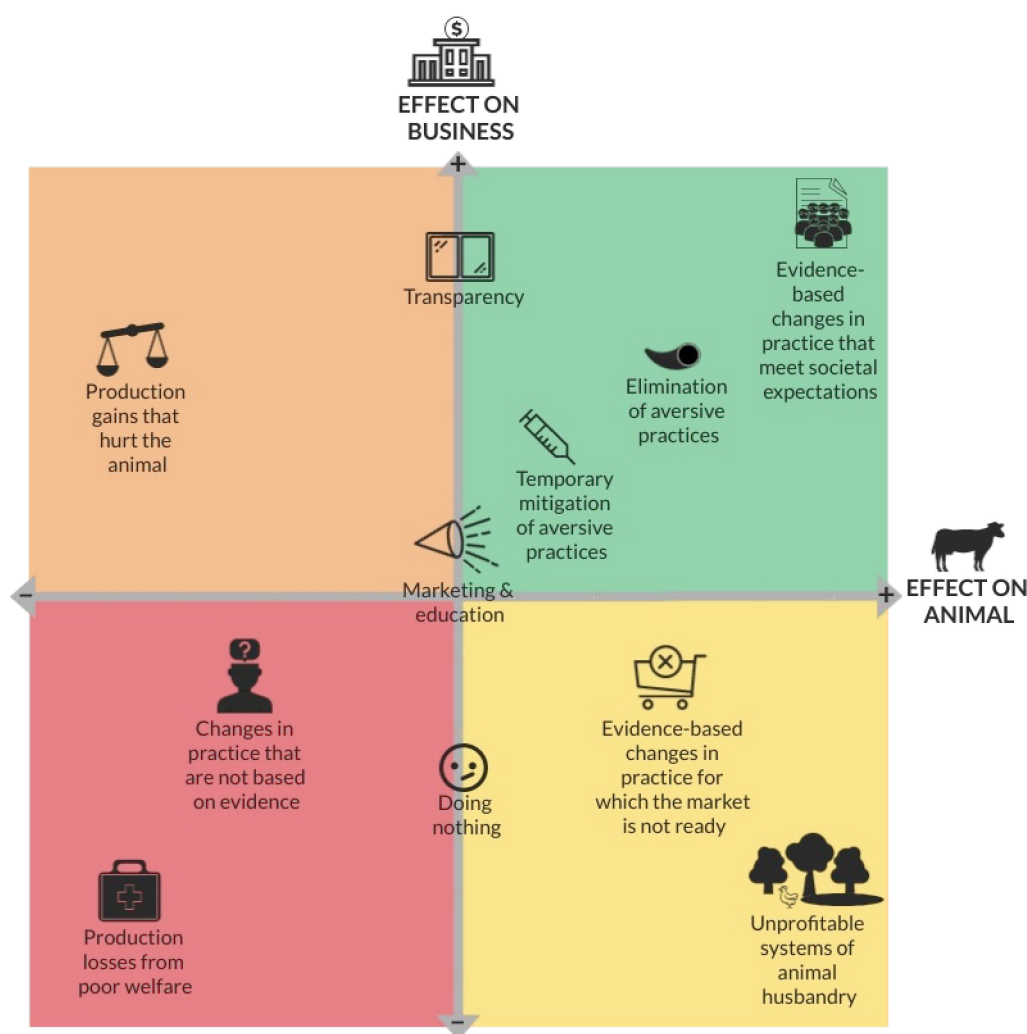


Figure 2. Decision tool for businesses considering changes in practice to improve farm animal welfare. The horizontal axis depicts the effect of the change in practice on the welfare of the animal, with more positive effects towards the right. The vertical axis depicts the effect of the change in practice on the profitability of the business, with more positive effects towards the top.

In the upper-right quadrant of Figure 2 are practice changes that benefit both the welfare of the animal and the business. As long as the changes in practice are based on scientific evidence and meet societal expectations, we expect that those practices that result in more positive animal welfare states will also have a more positive effect on the business in terms of profitability and sustainability. Where there is not yet sufficient market demand for changes in practice that positively affect the welfare of animals, there may be insufficient incentives for businesses to carry out these changes, as depicted in the lower-right quadrant. Businesses that carry out these changes in practice before the market is ready may in fact lose money in the short term. Therefore, those who wish to encourage these changes in practice should focus on creating a market demand for them or supporting them through other means. Similarly, it is plausible that major changes in animal husbandry systems could be positive for animal welfare, as indicated by scientific evidence, but result in unprofitable systems of animal production. In this instance, if society is in favour of such systems, the animal husbandry systems would have to be subsidised in order for the business to be profitable. In the upper-left quadrant are practice changes that result in higher productivity from the animals and therefore increased profitability for the business but produce negative animal welfare states. These practices are likely unsustainable in the long term due to cumulative negative effects on the health and welfare of the animals and to rising societal expectations for animal welfare. Changes in practice that are not based on scientific evidence (i.e., unsubstantiated practices that are perceived to improve animal welfare) are unlikely to have a lasting positive effect on the business, given the lack of evidence underpinning them, and may have a neutral or negative effect on the welfare of the animal. In the bottom-left quadrant are those practices which are known to have negative effects on animal welfare, as indicated by scientific evidence, and are likely to result in losses for the business, either in the short term due to reduced productivity of the animal or in the long term due to loss of market.

The importance of engaging with society is a key finding that emerged from our review of the costs and benefits of improving farm animal welfare. On the horizontal axis of Figure 2, we demonstrate that doing nothing to improve farm animal welfare will likely result in losses for the business due to a widening misalignment of the business with societal expectations around animal welfare over time. Marketing and public education around animal husbandry practices may improve returns for the business in the short term, but because these activities are unidirectional (i.e., they do not allow for societal input), they are unlikely to provide lasting benefits to the business due to the problem of misalignment of expectations just mentioned. Transparency (e.g., a “glass wall” approach) can allow for more societal trust than marketing and education do [105], and some European retailers have begun to pursue transparency around farm animal welfare. For instance, in its commitment to the 2026 European Chicken Commitment, Dutch supermarket Albert Heijn has turned to DNA testing to verify its pledge to use only slow-growth breeds of broiler chicken [106]. An ideal approach would be to combine transparency around animal welfare with a safe channel for businesses and other members of society to engage in constructive dialogue around best practices in animal husbandry based on current science. This dialogue would enable those with farm animals under their care and society to work together to develop strategies that ensure that the welfare of farm animals is as good as it possibly can be and is continuously improving.

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