Forest Birds on Pasture: Meddling Marketing and Conflicting Cultures

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Abstract: Chickens are problematically embedded in the West and Global North as farm animals. Structures built for containing chickens including henhouses, industrial poultry sheds, shading devices and mobile poultry sheds, place chickens – naturally forest birds – into pastoral farming settings that are at odds with natural chicken familial structures and behaviours. I assert that structures built for containing chickens influence human–chicken labour. I support this claim through an investigation of chicken labour at poultry farms. I advance the concept of labour in human–animal studies by looking at labour culture from sociology and labour history scholarship centred around humans. How humans labour with animals contributes to the continuation of animal farming. The long history of chicken farming impacts cultural ideas about small-scale chicken keeping which have led to large-scale agribusinesses using marketing and promotional material in a way that masks more prevalent industrial practices. The structures built for the poultry industry are designed to further the status quo of industry even when working to reimagine that same industry. A critical analysis of how poultry husbandry structures are used in marketing reveals how human labour culture ultimately forces forest dwelling chickens into pastoral farming.

Keywords: Chicken culture, labour culture, animal labour, industrial poultry, human–animal studies

Introduction

Human technologies and labour culture significantly influence interspecies relationships in both small-scale poultry keeping settings and large-scale industrial farms. On this point, animal studies scholar Yvette Watt shares an account of her visit to a farm in Tasmania that conflicted with her idea of open green fields and animals roaming outside, as the farm consisted of long windowless poultry sheds (Watt 75). Industrial poultry sheds are used to control the biological processes of chickens to maximise outputs by controlling access to food, water, and daylight hours (Şahin and Küçük). The expectation that a poultry farm could consist of open green fields has been shaped by a long cultural history of humans keeping chickens in small-scale settings for food or entertainment. This has led to chickens being represented as inherently farm animals in the West and Global North (hereafter simplified to the West).

Pasture is an idea that evokes past agrarian societies. Pastoral scenes are common in poultry advertisements for large-industrial chicken keeping practices encouraging consumers to make associations related to good welfare (Bjørkdahl and Syse). Yet, chickens are not pastoral birds, they are by nature forest-dwellers (Potts 9). In reality, they have most of the same behaviours as their wild forebears (Marino 129). This point is supported by recent research highlighting intriguing parallels in behaviours such as foraging, social interactions and fear responses between wild junglefowl and captive leghorns (Schütz et al.). Studies on populations of formerly captive chickens reveal chickens' preferences for forest edges and roosting in trees (McBride et al.).

In contrast, in small and large-scale chicken-keeping, chickens are held in artificial environments where they often have limited access to adequate tree cover. Their welfare is reliant on what humans provide, such as artificial cover in the form of coops, henhouses, or sheds. Small-scale chicken keeping often offers chickens the opportunity to explore outdoor spaces and to forage independently, while large-scale industrial poultry farming is densely populated, and chickens are predominantly contained indoors (Davis 19). Depictions of small-scale farms are often used in marketing poultry products in Western nations because of the positive welfare outcomes that consumers associate with them. In a recent advertisement campaign in Norway, for example, farmyard scenes with a few chickens outside a barn were

used to promote chickens bred for meat, called 'Hubbard', who are farmed on an industrial scale (Bjørkdahl and Syse 47-50). Stereotypical packaging and advertising of chicken products (eggs and meat) tend to include farmyard imagery, such as a red barn. Labelling on packaged poultry products is often left to consumers to interpret, when consumers may not fully understand the poultry industry and how terminology in that industry is used (Powers et al). Consumers of animal products can also ignore unpleasant information about farmed animal (Northrope et al.). Images of industrial poultry sites can be found in Watt's photographs, taken from a public vantage point. These show grassy fields populated with sheds, electrically powered fans (tunnel ventilation) and feed storage silos (Watt 77, 79).

In the West, the cultural assumption that chickens are farm animals is reinforced by a human labour culture that uses technologies to farm chickens. These technologies include henhouses, industrial poultry sheds, tractors, feeding devices, battery cages and mechanical ventilation (Davis 175-176). This paper explores how the marketing of poultry-derived products may 'welfare wash' (Bjørkdahl and Syse 39) or use terminology that reinforces the notion that chickens are pastoral farm animals. The connection between imagery and animal product marketing is well established by Carol J. Adams in *The Sexual Politics of Meat*, which highlights the gendered marketing strategies used by agribusinesses, grocers, and restaurants. Chickens, more than mammalian beings, also tend to be represented in marketing as food even when the chickens are still alive, a phenomenon that emerged in the mid-twentieth century with the industrialisation of chicken farming and the associated dramatic increase in poultry consumption (Potts and Armstrong).

This paper discusses marketing tactics by addressing animal husbandry structures and their impact on interspecies labour relationships that encompass the artificial incubation of chickens, the raising of chickens without natural maternal care, and the use of industrial technology to regulate their metabolic outputs. These features of the poultry industry play into longstanding human prejudices. This paper addresses industrial poultry settings in the United States and Australia, focusing mostly on chickens farmed for meat (broiler chickens), acknowledging that these countries have differences. This work uses and builds on Karen Davis's insights into poultry and industrial poultry breeding practices. Davis founded United Poultry

Concern (UPC) in 1990 and dedicated her life to the compassionate treatment of poultry. In *Prisoned Chickens, Poisoned Eggs: An Inside Look at the Modern Poultry Industry*, Davis draws on scholarly scientific journals, publications tailored to the industry, webpages, and news articles to reveal the realities of the poultry industry. Davis's text shares parallels with Ruth Harrison's *Animal Machines*, casting light on animal welfare issues in industrial settings. Davis focuses exclusively on the poultry industry.

This paper introduces a human–chicken history shaped by geography. It then clarifies how the terms *labour culture* and *chicken culture* will be applied, situating these within the canon of human–animal studies. Longstanding chicken husbandry traditions are then explored, including the use of structures that influenced the emergence of the industrial poultry shed – a large rectilinear space frame. Structures built for chickens are primarily about controlling biological processes, chickens' metabolic labour (Beldo; Şahin and Küçük). The paper looks into this proposition by considering automatic range coops – aluminium rectilinear space frames clad in textiles and equipped with robotics to move automatically around a farm (Aouf). Humans working in the intensive poultry industry, or other industrial animal use economies, may be trained and/or habituated to modes of work without necessarily gaining an understanding of the natural histories or behaviours of the animals with whom they work (Alexander). In the case of intensive poultry farming, this leads to chickens being estranged from their natural behaviours and forest landscapes. These modes of work reflect the commonly accepted, though unnatural, position of chickens as pastoral animals. Marketing methods and industrial developments may leverage consumer acceptance of traditions associated with small-scale animal husbandry. These marketing strategies often obscure the harsh realities of large-scale industrial poultry farming. This paper asserts that by examining the historical and contemporary labour dynamics of poultry farming, including new designs of mobile poultry sheds and outdoor industrial chicken keeping, the ethical and environmental ramifications of the representation of chickens as pastoral animals may be unveiled, urging a critical revaluation of modern poultry production practices.

A Human–Chicken History

The ways in which humans currently keep and exploit chickens, including husbandry techniques and farming practices, are informed by geography and history. The earliest archaeological evidence of human-kept chickens is from Neolithic sites in China dating from around 6000BCE (Potts 12). By contrast, the earliest archaeological evidence of chickens on the European continent is from the Iron Age between 900 and 800BCE, which is likely when they were brought westward with the Phoenicians (Lee et al.). The longer human–chicken history in Asia is understandable, as chickens are junglefowl native to Southeast Asia. Recent research on the genetics of the four variants of wild chickens found that the natural range of red junglefowl overlaps the site of their earliest known human exploitation in China (Lawal and Hanotte). Ancient Chinese human settlements would have had more access to wild chickens, whereas their later arrival in Europe was influenced, in part, by its distance from chickens' natural ranges. Chickens have been spread globally through conquest, colonisation, and trade (Lawler).

The evidence of chickens in domestic settings does not clearly indicate prevalence. Outside of Asia, chickens are thought to have long been rare. In Europe in the Medieval and early Renaissance periods, for example, chickens made up as little as one to four percent of all livestock in England (Slavin). In *Chicken*, Annie Potts plots the history of the exploitation of chickens through four stages. The first and oldest traditions are related to the use of chickens for ritual purposes centred around cockfighting (Potts 17). The second is related to the global distribution of chickens that was still focused on cockfighting, an activity that spread globally during classical antiquity (18). The third emerges with the theory of evolution that brought an intensive interest in selective breeding in the nineteenth century (18). The fourth stems from the intensive industrialisation of poultry farming in the mid-twentieth century, leading to significant changes in the utilisation of chickens (18). The abundance of chickens today is unprecedented; previous ritual use and small-scale chicken keeping were not conducive to large-scale consumption (Lee et al.).

The industrial scale of chicken keeping makes chickens the most populous birds on the planet (Dorfman). The Food and Agricultural Organization of the United Nations suggests that the daily global population is roughly 33 billion birds (FAO). As a point of comparison, the

second most abundant avian species is the wild Red-billed Quelea, whose populations can swell to 1.5 billion during their breeding seasons (Soaga). A 2021 survey of wild populations of 9700 species of birds – excluding farmed species – shows a combined total of around 50 billion individuals (Callaghan et al.). This means there are roughly 1.5 wild birds of any species for each industrial chicken. Other farmed poultry are far less numerous than chickens; for example, farmed ducks and turkeys represent only one percent of poultry in industrial settings (Davis 205). The approximate population of industrial chickens is based on the collective weight as indicated in publications like *The World's Poultry Science Journal*. It has been estimated that there is an annual global production weight of 73 million tons of eggs and 100 million tons of meat (Mottet and Tempio). This metric does not account for chickens who were not productive, an example being male chicks culled in the egg production industry (Davis 185).

The conditions of industrial agriculture have been made more visible through the efforts of animal advocates. However, the serious environmental and ethical consequences of the large-scale farming and overabundance of poultry in industrialised agriculture have not been resolved. The worst environmental aspects of industrial farming are often understood in opposition to small-scale keeping methods (Ussery), which may reinforce a prevailing belief amongst homesteaders that free-range chickens or companion chickens are advantageous to farms, gardens, homesteads, and backyards (Galhena et al. 4). Poultry manure is particularly valued as a plant fertiliser (8). However, plant-based fertilisers are effective for vegetable crops and a recent study found they are a good alternative to animal-based fertilisers (Lynge 114).

Wild red junglefowl are the same species as captive chickens, and while there may be some inconsistency in frequency of behaviour, they express equivalent vocalisations and social structures (Garnham and Løvlie). Chickens, not naturally inhabiting grasslands or pasture, must be conditioned to farming (Davis 12, 44-45). Structures such as pens, coops and henhouses bind chickens into this role. The poultry industry places exceedingly high numbers of forest birds into open landscapes inside warehouse scaled poultry sheds. A single shed often contains tens of thousands of individual chickens (Davis 4). Industrial sheds emphasise an interiorisation of chickens, which may see chickens completely separated from outdoor environments and

deprived of chicken cultures. The stereotype of chickens as farm animals is reinforced by structures and labour patterns ingrained in industrialised human societies. What may seem today to be an indelible husbandry relationship has a beginning, has changed through history, and could have an end.

Entangled Labour: Human Culture and Chicken Culture

In the West there is welfare bias associated with small-scale poultry keeping and/or with allowing chickens access to the outdoors that is entangled with human culture and commonly accepted ways of working (or labouring) to farm chickens. The building of the simplest henhouse, a structure for chickens, is a form of labour. The term *labour* has been adopted in human–animal studies at various scales as a way to examine the human relationships with farmed animals who are forced into subjugated labour roles (Wadiwel 536). The way the concept of labour has been used in human–animal studies can be advanced by extending the concept of *labour culture* from sociology and labour history scholarship centred around humans (Michelson). Human labour culture may be used by agribusinesses to maintain a perception of chickens as pastoral birds, who labour alongside farmers despite their behaviours being artificially conditioned. As will be discussed in the next section, a human-built container can also regulate labour. The walls and structural features of industrial poultry sheds form physical boundaries that impact spatial relationships and how humans and chickens are organised.

Industrial poultry sheds support an intense and interior mode of production with an emphasis on the internal labour of a chicken's body or their *metabolic labour*. Les Beldo describes 'metabolic labour' as the work happening within a chicken's body at the cellular level (119). Since industry is concerned with biological outputs, poultry sheds are designed to intensify the metabolic labour (or outputs) of chickens. This labour continues from egg incubation until the point at which a chicken is killed. Incubation in industrial settings is most often done artificially (Boleli). Dinesh Wadiwel finds that food animal labour is related to the time that an animal is

alive, since it 'is not regulated by the normative limits imposed by the working day' (536). I argue that metabolic labour starts before the chicken has hatched, as incubation starts the process of generating a new chicken.

Metabolic labour offers a way to understand how humans exploit farmed animals. Animal labour has also been understood as labouring for the farm. Porcher proposes that farmed animals are in a labour relationship with farming through animal husbandry (1-22). For Porcher, interspecies relationships between poultry and farmers include amicable exchanges and emotional bonds. Through these bonds, she sees the animals as having a participatory role in the workings of the farm (107-109). Porcher employs Alain Caillé's definitions of sociality (Porcher 11-12), which include *primary ties* (*don primaire*), based on direct relationships, such as family, friends, and neighbours; and *secondary ties* (*don secondaire*), based on the need to carry out particular tasks where relationships may be anonymous (Caillé 255). However, Caillé's relationships involve some level of choice and variability that do not exist for animals kept by humans. Porcher considers animal husbandry as a co-evolution between species but does not discuss how farmed animals are often in a forced relationship with the farm. An illustration of this forced relationship can be seen in the populations of chickens in wild settings who prefer to roost in trees despite having captive ancestors, as observed by evolutionary biologist Glen McBride (McBride et al. 131). Animal husbandry may be a form of multispecies labour, but choices are disproportionately made by humans.

The concept of *labour culture* from sociology and labour history scholarship helps to add another layer to understandings of animal labour. Grant Michelson uses the 1996 film *Brassed Off* to illustrate how culture – in his example, music – is intertwined with labour and the identity of working people that extends to the local community (1-2). Michelson outlines three broad themes within the labour culture of working-class people to demonstrate the validity of studying this area. These include an instrumentalised use of solidarity that is inherently politicised; the use of leisure time such as rugby matches; and the celebratory dimension of work culture (2). For the third theme, he uses the example of a cultural response to a tragedy at a work site, such as a mining accident, which may become memorialised by the mine (2). His primary finding is that culture is intertwined with work and a sense of identity within localised community

cultures. The use of mining examples is impactful, because in mining communities there may be a habituation to mining labour and the associated risks that people from outside of these communities may not understand or accept.

Human culture also shapes how humans house, work with, and/or farm animals. Similar to Michelson's example of mining, humans who work in the farmed-animal industry may be part of a labour community. Workers are trained or habituated to industry standards through systems of vertical integration that controls every aspect of the poultry production (Alexander 367-368). Training in animal agriculture is focused on industrial husbandry and it may not require the employee to understand the biological or natural histories of the animals they farm. Companies may also keep labourers unskilled by having them trained to do one job. For instance, ethics and labour scholar Charlotte Alexander finds workers may be only trained as chicken catchers, who 'are dispatched into the chicken houses to grab the live birds, cage them, and load them onto trucks for the processing plants' (Alexander 360). The industrial poultry shed is often referred to as a *house* within the industry, which distorts the scale of a large warehouse into something intimate and personal. *Grower* is also used to label the job of chicken meat farmers (Davis 23). Since growing is commonly associated with plant crops, the term works to relate chickens to plants and disassociate them from the birds they are. This creates a labour culture that views chickens as resources to be *harvested*. Labour culture also often extends to consumers who may be encouraged by marketing and cultural norms to accept industrialised practices. One example is school hatching projects that are commonplace in many anglophone countries (for example, the US, Canada, and Australia). Davis finds that these projects teach children that chickens have no natural origins nor need for a familial life with their own kind (Davis 39). Artificial incubation is standard in industrial poultry farming for economic reasons (Boleli). This practice completely removes the maternal nurturing and teaching that hens would provide to their offspring.

For centuries, culture has been set in opposition to nature and regarded as an inherently human attribute. However, animal studies scholars have challenged this assumption by arguing that nonhuman animals have cultures too. Animal cultures have been recognised in cetaceans (aquatic mammals), with evidence of novel behaviours shared amongst pod members (Rendell

and Whitehead 312). Cetaceans also teach their young and exhibit social learning (313). Rendell and Whitehead find that social learning is a major part of cetaceans' lives, which they identify as culture. However, they argue that culture does not need to be 'tied to any particular species or any particular form of culture' because culture has complexities that vary between species and ecologies (318). Rendell and Whitehead came to their conclusions from scientific observational studies of behaviour and did not look for cultural transmission of knowledge (324). Culture was simply the clearest concept fitting what they witnessed.

Another dimension to this discussion on culture is that humans have long tended to perceive mammals as more evolutionarily advanced than avian species. Avian species, because of their unique biology that includes different brain structures and size, have been mistakenly viewed as less intelligent than mammals (Kaplan 17). Avians, like cetaceans, have been documented in the sciences as exhibiting social learning, teaching, and having local behaviours that are unique to a single flock and not the same across the whole species. Ethologist Gisela Kaplan observes, for example, that bower birds who collect objects and display them in intentional and unique arrangements would be viewed as having a culture if they were primates (190). Chickens are cast into a more marginalised position in human society, since the speciesist uses of chickens depend on pejorative views of them. Carol Gigliotti points to how corvids and pigeons have often been studied in the sciences for their intelligence and creativity in a way that chickens have not been until recently (Gigliotti 168-69). Chickens are now known to have extensive social and emotional complexity (Marino).

This paper asserts that *chicken culture* includes maternal care, teaching, etiquette, and evolved behaviours. Chickens both captive and wild share a vocalisation repertoire of twenty-four calls, with distinct calls for food, danger, social status, and so on; however, each bird has their own individual voice which other chickens can distinguish and use to identify unique members within their flock (Garnham and Løvlie 5). Evolved behaviours such as chicken vocalisations are entangled in chicken cultural and community groups, since calls express uniqueness and a connection to their known flock members. Further research reveals the learning and development of local behaviours. For example, a study on captive chickens finds that chicks raised by their mothers have improved social abilities that continue into adulthood,

such as how they respond to fearful stimuli (Edgar et al. 5). Hens also teach their young to peck appropriate stimuli, which is known to reduce feather-destructive behaviours (6). Chickens learn from their mothers; in addition to better social abilities, hens intentionally direct their offspring to correct food sources, which teaches chicks about their mother's food preferences (4). Through the process, a hen also responds to what a chick is doing and corrects then if she is not satisfied with their food choice. In turn, the chick changes their behaviour based on their mother's direction (4). There is no doubt that chickens exist within their own societies and have standards of etiquette and culture.

However, research on chicken social structure has most often been used to inform industry practice or to reinforce the categorisation of these birds as farm animals. Between the 1960s and 1980s, McBride studied chicken behaviour to resolve problems that existed in the industrial settings of his time (McBride et al.). The basis of his work was observations of a population of chickens formerly kept by humans, comprised of several small flocks on Northwest Island off Australia. This population was thought to have been originally left on the island in the nineteenth century by sailors or labourers, but their exact history is not clear (127). McBride's research revealed that these chickens stayed on the edges of the forest and formed multiple small family groups of a male and four to six hens (136). He documented intimate relationships between chickens and the ways in which their social structure influenced how a flock functioned (136-43). McBride believed that humans have a moral, legal, and 'clear responsibility' to captive animals; he looked at animal behaviour as a way to improve the problems he saw in animal industries (McBride, 'Feral Animal Studies' 474). He believed that stress in industry could be reduced by allowing birds to exhibit what he discerned as their natural behaviours, such as allowing birds to live in small groups between partitions, yet he did not suggest disbanding industrial poultry farming (McBride, 'Crowding without Stress' 566). Despite the limits of McBride's reach from an animal liberation point of view, his research remains significant because he highlighted that chickens placed in captivity are forest birds, something often not done. This is not to say that natural histories are infallible, but a natural history works to understand a living being in the environment in which they have evolved and recognises that animals exploited by humans are still like their wild ancestors.

Today, the idea that chickens are farm animals is unsettlingly entrenched in Western culture. In scholarship on chickens, competition and aggression have been used to frame the social structure of chickens in terms of the pecking order (Guhl). Although competition and aggression are known to be features of animal behaviour (including in humans), it is not well understood what structures dominance in relationships (Holekamp and Strauss). Even within different groups of the same species, there is variation from 'despotic' to 'tolerant and egalitarian' (48). Yet, chickens have often been reduced to their pecking order without recognition of how a flock may be structured uniquely. In *The Chicken: A Natural History* by Joseph Barber, for example, the pecking order is framed as an outcome of competition, with the winner being the most dominant (80). This view of the pecking order is reductive and understands chickens in terms of human concepts of winners and losers, and the power that humans associate with being the victor. What humans describe as competition may not have the same meaning to chickens. Bird social hierarchies are asymmetrical and nuanced (Strauss et al.). It should be noted that the sources used by Barber came predominantly from farming and animal husbandry (218-19). His book, called *A Natural History*, in effect outlines a history of farmed chickens or chicken husbandry. The reductive way the pecking order is used to frame dominance in chickens is chiefly about human control.

In both industrial settings and small-scale keeping practices, chicken cultures are often dismantled. This is principally carried out through artificial incubation that breaks down chicken-to-chick learning and nurturing. Artificial incubation has been practiced for at least two millennia (Lee et al. 9850). Roosters have also been conditioned to cockfighting through isolation, preventing them from engaging in social interactions with siblings, parents, and peers (jones). Severing chicks from nurturing and familial bonds is linked to behavioural problems, such as pecking cage mates and eating their own feathers (Edgar et al.). These young birds are placed in a labour relationship fixated on production and chickens' metabolic processes without consideration of their culture, through farming practices and containment.

Containers of Control: Labour and Culture

Containers used in animal husbandry influence labour, animal behaviours, and cultures. In the case of captive chickens, coops, runs, walks, sheds, pens, henhouses, and other constructions are designed to integrate chickens into entwined human–chicken societies, and direct how labour unfolds. Backyard chicken coops, for instance, typically have nest boxes set at convenient heights for humans to collect eggs. Backyard chickens in urban or suburban settings in Australia have most commonly been kept for egg production (Gaynor). Today, readily available, prefabricated flatpack coops universally include nest boxes in Australia. This indicates that the coop design responds to its purpose within a particular situation – backyard chicken eggs, in this case. Chickens will lay eggs in nest boxes if they are confined and there are no other opportunities for them to seek the privacy needed for laying (Davis 45). It is in this capacity that designated nest boxes become a form of control, as hens are compelled to use them, which also conditions continued utilisation. Backyard coops are often also used to contain hens to protect them from predation or from wandering. This is also a form of control as coops limit chickens' abilities to make choices for themselves, including which tree to roost in. It is in a similar capacity, although clearly on a much larger scale with different motivations, that industrial poultry sheds function as containers that structure the everyday workings of poultry facilities.

The physical boundaries of the sheds directly govern who labours – chickens, humans, and in some cases machines – and how labour occurs. Large-scale poultry sheds are generally metal rectilinear space frames on a solid slab, although there is some variation in the materials used globally. This simple, large geometry maximises the building footprint while maintaining a height sufficient for human workers and other related machinery. Machinery, such as ventilation, also impacts the length of sheds and density of birds kept within them (Australian Department of Agriculture). Passively ventilated sheds are generally smaller and consist of openings along the longitudinal axes and allow for cross ventilation, whereas mechanically or 'tunnel' ventilated sheds can be enormous and depend on electricity to power large fans on their short axes (Davis 175). Birds in mechanically ventilated sheds are kept more densely than those in passive sheds. To give a sense of the density, in Australia, the new guidelines for mechanically ventilated sheds allow them to contain 35 percent more birds than passively ventilated sheds of

the same size (Australian Department of Agriculture, 32). Ventilation does not ensure comfort; these birds lack privacy, are kept in high densities, and experience observable heat stress (Davis 55, 102, 104, 120, 179).

Life in an industrial poultry shed influences chicken flock dynamics, which are upset by the large-scale character of the sheds. The stress from high densities of birds living in close proximity encourages feather-destructive behaviour and increases fear and cannibalism (Davis 102-07). Industry manages these issues by debeaking, a practice existing since the beginning of the industry to prevent chickens from cannibalising each other (Harrison 177). Architectural theorist Sandra Kaji-O'Grady finds that the spatial organisation of animal husbandry structures influences interspecies interactions and their intensity (581). Although Kaji-O'Grady discusses this in terms of the pack dynamics of dogs (571, 575), the finding that physical structures organise interspecies interactions is transferable to industrial poultry sheds. The sheds reflect the workings of the industry in the ways they restrict and control interactions between human workers, machines, and birds. The sheds, even when causing stress and anti-social behaviour in chickens, continue to be the most prevalent structure in the industry to meet economic objectives.

The principal ways in which poultry sheds conserve running costs are by controlling daylight hours, containing waste, and regulating access to food and water. Reduced daylight keeps meat chickens less active, so they eat less feed and drink less water (Davis 175). Increasing light stimulates hormones and using artificial lights can increase egg production in hens (Şahin and Küçük). The sheds further contain waste or 'litter' – a combination of manure, soiled bedding, deceased birds, and feathers – which can be expensive to remove (Davis 23). Some sheds are tall enough that tractors can enter for cleaning and preparation between batches of birds. Using machinery to clean sheds is more financially efficient and faster than using human labourers, although Davis finds that often flocks in the US are raised back-to-back over the same litter for further cost savings (Davis 190). According to Davis, battery hens in the US, whose reproductive life may be one to two years, often live continuously in squalid conditions among amassed filth for their entire time in the battery shed (98, 121–24). In Australia, the new guidelines allow litter to be reused between batches of birds so long as it has been treated to

prevent the spread of pathogens and is dry (Australian Department of Agriculture, 21). Feeding and watering devices are low to the ground, which may impede access by human workers and large equipment. For this reason, many facilities use suspended watering and feeding devices that can be raised from the shed's floor to make room for larger machines and human labourers. These same devices are designed to regulate access to food and water to make it as economical as possible. Suspended watering devices typically use a nipple design that chickens must press to get droplets of water at a time, as opposed to dipping their beaks and wattles in the water for full gulps as they would with access to open water (Davis 121). Chickens farmed for meat have additional difficulties accessing water due to lameness and being kept in high densities (Evans et al.).

These economic but unhygienic practices cause environmental pollution when litter is removed. Davis finds that litter in the US is often dumped in landfills, at over a hundred tons a year in the state of Georgia (Davis 99). Additionally, these conditions pose serious risks to human health, since the high densities of birds create a risk of communicable illnesses and if treated with antibiotics, influence the emergence of antibiotic-resistant bacteria (Benameur et al. 299). No matter the environmental, ethical, or cross-species health risks, the emphasis remains on how to produce the most material output (meat and eggs) for the least amount of input. Complexities remain in relation to different scales of chicken keeping. Whereas there are differences between industrial sheds and backyard chicken coops used for eggs, all scales of poultry production use human-built structures to control chickens.

It is due to broadly embedded – not universally accepted – cultural beliefs that small-scale keeping entails better welfare, that industrial poultry marketing uses graphics showing small-scale farms (Bjørkdahl and Syse 47-50). Commercial poultry farms may use images on their website and promotional material where chickens are depicted standing in grass (see for example Perdue Farms, 'About Pasturebird' or Grassland Poultry). The opportunity to stand on grass was an important design feature of open-floor robotic and mobile automatic coops. Some of these have motorised wheels and moves slowly around a farm in order to rear chickens on the open ground (Aouf). Companies may include such innovations precisely because the birds would be able to 'roam freely' and 'live their best lives' (Aouf). A unique example is Pasturebird,

which has gained attention in architecture and design as a significant innovation and received coverage on a widely circulated online design magazine *Dezeen* (Aouf). This innovation however accepts chickens as food and the designed shed is presented as a 'best life' simply because it allows the contained chickens to touch grass. This can somehow be viewed positively in the context of industrial poultry farming, and alarmingly, as positive design innovation.

Connection with grass and small-scaled farming may situate an automatic range coop as better for the environment. However, there remain concerns. Little attention is drawn to more prevalent practices that use industrial sheds built over a concrete slab (Coker and Coker). Although some automated coops may be clad in lightweight textiles, solar-powered, and interfaced with robotics operated by a computer program, they are still rectilinear spaces designed to accommodate the industry's standard equipment (see for example, the one described by Aouf). How far this constitutes a significant open ground experience for chickens themselves, and how far the open ground experience signifies market difference regarding production is a question for critical animal scholars to interrogate.

The use of mobile sheds by large agribusinesses in the United States is transferable to the situation in Australia. In Australia, new guidelines on industrial poultry welfare include outdoor systems (Australia Department of Agriculture, 16-17). Outdoor industrial poultry keeping in Australia is becoming more common, especially in the egg industry. Yet, outdoor systems in Australia maintain high population densities. Cover is provided with 8 square metres of overhead shading per 1000 birds, or 125 birds per square metre if all birds accessed the site at once (Australia Department of Agriculture, 16). Mobile poultry coops and outdoor shading for industrial poultry broadly serve to provide artificial forest cover to place chickens into the role of 'pasture' birds. These systems tend to maintain the status quo of the poultry industry by prioritising automation and using chickens as material parts of a much larger economy. In this context, innovation focuses on 'reimagining' chickens touching the ground, which evokes small-scale chicken keeping practices and its associated good welfare.

Conclusion

This paper has shown how human technology and labour culture influence human–chicken interspecies relationships. In the West, chickens have not been understood as the forest birds they naturally are, an observation not novel to this paper (Davis; McBride; Potts). The large-scale exploitation of poultry emerged in the mid-twentieth century (Potts 18). However, a long history of human–chicken entwinement has positioned chickens as farmed animals within human societies. In part because of a lack of awareness, a point often overlooked is that all chickens naturally have similar behaviours to wild junglefowl and express the same vocalisations and preferences. There is a natural tendency for all chickens to prefer forest edges and to seek cover, as is observed in wild junglefowl. Captive chickens are frequently raised and kept in environments that are not appropriate for them as forest birds, such as being kept in wide open pastoral land or in sheds. Today, the history of small-scale chicken keeping continues to inform how human societies understand chickens and their perceived positive welfare in these settings. This positive association is why large-scale agribusinesses may use small-scaled farmyard scenes with a few chickens on green grass in marketing material.

With the industrialisation of poultry farming, new forms of human–chicken labour emerged that focused on efficiency – the most outputs (meat and eggs) for the least inputs (running costs, human labourers, feed, water, veterinary care). Chickens are now valued for their metabolic labour or the biological processes that include growing (meat) and laying (eggs) (Beldo). Industrial chicken keeping has also broken down chicken familial structures, since artificially incubating eggs for the meat and laying hen industry is now standard for economic reasons (Boleli). However, chicken-to-chick maternal care and learning have been proven to improve chicken social interactions and their ability to respond appropriately to certain stimuli (Edgar et al.). Chickens have culture and removing chicks from their flocks and maternal care disrupts it.

The perception of positive welfare in small-scale chicken keeping settings continues and is made use of by large-scaled agribusinesses. This has been shown drawing in the examples of commercial poultry farms' promotional web material and published discussion of just one example of poultry innovation: a robotic coop. Outdoor shading devices also work like mobile

sheds by providing artificial cover for forest birds who are raised on pasture. Mobile poultry sheds, outdoor keeping, and the more common industrial poultry sheds on a concrete slab are all used to raise thousands of chickens as quickly and economically as possible with a focus on production yields over individual wellbeing. When evaluated through an animal studies lens, seemingly new designs of poultry sheds, outdoor shading, machinery, and buildings are found to continue the status quo of industry. They are built to purpose, and chickens have been equated to commodities or something to be grown and harvested. Through the poultry shed, these vibrant athletic forest birds have been reimagined as a pastoral crop.

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