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# Chicken Run

## A CHICKEN-CENTRED DESIGN RESEARCH PROJECT

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**ABSTRACT**

In the UK about 2.2 million chickens are eaten daily[1], through a process largely designed for human functionality without accounting for the bird's natural behaviour. Typically, 20,000-40,000 birds live together in single barns, sometimes for as little as 35 days, leading to a number of health and welfare issues that can ultimately compromise the commercial value of the birds[2].

The Chicken Run project saw designers and scientists working together to explore ideas to improve poultry welfare in commercial facilities, applying user-centred design to all key stakeholders: farmer, consumer and chicken. Initially, a researcher led a group of 25 multi-disciplinary MA students in the development of designs for improved poultry welfare, exploring various aspects of the chicken's journey from egg to plate to better understand their needs and to maximise joined-up positive impact. Some proposals were then developed and tested, including perches, bales and an app to enable consumers to make the right chicken purchase choices. This paper describes the issues, design process and the variety of design developments that emerged. It also provides an update on progress of selected design ideas that are currently being developed with a commercial poultry farm, drawing out the challenges and successes encountered.

**KEYWORDS**

**Design, Agriculture, Animal welfare**

[1] Defra, United Kingdom Poultry and Poultry Meat Statistics – August 2014

[2] Julian (2005) Production and growth related disorders and other metabolic diseases of poultry – A review. The Veterinary Journal 169:350-369

**figure 1** Chickens at FAI Farms

## CONSIDERING A CHICKEN-CENTRED DESIGN APPROACH

Despite a host of evidence to prove its value across a variety of sectors of society, design is still widely associated with application in commercial and consumer-driven markets. It has been suggested that some of the design tools and techniques developed for this context are therefore intrinsically unethical and unsustainable. User-centred design, for example, that explores needs of users to identify ways of satisfying those needs, was highlighted by Roberto Verganti as an outdated tool for a world where sustainability is now a key driver. He argued (not unreasonably) that, given the well-documented link between design and economic growth[3], user-centered innovation may have "helped conduct us into an unsustainable world"[4]. In the midst of a 'me' era, where the individual user is king/queen, user-centred design would appear to feed the anthropocentric notion that the human is at the centre of the universe, able to dominate, rather than be a part of nature[5].

This paper argues, however, that design methodologies such as user-centred design, visioning and testing/prototyping, when used in the right way, can be applied beyond the context of consumer-driven innovation. Inclusive design, whose well-documented techniques are elaborations of user-centred methods, co-creation and active prototyping, has long been addressing issues of social equality, demonstrating that design techniques can be perfectly suited to address broader challenges beyond that of increasing consumption[6].

It follows that the same techniques may be applied to welfare or environmental briefs, and designers (as well as artists) are beginning to explore territory beyond humans, highlighting and addressing big systemic challenges in which the human plays only a partial role, and questioning how design techniques may be extended to explore and enhance non-human agencies[7].

However, as far as this research has been able to ascertain, the

[3] The Value of Design Fact-finder Report, Design Council 2007

[4] Verganti, R, Harvard Business Review http://blogs.hbr.org/2010/03/user-centered-innovation-is-no/

[5] Lovelock, J. Gaia: A New Look at Life on Earth, 2000

[6] Myerson, J; Lee, Y.K; Designing For The People, With The People And By The People (2007),

[7] Latour, B; *How Better to Register the Agency of Things, Tanner Lectures, Yale* 26th and 27th of March 2014

**figure 2** Omlet

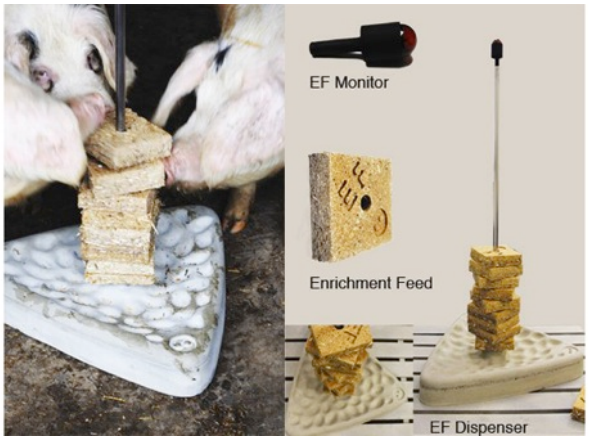


**figure 3** Anne Sofie Lefevre, 2012

**figure 4** André Ford, 2013

world of commercial farming has rarely used design techniques to innovate and create change.

At an experimental level, projects are emerging that employ design techniques in this broader sense, to address not only animal welfare, but the relationship between people and animals. Omlet, a company that began as a design project at the RCA, brings together all the elements that give people in cities access fresh, zero-mile eggs by enabling urbanites to easily keep chickens in their gardens[8] (*fig 2*). In an example of pig-centred design, Beatrijs Voorneman (MSc), a researcher at the Technical University, Delft, designed a pile of differently shaped layers of various edible materials, enabling pigs to engage in natural rooting behaviour[9]; at the RCA, Anne Sophie Lefevre's similar concept uses waste materials to create edible pig-friendly blocks on a pole embedded on a specially shaped concrete base, providing both ideal material and snout-shaped cavities for rooting; but it also considers the operational needs in intensive pig farming, incorporating a mechanism for alerting the farmer when the bricks are in need of replacement[10] (fig 3).

A number of projects have also cast light on the ethical questions of our chicken farming techniques. RCA Architecture graduate André Ford's "Headless Chicken Solution"[11], embodied a monstrous vision inspired by an essay by Robert Burruss in which he predicted that the future of chicken and egg production will include birds "beheaded and hooked up en masse to industrial-scale versions of the heart-lung machines...Through cutting off the areas in the brain that are connected with sensation and consciousness the chickens become unaware of their surroundings. They can then be packed even closer and farmed in a "Matrix" style manner without suffering"[12] (*fig. 4*). And Fine Art graduate Kate MccGwire highlights the sheer numbers in poultry production through her sculptures made from masses of delicate feathers and bones; occupying a liminal space between nature, science and art, her sculptures are both ominous and sensuous, "impossible creatures" that are both

[8] https://www.omlet.co.uk
[9] www.pigprogress.net/Home/General/2011/2/Product-designer-develops-edible-toy-for-pigs-PP007086W/
[10] http://www.rca.ac.uk/students/anne-sofie-lefevre/
[11] http://www.wired.co.uk/news/archive/2012-02/15/andre-ford-chicken-farming
[12] Robert Burruss, "The Future of Eggs," The Baltimore Sun, Dec. 29, 1993

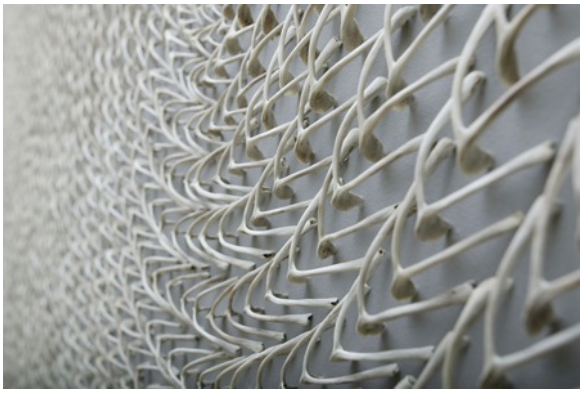

**figure 5** Kate MccGwire, 2004

**figure 6** FAI Farm visit

faceless and abstract[13]. Her graduating piece was a wheel of wishbones, perhaps reflecting humanity's attempt to dominate nature[14] (*fig.5)*.

**WORKING WITH FAI FARMS**

The Chicken Run project sought solutions that demonstrated economic as well as environmental and welfare benefits. Scientists from FAI Farms, together with researchers from a leading MA college of Art and Design, carried out a research project using a chicken-centred, as well as human-centred, design approach. Co-funded by a major high-street retailer and a restaurant chain, the aim was to explore some of these issues and to generate ideas for improving poultry welfare in high-density production units, while at the same time considering the health and environmental impacts of chicken production and enabling meat-eaters to distinguish between low- and high-welfare poultry.

**ENVIRONMENTAL AND WELFARE ISSUES OF THE POULTRY INDUSTRY**

Across the meat industry, farming techniques over the last 60 years have developed in response to a demand for more and cheaper meat. With the exception of Temple Grandin's work[15] in the handling of cattle and pigs that has led to the redesign of slaughterhouses across the USA (*fig 11*), animal farming rarely benefits from advanced design thinking; most animals are bred, grown and slaughtered in facilities designed from a human perspective in order to increase production and reduce costs, with limited regard for the welfare of the animals. The poultry industry is no exception with all aspects of production, from barn design, lighting, and feeder/drinker layout based on maximising efficiency and the needs of the farmer. Furthermore, as meat consumption has intensified, people are increasingly disconnected from the realities of how it is produced[16] and there is widespread confusion about the multitude of definitions and

[13] http://www.aestheticamagazine.com/blog/review-of-kate-mccgwire-lure-london/
[14] http://www.saatchigallery.com/artists/kate_mccgwire_articles.htm
[15] http://www.grandin.com
[16] Pretty, J, Agri-Culture: Reconnecting People, Land, and Nature, 2002

labels used at retail level[17].

**GENETICS**

In the UK our appetite for chicken has increased exponentially, with poultry accounting for more than half of our entire meat consumption, compared with just over a third 20 years ago[18]. As a nation, we now eat our way through 2.2 million chickens a day, with 70 per cent reared in the UK[19]. This scale of production has been made possible largely through developments in poultry genetics and nutrition. Modern broiler breeds have been selected for fast growth rate, efficient feed conversion and high breast meat yield[20]. Since the 1950's the number of days required for a broiler to reach 1.5 kg body-weight has decreased from 120 days to 30 days. Simultaneously, the quantity of feed (kg) needed to produce this 1 kg of chicken (the feed conversion ratio) has reduced from 4.4 to 1.47[21]. However, these developments have frequently been accompanied by a welfare cost to the birds, including metabolic disorders, poor leg health, and the concomitant reduced activity of the birds. Metabolic disorders have been directly related to fast growth rate and ultimately result in increased flock mortality[22]. Lameness associated with poor leg health can be painful for the bird[23] as well as behaviourally restricting access to resources[24]. Reduced activity has been associated with the formation of lesions on the hocks of the birds[25], likely due to increased time sitting on soiled litter. Whilst more recently broiler genetics companies have begun incorporating welfare and robustness traits into the breeding

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[17] Verbeke, W; "Influences on the consumer decision-making process towards fresh meat – Insights from Belgium and implications", (2000) British Food Journal, Vol. 102 Iss: 7, pp.522 - 538

[18] British Poultry Council

[19] British Poultry Council

[20] Bessei, W. **(**2006) Welfare of broilers: a review. *World's Poultry Science Journal 62*: 455-466

[21] EFSA (2010) Scientific Opinion on the influence of genetic parameters on the welfare and the resistance to stress of commercial broilers. EFSA Journal: 8 (7):1666

[22] Julian (2005) Production and growth related disorders and other metabolic diseases of poultry – A review. The Veterinary Journal 169:350-369

[23] Danbury *et al.* (2000) Self selection of the analgeic drug carprofen by lame broiler chickens. Veterinary Record 146:307-311

[24] Weeks et al. (2000) The behaviour of broiler chickens and its modification by lameness. Applied Animal Behaviour Science 67:111-125

[25] Dawkins *et al*. (2013) In search of the behavioural correlates of optical flow patterns in the automated assessment of broiler chicken welfare. Applied Animal Behaviour Science *145: 44–50*

goals (e.g. leg strength and cardiovascular fitness), substantial improvement is hampered by the ongoing drive to increase the efficiency of broiler production through genetic gains in growth rate and feed conversion[26].


**figure 7** Three stakeholders mood-o-gram

## DESIGN PROCESS

The project followed a classic four-stage double-diamond design process: Explore, Define, Develop, Deliver[27]. The initial phase of the project involved a six-day workshop with a multi-disciplinary group of 25 MA students from a wide variety of courses including Service Design, Textile Design, Visual Communication, Design Products, Architecture and Innovation Design Engineering. Together they explored the issues and generated ideas across different specific areas of poultry production and consumption, under the guidance of farming, welfare, retail and design experts.

## STAGE 1: EXPLORE

As already explained, agriculture, poultry production and welfare in particular have remained very far from the traditional remit of the design profession. The industry has rarely considered design to be a possible tool for innovation, and designers have not thought about applying their skills in a farming or welfare context. Furthermore, the industry is largely hidden from public view, allowing “no link whatsoever between the consumer and the producer, between human and animal”[28], and as such goes to some length to shield all stages of production from the public eye[29]. However, in order to generate viable ideas for poultry enrichment and consumer understanding, it was essential for the design team to get a full and broad understanding of the industry. For this reason, two field trips to poultry production facilities were organised, in order to expose them to as much informed knowledge as possible, both through observation and expert advice. Guidance given from experts into the natural behaviour

**figure 8** Chicken timeline

[26] Neeteson-van Nieuwenhoven, et al. (2013) (Aviagen) The role of sustainable commercial pig and poultry breeding for food security. Animal Frontiers (3):1 52-57

[27] Design Council 2007; Eleven lessons: managing design in eleven global brands. A Study of the Design Process, (6)

[28] Young, R, Craig, A, Too Hard to Swallow, The Truth about Drugs and Poultry, Soil Association 2001

[29] Photographs, for example, were prohibited during our visit to the commercial chicken farming facility

of chickens during an initial visit to a best practice low-density experimental farm (FAI), where chickens are kept in relatively small numbers in sheds with outdoor access, provided students with a broad overview of the poultry industry (*fig. 6)*. Two days field research also led the students to explore the multitude of forms in which chicken reaches the consumer. Students gathered photographic evidence showing everything from whole birds pre-packaged in the supermarket, to chicken shops and sandwiches.

**figure 9** Commercial chicken farm visit

**STAGE 2: DEFINE**

Back in the studio, a mapping exercise helped identify the journeys of the three main stakeholders (Farmer, Chicken, and End Customer). A mood-o-gram[30] Chicken Timeline of the life of the chicken was created, following the six life stages: hatching and transport; growth; thinning; catching; transport and slaughter; retail (*fig 7*, 8). Scientists from FAI facilitated the exercise, providing explanation and detail, and helping replace preconceptions with facts.

Following the Chicken Timeline students visited an intensive production facility, (albeit a high-welfare one) (*fig 9*). The visit represented a full-immersion into the world of chickens and included a walk amongst the chickens, as well as thorough explanation by the farmer of the various daily issues and needs of the birds, and how these changed over time as they developed. To and from the facility, film viewings gave further insights into the world of chickens, farming and meat, and illustrated some high-welfare alternatives to intensive chicken production. By the end of the second field trip, students had a good understanding of the needs of the farmer, the welfare and health issues of the birds and the market drivers that dictate the current production methods.

**figure 10** Idea generation in the studio

**STAGE 3: DEVELOP**

[30] A 'moodogram' is a technique used in service design where positive to negative feelings are plotted into a 'y' axis agains time along an 'x' axis



**figure 11** Temple Grandin, Food Inc, DVDs

In this phase of the project students were divided into five groups and given a specific sub-theme to work on. These included: Housing and Management; Feed; Customer Awareness; and Enrichment. Each group spent a day brainstorming and generating ideas (*fig. 10),* and through a series of facilitated exercises, formulated a large number of broad concepts within their sub-theme. The best ideas were developed into more evolved concepts, considering the perspective of the three key stakeholders (farmer, chicken, customer), as well as economic viability. At the end of the workshop week, refined ideas were presented to the clients (sustainable farming experts and representatives from the high street retailer) showing user journeys for all stakeholders. A wide variety of ideas were developed, from the highly practical, to the more conceptual and systemic.

**HOUSING AND MANAGEMENT**

Commercial broiler housing is designed for efficiency of production. Farms typically consist of multiple large-scale sheds, each housing between 20-40,000 chickens. Modern houses are fully automated with feeder and drinker lines, and ventilation fans and heating systems to control air quality and temperature. Broiler chicks are transported from the hatchery to the farm at day old and collected 5-6 weeks later by contracted 'catching' teams that load the birds into transport containers to be taken to slaughter. In the UK broilers are kept on a bedding litter of chopped straw or wood shavings to provide a comfortable lying surface and to aid the absorption of wet faeces from the birds. In the UK, maintaining dry and friable litter is of key importance[31] [32] so as to prevent an increase in microbial growth and release of ammonia from the breakdown of nitrogen compounds in the faeces. High levels of ammonia can cause damage to respiratory function of the birds and humans, increasing predisposition to infection and reducing production performance[33]. Wet litter has been associated with lesions on the footpad and hocks[34] of the

[31] Welfare of Farmed Animals (England) Regulations 2007

[32] Defra Code of Recommendations for the Welfare of Livestock: Meat chickens and breeding chickens.

[33] Kristensen, H.H. & Wathes, C.M. (2000) Ammonia and Poultry Welfare: A Review. *World's Poultry Science Journal.* 56:235-245

[34] Haslam *et al.* (2006) Preliminary study to examine the utility of using foot burn

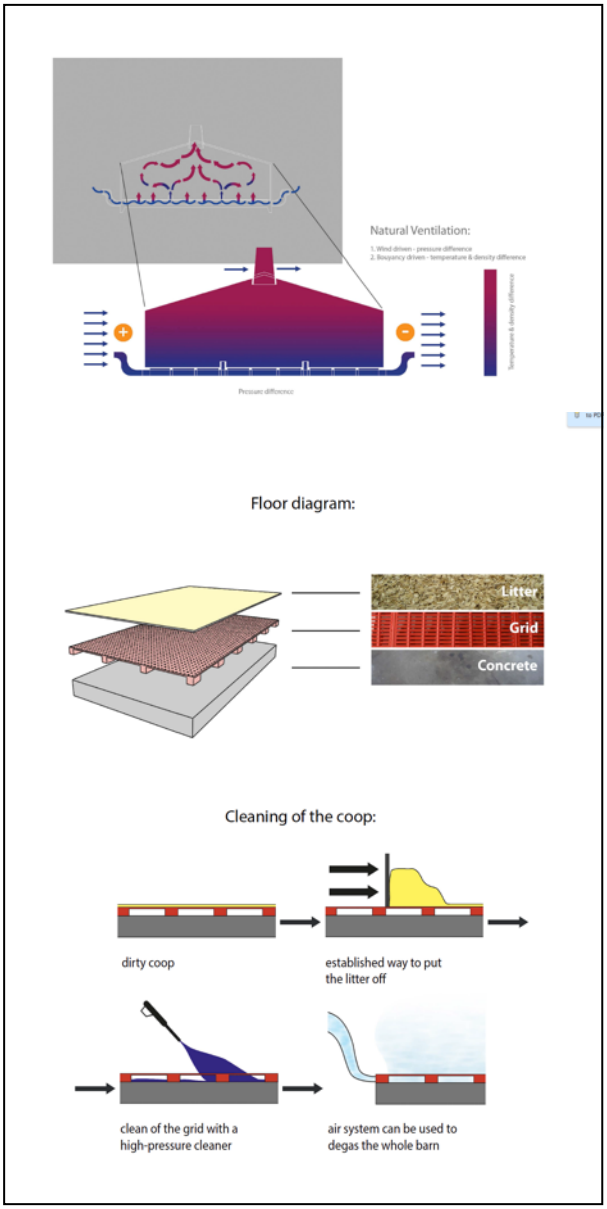


**figure 12** Housing and management project

birds that cause pain to the animal[35] and also affect the commercial value of end products.

As a result of the high numbers of birds housed and the juvenile age of broilers (whose immune capacity is underdeveloped), biosecurity is a major concern in broiler production. Barrier systems and cleaning and disinfection practices are used to limit the introduction of pathogens. Of particular concern are pathogens that affect human health, most notably Campylobacter. 80% of human campylobacteriosis cases are derived from contaminated chicken[36]. Current presence of Campylobacter in broiler chickens in Europe vary between 18 to >90% of flocks[37]

**Project for housing and management**

Students developed a concept utilising a grid flooring system, natural ventilation and underfloor heating to improve air flow through chicken sheds, to improve air quality, reduce heating energy requirements and help keep bedding drier throughout the crop. The proposal suggested that heat could be dissipated through underfloor heating and recovered at roof level by high-level heat exchange processes. The grid floor could be disinfected between crops with a high-pressure cleaner (*fig. 12*) Students forecast an improved bird health and with resulting lower loss in value, and calculated a reduction in energy costs, currently estimated at £0.09 per bird

**FEED**

Feed is the major input cost in poultry farming, accounting for up to 70% of total production costs. Largely grain based, ingredients include wheat, soybean meal, barley and oilseeds, supplemented with vitamins, minerals, enzymes and antimicrobial additives to support gut health. Rations are

or hock burn to assess aspects of housing conditions for broiler chicken. British Poultry Sci. 47(1)

35 Haslam, S.M., Knowles, T.G., Brown, S.N., Wilkins, L.J., Kestin, S.C., Warris, P.D. & Nicol, C.J. (2007) Factors affecting the prevalence of foot pad dermatitis, hock burn and breast burn in broiler chicken. *British poultry Science*. 48: 264-275

36 FSA (2014) *Campylobacter.* FSA, London. [online] Available from: http://www.food.gov.uk/science/microbiology/campylobacterevidenceprogramme/#.U9EBF41dWM U [Accessed 24 July 2014]

37 Newell, D.G. and Fearnley, C. (2003) Sources of *Campylobacter* colonization in broiler chickens. *App and Env Microbiol.* 69(8) pp 4343-4351

**figure 13** Feed project – three ways of delivering black soldier fly larvae to chickens

developed for specific stages of broiler growth, providing a balance between the nutritional requirements of the fast-growing birds and the cost and availability of the ingredients. Pelleted feed is delivered to the birds ad libitum through automated pan feeders suspended in lines across the house.

Although broiler chickens have a very high feed conversion efficiency, their requirement for grain crops, that could also be directly consumed by people, places commercial poultry in direct competition for human access to food resources, as well as the land, water and energy required to cultivate these crops[38]. In addition, carbon footprinting assessment has demonstrated that the majority of carbon emissions associated with poultry production originate at the feed production stage, for example through soy-related deforestation or land-use changes to grow grain crops[39]. Similarly, the water footprint of broilers (around 6m3 per bird) is largely related to use at the level of feed production. As the world population continues to grow and demand for meat increases, the need to find alternative feed materials for poultry, in particular those with adequate protein composition to replace soybean will become increasing important.

**Project for feed**

This concept looked at mechanisms to reduce feed imports through the introduction of parallel alternative feedstock based on the production of soldier fly larvae. Building on research about use of the black soldier fly larvae (BSFL) for use in manure management and for the bioconversion of organic waste material[40], the students created three different systems to breed and disseminate the larvae in the shed (*fig. 13)*. The concept suggested that mature larvae and prepupae could feed on soiled bedding in parts of the barn isolated for their cultivation, cleaning and drying it; subsequently they would provide food for chickens, who would have to seek them out in the litter through scratching

[38] FAO (2011). World Livestock 2011. Livestock in food security. Food and Agriculture Organization of the United Nations.

[39] MacLeod, M. *et al*. (2013) *Greenhouse gas emissions from pig and chicken supply chains – A global life cycle assessment.* Food and Agriculture Organization of the United Nations (FAO), Rome.

[40] Sheppard, D. C. (1992). "Large-scale Feed Production from Animal Manures with a Non-Pest Native Fly". Food Insects Newsletter 5 (2)

and pecking in the bedding, an action that would supplement soy-based feed while aerating the bedding material.

**ENRICHMENT**

Some broiler chickens are reared in housing lit by artificial means and containing only feeders and drinkers. Increasingly, houses in the UK are fitted with windows to provide natural light, but these systems provide limited opportunity for the birds to engage in some of their natural behaviour, such as scratching, perching and pecking. These behaviours are thought to be particularly important for to chickens; for example, red jungle fowl, the ancestor of domestic chicken, would have spent 60% of their time engaged in pecking and foraging on the ground[41]. Providing objects that enable specific behaviours such as bales and pecking objects has positive effects on broilers, including increased activity, improved walking ability and confidence in approaching novel objects when compared to birds that do not have access to these tools.

Enrichment can be described as the provision of stimuli which promotes the expression of species-appropriate behavioural activities and biological functioning of the animal. To be effective, enrichment should[42]

1) Maintain the sustained interest of the bird
2) Increase the occurrence of desirable behaviour
3) Decrease detrimental behaviours and
4) Be practical to implement (i.e. long lasting, easy to clean and disinfect between flocks and integrated into the environment)[43]

The opportunity to express natural 'chicken' behaviours is fundamental to the provision of broiler welfare. In addition, although not currently well researched there may also be production benefits of improved health and welfare also (e.g.

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[41] Dawkins, M. S. (1989) Time budgets in red junglefowl as a baseline calculated using the formula: for the assessment of welfare in domestic fowl. *Applied Animal Behaviour Science.* 24: 77–80

[42] Jones RB, 2004. Environmental enrichment: the need for practical strategies to improve poultry welfare, In: Perry, G.C. (Ed.), Welfare of the laying hen.Papers from the 27th Poultry Science Symposium of the World's Poultry Science Association (UK Branch), Bristol, UK, CABI Publishing, Wallingford, UK

[43] de Jong, I. *et al.* (2012) Scientific report updating the EFSA opinions on the welfare of broilers and broiler breeders. European Food Safety Authority. [Online] www.efsa.europa.eu/publications [Accessed 07/11/14].

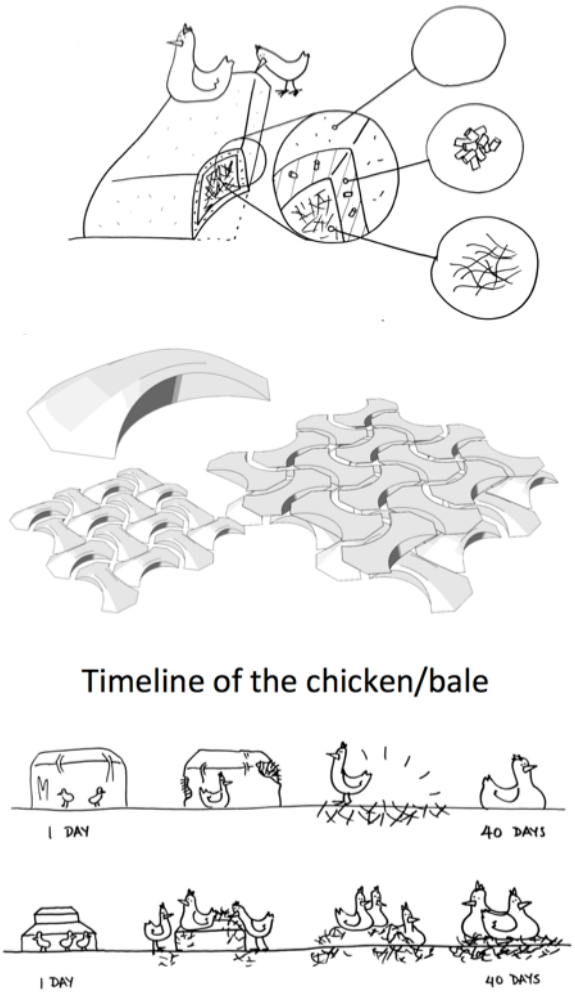


**figure 14** Proposal for chicken bale

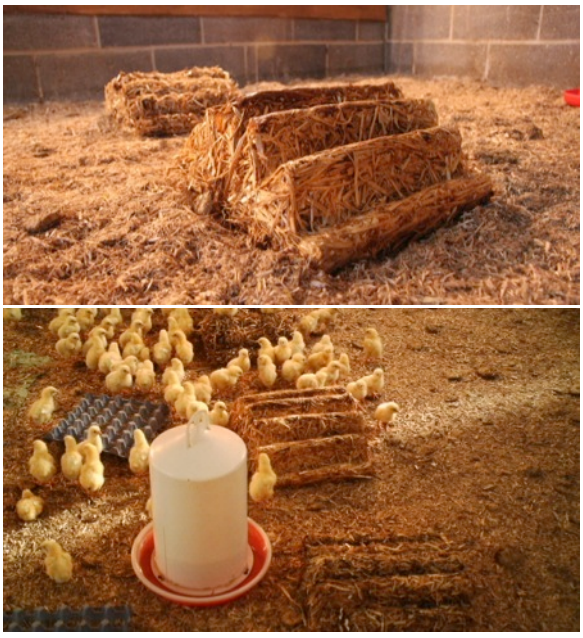

**figure 15** Development of chicken bale

reduced down-grades or better eating quality from increased activity). (see table 1 in annex)

**Projects for enrichment**

Two groups developed ideas for enrichment, focusing on perches and bales.

Through their research students discovered that existing enrichment tools are usually considered a nice-to-have or just too costly to install. Even at the higher tiers of the market (e.g. free range or organic), where the emphasis is on going beyond the minimum welfare standards, designs often do not respond to the needs of the birds, with barren outdoor ranges and indoor environments based on human requirements.

Current solutions are generally ineffective and, since they are not designed with the chicken in mind, tend to be little used. Perches, for example, are not favoured by chickens because they are often too steep or high for older (heavier) birds to access, and those with metal rungs are also slippery and cold; wood shavings bales are sometimes added at the beginning of a crop, but once unwrapped these disintegrate quickly, and while wrapped bales last longer, this leads plastic debris that can be dangerous to the birds. Enrichment tools can also cause a hindrance to the farmer and catching teams passing through the barn.

**The bale**

Students identified that birds' needs change over time, with one-day old chicks huddling together next to the bale for comfort and warmth, while slightly older birds peck at the bale and even in some cases climb on top of them. At the last stage of development, birds with reduced mobility show some difficulty interacting with the bales.

Bales must be moved into the barn wrapped in plastic, and in this state are heavy and awkward for the farmer to distribute. If left intact, the plastic wrapping gets pecked and spreads through the barn causing a potential danger to the birds, while unwrapped bales get destroyed in a matter of days, eventually blending into the litter.

The students proposed a new bale made of straw or shavings

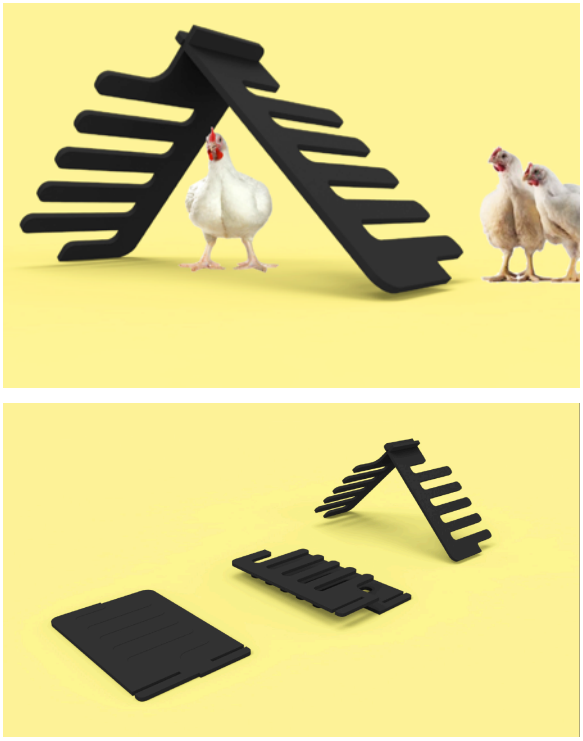

**figure 16** Proposal for perch design

**figure 17** Development of perch

compacted with a natural resin. The bale was slightly convex in shape with gently sloping sides, encouraging young chicks to huddle, but also making it easy for older birds to climb and perch on the top. The varying density of the bale (harder on the inside and more friable on the outside) meant that it would be gradually scratched and pecked, but last through the crop. The bale was conceived in such a way as to be stacked for easy storage, and small and light enough to be easily carried through the barn. This avoided blocking the areas between the feeding lines, making it easy for the farmer to place them throughout and to be able to manoeuvre easily in the barn, even when the birds are at their full growth with little mobility (*fig. 15).* An important consideration was also that the cost of the bale should be offset by better bird health (and consequent value), so the cost of the bale was also calculated.

**The perch**

The second enrichment project looked at perching. Students' observations determined that the perch had to be lightweight, made of a material that could be easily cleaned between crops but that facilitated perching by not feeling cold or slippery, and whose rungs were of a diameter suited to the bird's ability to grip. It was also important the perches did not block aisles or get in the farmer's way, and were safe for chicks and farmer alike. They also needed to be positioned in such a way that there was no risk of excrement from perching birds getting into the feeding trays.

The group hypothesised a flat, interlocking form with multiple rungs, rotationally moulded out of recycled plastic that when assembled formed an A-shaped ladder that would fit over the feeding lines. These would be cheap to produce, easy to install and clean, and would be lifted off the floor by the feeding lines at the end of every crop for floor cleaning (*fig. 16).*

**Project for enhanced customer awareness**

Not part of the original focus of the client, it emerged that improving the customer end of the chicken journey was of paramount importance. Focusing initially on the supermarket environment, the students identified a high level of consumer

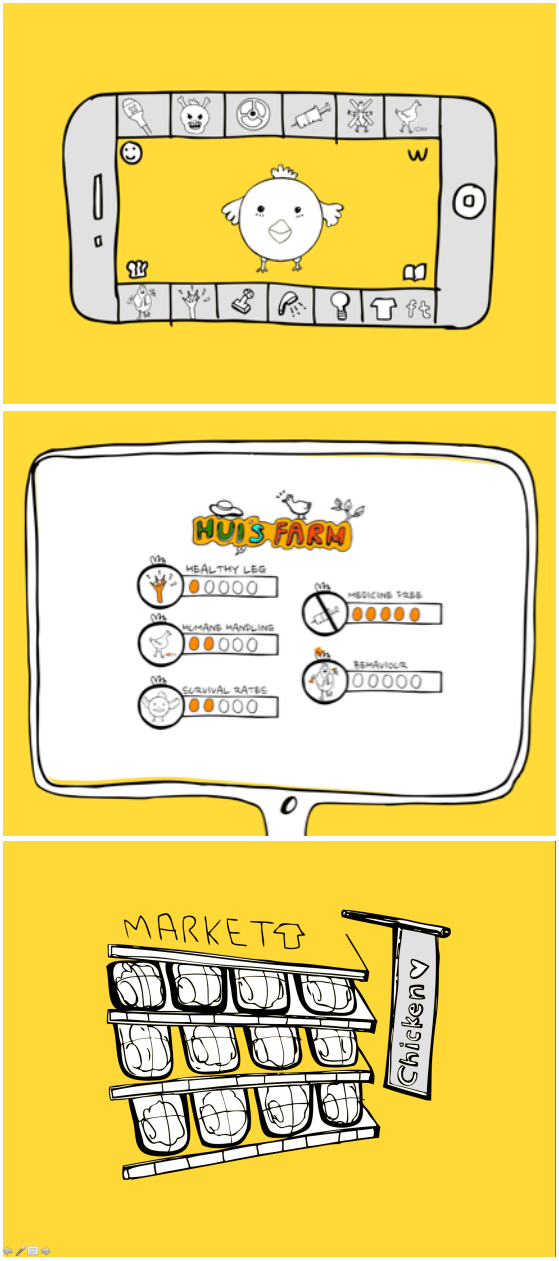


**figure 18** Proposal for consumer-facing smartphone app

confusion with regards to the various prices of whole chickens on the market, as well as different chicken types (eg corn-fed, free range, organic), and their understanding (or interest) of how this related to the welfare of the living animal. There was found to be too much information on the label with no indication of welfare, together with a lack of knowledge even amongst more informed consumers. For example, there was a broad misconception that 'free-range' was equivalent to higher welfare, whereas the reality is in fact more complex. Students observed a high level of cognitive dissonance[44], with most purchase decisions being price-led. A concept for a customer-focused smartphone app was developed, to provide more detailed information about the life of the chicken. The app centred on a scoring system, that identified positive measures of welfare based on levels of foot and leg health, humane handling, survival rates, medicine free and natural behaviour. The app also permitted a connection between consumer and farmer, enabling the farmer to perceive a consumer's appreciation of his/her efforts to run a high-welfare farm (*fig. 18)*.

**FURTHER DEVELOPMENT**

At the end of the workshop week, the app, the bale, and the perch were selected by the client to be developed further. A series of bales and perches were built and tested at FAI with live birds in small production facilities, allowing designers to identify the real abilities and needs of the birds throughout their lifecycle. Time-lapse cameras were installed in the facility, uploading images every 20 minutes, enabling designers to understand the effectiveness of each design in real time.

**Smartphone App**

The concept evolved into a broader guidance for choosing, buying and cooking 'better meat' (better for the consumer, better for the animal and better for the environment), by offering a range of recipes and choices of ingredients, and discreetly incorporating the welfare aspects into its wider functionality. 'Meat Up' included several personalisation filters, enabling

[44] Cognitive dissonance is the feeling of discomfort that arises when a person's behavior clashes with the person's beliefs or when a person's beliefs are inconsistent.


**figure 19** Development of consumer-facing app – Meat-Up

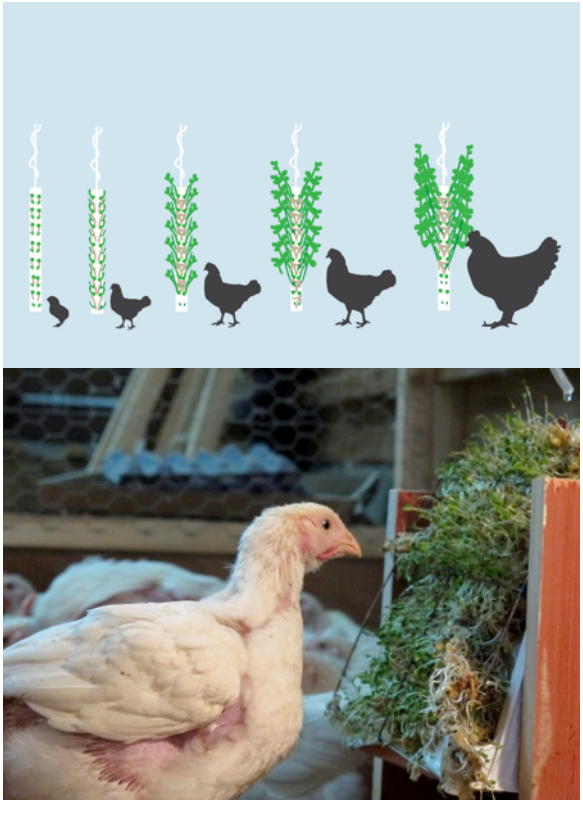

**figure 20** Development of Supersprout

customers to input their own values and preferences within a 'F.O.W.L' framework (free range, organic, welfare, local). The app would allow the scanning of bar codes in supermarkets to provide more detailed information (F.O.W.L ranking) about the origin of the meat, the welfare conditions and the farmer him/herself. Tips and information were incorporated about choosing, handling, preparing and eating meat, as well as where to purchase better welfare meat (*fig. 19)*.

**Perches**

Perches of different rung-diameters, steepness and height were tried out, before creating an adaptive structure that fits onto a standard feeding line. As the line is gradually raised day by day, the perch adapts to the changing ability of the birds to climb, becoming consistently less steep. Perches are still being tried out on small-scale farms (*fig.17)*.

**Bales**

Different densities and ingredients were tried out in small blocks, to get a better understanding of the interest of the birds. Unexpectedly, blocks made of compacted bread did not interest the birds at all, while a compacted mixture of straw, bread and molasses had more appeal. A bale was finally tested with an undulating surface, doubling as a climbing/perching structure that could be dismantled by the birds over time (fig 15). During testing, the discovery of further research documenting the reduction in campylobacter in chickens by adding live green crops led to a further idea of sprouting seeds being tested in the chicken barn. Sprouting bean seeds were spread on a matted strip on an A-frame, and attached to the water supply to stimulate germination (*fig. 20)*.

The bale is currently being developed for mass production, and it is hoped that prototypes will be tested in industrial scale farms in the spring 2015.

**CONCLUSION**

As a result of this project, Redesigning Agriculture has become a core research strand, and has led to significant interest from the

scientific and industrial community. As a design approach it has provided a critical framework for taking this kind of work to the next level, and using it to further explore complex topics hitherto barely explored by design. This paper hopes to open up a debate about the boundaries of design and its potential in supporting innovation in agriculture.