
FarmJam 2017: Designing Enrichment for Farm Animals

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Abstract

This workshop will allow participants to work together to devise novel forms of technically enhanced enrichment for farm animals. It will take the format of a gamejam, whereby teams will be given clear briefs, they will brainstorm concepts and present their ideas to the group for feedback and analysis.

Author Keywords

ACI, farm animal, environmental enrichment, intensive farming, gamejam, workshop, physical computing.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

The field of ACI is constantly expanding its knowledge base and reaching out to diverse communities of animals, both wild and captive. This workshop is driven by a need to address the plight of intensively farmed animals, offering a forum for discussion and innovation – an opportunity to take a small step towards finding more sustainable solutions for food production using livestock.

The workshop will focus on the development of novel and practical forms of environmental enrichment, with

Only a minority of farm animals live like this:



a special emphasis on providing solutions for intensively farmed cattle, poultry and pigs.

Motivation

It is important to acknowledge that farming practices worldwide differ due to factors such as cultural expectations, regulations, heritage, environmental features, local needs and market forces. The current European and US model relies on intensive farming that produces higher yields of animal products at lower financial cost than traditional farming. Although this has had the egalitarian effect of making cheap meat, dairy produce and eggs available to more people, there are serious animal welfare and environmental consequences.

Minimum requirements for the protection of animals kept for farming purposes are set by the European legislation [15]. Such regulations are guided by the "Five Freedoms" [1]. While it makes economic sense for farmers to maintain physically healthy and well-fed livestock, the freedoms from suffering and mental distress and the freedom to express normal behaviour (as outlined in the current FAWC report) have undoubtedly been compromised in the quest for profit. This is critical in the case of chickens, pigs and dairy cows [2], but also affects other poultry and ruminants.

The journey from "farm to fork" is fraught with uncertainty, due to the many changes that occur during the animals' brief lives - new housing, conspecifics, handlers, food, transport arrangements etc. - all of which are outside their control [3]. This, especially when associated with poor rearing and transport conditions, causes stress, which is in turn linked to negative emotions in the animal [4] as well as long-

lasting changes in epigenetic mechanisms of inheritance that cannot be controlled through animal breeding programs. Furthermore, reducing stress in parent and grandparent stock can be a promising direction for reducing behavioural problems in the second and third generations [5]. It is becoming widely accepted that offering more control over the environment can improve animal welfare [6] [3] [7] and thus we seek to explore ways of improving captive environment by offering interventions that allow animals to play, learn and exercise choice.

Manteuffel et al. [7] offer a clear explanation of how cognitive challenges can mitigate some of the negative effects associated with being in captivity, such as boredom and stress-related stereotypical behaviours. *"When an animal acquires successful strategies to cope with environmental demands... this activates intrinsically-rewarding mesolimbic brain axis."* Gaining control over an aspect of the environment is rewarding in itself. Moreover, having learned how to exercise control, the animal can then anticipate the result of performing a particular action, and this is also rewarding [6]. The resulting novel directed behaviour only occurs if the animal has learned something new, either through positive reinforcement training or more gradually via exploratory behaviour that eventually results in the animal performing rewarded (reinforced) actions.

It could be argued that learning to "do tricks" is not a normal behaviour and therefore has no place in an enrichment programme; on the other hand, it may be possible to motivate normal cognitive processes using high-tech interventions in a highly-managed context that supports little freedom of choice. Indeed, it has

Only a minority of farm animals live like this:



Chickens, ducks, pigs and sheep in UK, cattle in Switzerland: images courtesy Fiona French.

been found that animals quickly habituate to inanimate enrichment, whereas they may exhibit higher levels of interest in a technically-enabled device that offers more variety [8].

Key aspects to take into account when developing such devices are: (i) the requirements to always be reliable and timely so that any learned behaviour does not become extinct [7]; (ii) design that takes into account species specific modalities of interaction and cognitive abilities [3]; (iii) design that accommodates a range of personality types and learning speeds [9]; (iv) design that caters for groups without promoting competition [10]; (v) serious consideration of the possibility to elicit pleasure and joy in the target users [11]. Finally, because it is hopeful that public awareness of farm animals' welfare is increasing to a level where it can be used as leverage [12], we recommend that designers could aim for solutions that might have social media appeal.

Aims and activities

The workshop aims to:

- Raise awareness of the needs of farm animals amongst the ACI community and beyond.
- Provide opportunities for networking and creative teamwork.
- Investigate novel ways of integrating technology within farm management systems so as to enhance animal welfare.
- Examine briefs (challenges) offered by farm animal welfare specialists and working farmers.
- Generate radical concepts for farm animal enrichment.

- Produce design documentation for environmental enrichment that is suitable for showing to an interested panel of farming community members.

We would like to emphasise that the workshop does not offer lengthy opportunities to discuss the ethics of intensive farming, but will take a practical "what can we do now that will work" approach. Participants will be offered a future opportunity to contribute to a seminar/forum that specifically focuses on ethical considerations.

We anticipate participants to be pragmatic in their approach to farm animal welfare, and we will provide clear briefs prior to the event so that people are aware of the specific problem spaces to be investigated.

We plan to undertake the following activities during the event:

- Brief introductions for participants and members of organizing committee.
- Structured workshop activities enabling people from different backgrounds to meet and discuss challenges in the field of farm animal enrichment. Participants will work together to find common themes. Opportunity for 6 Hats (or similar) feedback [13].
- Small teams undertaking collaborative design briefs and creating early phase concepts presented as annotated workbooks and video presentations.
- We plan to share the outcomes of the workshop in a repository of ideas and support future collaborations by keeping a record of participants' skills and interests. There will be a website dedicated to the

workshop and we will publicise it via our mailing lists and personal contacts.

Biographies

Fiona French is a senior lecturer in the School of Computing and Digital Media at London Metropolitan University. She is course leader for BSc Computer Games Programming and has organised several gamejams and other play related public events. Her research interests include Animal Computer Interaction, physical computing and toy and game design and development. Fiona is currently investigating the design of playful interactive systems for elephants, as part of a PhD in the Animal Computer Interaction Lab at The Open University.

Sofya Baskin is a researcher at the Tauber Center for Bioinformatics at the University of Haifa, and works with the Technology for Animals Lab. Sofya is an expert in applied ethology. Her PhD topic was in ethological analysis of interactions of humans with dogs, horses and cows. For over 10 years she has been practicing as an animal behavioral consultant. She is the founder of the Russian-speaking online community School of Applied Ethology (almost 3500 participants), where people can get professional consultations and take online courses in animal behaviour.

Adrian David Cheok is the Director of Imagineering Institute, Iskandar, Malaysia, and Professor of Pervasive Computing at City University London. He is Founder and Director of the Mixed Reality Lab; previously Professor at Keio University, Graduate School of Media Design, National, Associate Professor at National University of Singapore, and Mitsubishi Electric, Japan. Research in mixed reality, human-

computer interfaces, wearable computers, pervasive and ubiquitous computing. Featured in worldwide broadcasts such as CNN, BBC, National Geographic, Discovery Channel, etc. Recipient of awards and prizes: A-STAR Young Scientist of the Year, Hitachi Fellowship, SCS Young Professional of the Year, Fellow in Education, World Technology Network, Microsoft Research Award in Gaming and Graphics, C4C Children Competition Prize, Integrated Art Competition Prize, Creativity in Action Award, First prize Mindtrek Award, First prize Milan International InventiON, Gold Award Creative Showcase ACE, Keio University Japan Gijyujusho award, SIP Distinguished Fellow Award, Young Global Leader by the World Economic Forum. Honorary Expert of Telefonica and El Bulli, the number one restaurant in the world. Fellow of the Royal Society for the encouragement of Arts, Manufactures and Commerce (RSA). NESTA Top 10 Technologies of 2015.

Eleonora Nannoni (DVM, PhD) is a researcher at the Department of Veterinary Medical Sciences of the University of Bologna (Italy). Her main research interests are in the field of animal welfare and its relationships with the quality of animal-derived products, focusing in particular on pigs. She has recently taken part in a competitive research project aimed at designing innovative environmental enrichment tools to be used for Italian heavy pigs. She is European Specialist in Animal Welfare Science, Ethics and Law (ECAWBM-AWSEL).

Billy Wallace ([M.Agr.Sc](#)) is Operations Director with Makeway Ltd, an Agri-Technology Supply company based in Ireland. Makeway specializes in pig production systems and provides a diverse range of products and consultancy services which they supply across the entire

pig industry from production, nutrition, housing, equipment, welfare and environment. In previous roles, Billy worked as Technical Manager for an Animal Feed Company before specializing in pig production, where his role with Makeway includes farm building design and layout planning, ventilation and environmental control measures and specialized feeding systems to complement the company's core nutritional consultancy service.

Anna Zamansky is a senior lecturer at the Information Systems Department at the University of Haifa, and heads the Technology for Animals Lab. Together with Clara Mancini, she co-chaired the First International Conference on Intelligent Systems for Animal Welfare (ISAWEL'14), held in conjunction with AISB-50. Her organizational experience includes also chairing three editions of the Israeli Workshop of Applied Logics (Isralog'13, Isralog'15 and Isralog'17) and co-chairing a special session COLAFORM running for two consecutive years at ENASE (in 2016 and 2017).

Call for participation

This workshop aims to bring together expertise from different disciplines and enable participants to network and move towards designing and developing exciting new enrichment experiences for farmed animals.

In particular, we will focus on practical solutions for enriching the lives of intensively farmed cattle, poultry and swine. Working with a set of briefs written by experts from the farm animal welfare community and provided with materials from farmers outlining their specific challenges, we will form teams to brainstorm concepts and present ideas to the group. The structure will follow the format of last year's successful ZooJam

when the focus was on hunting enrichment for predators [14], which generated a range of exciting concepts for penguins, sealions and big cats.

Importantly, given our one-day time constraint, we will not spend time discussing the ethics of associating ACI with food-farmed animal production, assuming that participants have already made a commitment to be involved in the workshop in order to focus on improving animal welfare.

We aim to raise awareness of the challenges facing farmed livestock and their owners and handlers, as well as devise realistic and appropriate interventions that could alleviate some of the stress experienced by the animals and enhance their welfare by offering opportunities for them to express some of their natural behaviours via interactive media interventions. The workshop output will be shared publicly.

We invite participants from a wide range of communities, including but not limited to game design, computer science, engineering, education, HCI and ACI, farm personnel, animal behaviour and environmental enrichment. This is an opportunity for those with an interest in farm animal welfare to share ideas and explore the potential of using technology to enhance enrichment.

We would like prospective participants to submit a one-page description of their relevant expertise and how this might contribute to the topics under discussion.

References

1. <http://webarchive.nationalarchives.gov.uk/20121007104210/http://www.fawc.org.uk/freedoms.htm>

2. Broom, D.M. 2016. Sentience, animal welfare and sustainable livestock production. In *Indigenous*, eds K.S Reddy, R.M.V. Prasad and K.A. Rao, 61-68. Excel India Publishers: New Delhi
3. Wechsler, B and Lea, S.E.G. 2007. Adaptation by learning: Its significance for farm animal husbandry, *Applied Animal Behaviour Science*, Volume 108, Issue 3, Pages 197-214, ISSN 0168-1591, <http://dx.doi.org/10.1016/j.applanim.2007.03.012>
4. Boissy, A., Manteuffel, G., Jensen, M.B., Moe, R.O., Spruijt, B., Keeling, L.J., Winckler, C., Forkman, B., Dimitrov, I., Langbein, J. and Bakken, M. 2007. Assessment of positive emotions in animals to improve their welfare. *Physiology & Behavior*, 92(3), pp.375-397.
5. Bas Rodenburg, T. and de Haas, E.N. 2016. Of nature and nurture: the role of genetics and environment in behavioural development of laying hens, *Current Opinion in Behavioral Sciences*, Volume 7, Pages 91-94, ISSN 2352-1546, <http://dx.doi.org/10.1016/j.cobeha.2015.12.007>
6. Bassett, L. and Buchanan-Smith, H.M. 2007. Effects of predictability on the welfare of captive animals. *Applied Animal Behaviour Science*, 102(3), pp.223-245.
7. Manteuffel, G., Langbein, J. and Puppe, B., 2009. From operant learning to cognitive enrichment in farm animal housing: bases and applicability. *Animal Welfare*, 18(1), pp.87-95.
8. Tarou R.L. and Bashaw M.J. 2007. Maximizing the effects of environmental enrichment: Suggestions from the experimental analysis of behaviour. *Applied Animal Behaviour Science* 102: 189-204
9. Koolhaas, J. M., and C. G. Van Reenen. 2016. "ANIMAL BEHAVIOR AND WELL-BEING SYMPOSIUM: Interaction between coping style/personality, stress, and welfare: Relevance for domestic farm animals." *Journal of animal science* 94.6: 2284-2296.
10. Ernst, K., Tuchscherer, M., Kanitz, E., Puppe, B. and Manteuffel, G. 2006. Effects of attention and rewarded activity on immune parameters and wound healing in pigs. *Physiology & behavior*, 89(3), pp.448-456.
11. von Gall, P. and Gjerris, M. 2017. Role of Joy in Farm Animal Welfare Legislation. *Society & Animals*, 25(2), pp.163-179.
12. Autio, M., Autio, J., Kuismin, A., Ramsingh, B., Kylkilahti, E. and Valros, A. 2017. Bringing Farm Animal Welfare to the Consumer's Plate—The Quest for Food Business to Enhance Transparency, Labelling and Consumer Education.
13. De Bono, E. and De Bono, E. 1999. Six thinking hats (Vol. 192). New York: Back Bay Books.
14. French, F., Kingston-Jones, M., Schaller, D.T., Webber, S.E., Väättäjä, H. and Campbell, M. 2016. Don't cut to the chase: hunting experiences for zoo animals and visitors. In Proceedings of the Third International Conference on Animal-Computer Interaction (p. 19). ACM.
15. European Welfare Standards: https://ec.europa.eu/food/animals/welfare/practice_en