

Impact case study (REF3)

Institution: Bournemouth University		
Unit of Assessment: 15		
Title of case study: How the chicken crossed the globe: using zooarchaeology to transform education and reframe public perceptions		
Period when the underpinning research was undertaken: 2014 – 2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Dr Julia Best	Postdoctoral Research Assistant	2014 – 2019
Dr Phillipa Gillingham	Deputy Head of Life and Environmental Sciences	2011 – current
Dr Ellen Hambleton	Associate Professor, Paleoecology	1998 – current
Professor Mark Maltby	Professor in Archaeology	1990 – current
Dr John Stewart	Principal Academic in Zooarchaeology	2010 – current
Period when the claimed impact occurred: 2014 – 2020		
Is this case study continued from a case study submitted in 2014? No		
1. Summary of the impact (indicative maximum 100 words)		
<p>Researchers at Bournemouth University (BU) used chickens as a vehicle to engage diverse national and international audiences in exploring food production, human-animal relationships, economic significance, sustainability and wellbeing. They have:</p> <ul style="list-style-type: none"> i) transformed teaching practice in the UK and Ethiopia, raising the educational attainment and aspirations of more than 3,000 students; ii) reframed public perceptions by promoting greater understanding of the links between people and animals, with events, exhibitions, films and podcasts reaching approximately 100,000 people, including the general public and heritage practitioners. <p>The impact of the research has been felt on a very personal, yet international, scale. It has also enhanced public appreciation of the importance of academic research into the past in understanding the present.</p>		
2. Underpinning research (indicative maximum 500 words)		
<p>Chickens are the world's most widespread and abundant domestic animals. They number more than 23,000,000,000 and provide much of the world's primary meat and egg resources. Their diffusion from their Southeast Asia origin is almost entirely due to human-assisted transportation; as such, their natural history reflects human history, and the species holds a high degree of social significance. However, the timing and circumstances of their spread across the globe, and their transition into a food resource have been poorly understood.</p> <p>In 2014, Maltby was awarded GBP1,576,505 by the Arts and Humanities Research Council (AHRC) to research chicken use from their first domestication to their modern-day roles and examine the cultural and environmental impact of this important species. The resulting landmark 'Cultural and Scientific Perceptions of Human-Chicken Interactions' project brought together researchers from six universities with expertise in zooarchaeology, anthropology, ecology and genetics. This section focuses on BU's specific contributions. We have conducted ground-breaking studies in animal-human relationships and have facilitated cross-disciplinary collaborations. Combined with this is an exemplar of how our integrated research and impact strategies and interdisciplinary ethos have created world-class outputs.</p> <p>Maltby led pioneering research into the exploitation of chickens through time, focusing on Roman Britain [R1]. Best investigated egg production through medullary bone laid within the shafts of the bones of laying hens, and via working with colleagues from the University of York, to develop analytical techniques in the study of ancient eggshells [R2, R3, R4]. This revolutionised understanding of egg production and showed that, shortly after their introduction, chickens were laying regularly [R1].</p>		

Best led research in tracing the spread of chickens in Europe via a targeted radiocarbon dating programme, funded in-kind by the Natural Environment Research Council (NF/2015/2/5), and through study of chickens and eggs in burial environments [R3]. The results challenged previous interpretations and demonstrated how chickens moved from being prize exotics [R3] to disposable food [R1, R4, R5]. Two doctoral research projects, supervised by Maltby and Hambleton, extended this research. The first examined the ecology of jungle fowl and chickens, particularly around the routes of domestication [R6] and the second revealed the cultural, social and symbolic role of chickens in material culture in Roman Britain and Gaul [R7].

Maltby and Best collated bone samples from across Europe to create the largest species-specific zooarchaeological database in the world, enabling complex, multidisciplinary research collaboration in archaeological science. The outputs based on this research included:

- past-population demographics and the anthropology underlying modern chicken exploitation [R1, R4], size changes in chickens through time, productivity, and chicken health and welfare [R4];
- isotope baselines for interpreting lipid evidence were created on a site-specific level, establishing for the first time that it is possible to recognise chicken food remains in pottery [R5];
- nitrogen and carbon stable isotopes, providing new insights into variations in chicken diets in the past and present [R5];
- ecological niche and genetic studies that have advanced our knowledge of the origins of domestic chickens and in the history of different types of chickens [R6].

Our seminal work has demonstrated that human and chicken health and well-being are inextricably linked in areas such as diet, religion, zoonotic disease and environmental sustainability. The project has transformed our understanding of the spread of domestic chickens through Europe. It has deepened our knowledge of how they were exploited and how they have been transformed from an exotic item often imbued with symbolic significance to the mass production associated with modern broiler chickens, whose skeletal morphology, pathology, bone geochemistry and genetics are very different to those of their ancestors.

The research provided the basis for the University of Nottingham's project 'Going Places: Empowering Women, Enhancing Heritage and Increasing Chicken Production in Ethiopia', funded by a Global Challenges Research Fund (GCRF) Innovation Award. This, in turn, led to a GBP73,382 AHRC Follow-On Funding project, 'Causing a Flap', award to Maltby in 2018. It enabled BU and University of Exeter to translate the research findings from the original chicken project and the social findings from the GCRF project into educational resources and personal stories of benefit.

3. References to the research (indicative maximum of six references)

R1-7 have all been subject to rigorous peer-review.

R1: Maltby, M., Allen, M., Best, J., Fothergill, B.T. and Demarchi, B. (2018), "Counting Roman chickens: multidisciplinary approaches to human-chicken interactions in Roman Britain," *Journal of Archaeological Science: Reports* 19, pp. 1003-1015. DOI: [10.1016/j.jasrep.2017.09.013](https://doi.org/10.1016/j.jasrep.2017.09.013)

R2: Presslee, S., Wilson, J., Woolley, J., Best, J., Russell, D., Radini, A., Fischer, R., Kessler, B., Boano, R., Collins, M. and Demarchi, B. (2017), "The identification of archaeological eggshell using peptide markers," *STAR: Science & Technology of Archaeological Research*, 3(1), 89-99. DOI: [10.1080/20548923.2018.1424300](https://doi.org/10.1080/20548923.2018.1424300)

R3: Jonuks, T., Oras, E., Best, J., Demarchi, B., Mänd, R., Presslee, S. and Vahur, S. (2018), "Multi-method analysis of avian eggs as grave goods: revealing symbolism in conversion period burials at Kukruse, NE Estonia," *Environmental Archaeology*, 23 (2), pp. 109-122. DOI: [10.1080/14614103.2016.1263374](https://doi.org/10.1080/14614103.2016.1263374)

R4: Fothergill, B. T., Best, J., Foster, A. and Demarchi, B. (2017), "Hens, health and husbandry: integrated approaches to past poultry-keeping in England," *Open Quaternary*, 3 (5), pp. 1–25. DOI: [10.5334/OQ.34](https://doi.org/10.5334/OQ.34)

R5: Colonese, A., Lucquin, A., Guedes, E., Thomas, R., Best, J., Fothergill, T., Sykes, N., Foster, A., Miller, H., Poole, K., Maltby, M., and Craig, O. (2017), "The identification of poultry processing in archaeological ceramic vessels using in-situ isotope references for organic residue analysis," *Journal of Archaeological Science* 78, pp. 179-192. DOI: [10.1016/j.jas.2016.12.006](https://doi.org/10.1016/j.jas.2016.12.006)

R6: Pitt, J., Gillingham, P., Maltby, M. and Stewart, J. (2016), "New perspectives on the ecology of early domestic fowl: an interdisciplinary approach," *Journal of Archaeological Science* 74, pp. 1-10. DOI: [10.1016/j.jas.2016.08.004](https://doi.org/10.1016/j.jas.2016.08.004)

R7: Feider, M., Hambleton, E. and Maltby, M. (2020), "Chicken hybrid imagery on late Iron Age coinage in northern Gaul and southern England during the Iron Age-Roman transition," In I. Selsvold and L. Webb (eds.), *Beyond the Romans: Posthuman Perspectives in Roman Archaeology*. Oxford: Oxbow, pp. 67-77. <https://eprints.bournemouth.ac.uk/33475/>

4. Details of the impact (indicative maximum 750 words)

We have used our leadership of novel interdisciplinary research to inform public attitudes to the chicken and demonstrate the impact of this globally significant primary food source on food security, zoonotic disease and environmental sustainability. We have created highly stimulating activities and materials to transform teaching practice in the UK, and targeted UN Sustainable Development Goals SDG4 (Quality Education) and SDG5 (Gender Equality).

Transforming teaching practice

In the UK we worked with the City of London Academy Southwark (CoLA), to develop a year of activities for Key Stage 3 pupils (11-14 years), [E1a] encompassing science, English and Art, and exploring global history, food politics and ethical consumption. Activities included an ancient DNA workshop, and artistic interpretations of the meat industry, culminating in the students creating a 9m-tall papier-mâché chicken ('Dinnersaurus Rex'), displayed at the school's Chicken Fest in 2015 and later at the Natural History Museum, Oxford in 2017 and viewed by approximately 40,000 visitors [E1b].

CoLA's principal noted: 'We're trying to develop our interdisciplinary curriculum at the moment and the Chicken Fest has proven to be our catalyst... This is a school in one of the most deprived parts of London and it really benefits from this involvement, raising aspirations within our community... and in terms of our students looking at... a whole host of different areas they would never have considered, had we not got involved... [This] has inspired our students, enabled them to do... amazing things. It's been remarkably successful' [E1a]. Another teacher added that it also resulted in that cohort obtaining the school's 'highest ever exam results... [T]he sheer ambition of the project created a sense of excitement amongst the students in the school and they could see that hard work paid off' [E1c].

We used the 'Causing a Flap' project to build on this trailblazing success and extend our UK reach by translating our original research findings into physical and online educational resources for mainstream Key Stages 1-4 pupils, home school and distance learners. Best and Maltby collaborated with educators during the development stage to trial, critique and advance the resources. Based on the feedback, they made the online packs editable, to allow adaptation to different education environments and needs. In December 2018, the suite of resources was made freely accessible via the TES website, a highly regarded UK teaching platform with global reach. By 31st December 2020, the resources had been downloaded 6,921 times [E2a], with peaks coinciding with the March and November 2020 Covid-19 lockdowns and the return to classrooms in September 2020. The resources have had international reach, with downloads across Europe, USA, Africa, Australasia and Asia [E2b]. They have also consistently received 5/5 from user reviews, with positive comments on the engaging style and clarity of the content [E2c].

Internationally, we focused on Ethiopia, where our research had highlighted that the strong cultural and social significance of the chicken was unrecognised, and the GCRF project had identified a need for educational resources. In consultation with teachers and officials from the Ministry of Education of Ethiopia, we created physical pre-printed education resources based on our chicken research. These were designed to work with limited classroom space/internet

access, expand the representation of women and girls (addressing SDG5), and include images drawn in the traditional Ethiopian style, alongside use of Ethiopian characters and names.

We exported more than 3,500 items, via Link Ethiopia, a charity aimed at transforming lives through improving educational opportunities in the country. They work in partnership with local communities to improve access to quality education for all students, encouraging mutual understanding and respect between different cultures. More than 3,000 students ([average class size 50](#)) in 60 classes at 10 different schools have access to our resources, including reading booklets and posters [E3a]. Link Ethiopia said: 'We know teaching aids and resources are scarce in the schools we support and it's a real challenge for teachers to keep large classes of students engaged with only a blackboard, so we were pleased to support the Causing A Flap project...' [E3a].

'Often, donated English educational resources are difficult for Ethiopian children to relate to ... and quickly become incomprehensible.' [E3a] By contrast, the use of chickens increased and enhanced learning, as the resources contained 'narratives and objects that are familiar to the children, to help them engage with what they're learning.' The resources have also increased teacher satisfaction: '[They] are so pleased to have adequate teaching materials which will help keep children engaged throughout lessons' [E3a].

The relationships we created have led to ongoing education networks between the UK and Ethiopia, with Link Ethiopia using the developed resources in their work [E3b]. We also changed attitudes to educational resource development by showing how university research can provide multi-disciplinary resources to engage diverse educational bases [E1a].

Changing public knowledge and attitudes

We used our research to create a wide range of activities and events to engage with more than 100,000 people, including children, older people and vulnerable groups (via over 20,000 event attendees and 80,000 podcast downloads). We transformed perceptions and knowledge of the long, interconnected histories of humans and chickens and the role of chickens in future human and animal health, well-being and environmental sustainability. Later media coverage showed how the project contributed to changing perceptions into our relationship with chickens [E4].

Glastonbury Festival 2014: We hosted a stand in the Green Future Science Tent, which attracted 800 visitors from very diverse backgrounds (e.g. vegan caterers, backyard breeders, sustainable food trust workers and chicken vaccinators). Interactive mapping activities revealed that although most people knew chickens were not native to the UK, they had a wide range of ideas as to where they did originate [E5]. The event was very successful in demonstrating that our work in the past can help understand current cultural issues such as commercial meat and egg production [E5].

Being Human Festival 2014: At the Vindolanda Roman fort and museum, near Hadrian's Wall, we worked with academic collaborators, partners *Practical Poultry* magazine, Equal Arts' (a charity engaging older people and dementia sufferers), and their project HenPower (who use hen keeping to promote health and wellbeing and reduce loneliness), to explain our research to more than 100 visitors. Visitor comments demonstrated that we had enhanced public understanding of the chicken's significance: '[We] explored lots of ideas about food production and animal welfare'. 'Just starting with chickens led us to [discussing] world poverty, the mental wellbeing of old people'. 'It makes you realise... how integral they've been to so much of human life'. 'It has important implications for how we consider how chickens are fed, how they're kept, [their] husbandry'. [E6].

Chicken Comedy Night 2015: We worked closely with comedian Steve Cross and TV personality Kate Humble to create a stand-up comedy event, which formed the climax of the Being Human Festival 2015 and was performed to a full house at the appropriately named Hen and Chickens Theatre Bar, London [E7].

Causing a Flap documentary filmed in 2018: Collaboration with Equal Arts, HenPower and Link Ethiopia allowed us to map our research findings about the ancient social and cultural significance of chickens to the present day, identifying circumstances in which chickens have

transformed the lives of some of the most vulnerable members of society (including isolated elderly people, dementia sufferers, underprivileged children and those with learning difficulties). Their positive stories were recorded as a documentary in which participants told their own tales and experience of chicken keeping, and the 'positive impact' they had on their health and wellbeing [E8]. The video testimonials also highlighted the importance of chickens to Ethiopian women, linking to our educational resources above, and creating an ongoing path that is promoting positive perceptions of chickens and their importance in modern society.

Gastropod podcast 2018: Best was invited to talk on this critically acclaimed American podcast series, which explores the science and history of the food we eat today. She used the research to increase public awareness about the history of egg production and consumption, and the issues associated with it [E9a]. The episode was downloaded more than 80,000 times in the first six weeks [E9b].

Interactive exhibition at Fishbourne Roman Palace Museum 2017-2018: More than 50,000 people visited Fishbourne during our exhibition, including over 20,000 children on school visits [E10]. The curator noted that exhibition 'feedback collected from visitors by survey was overwhelmingly positive and anecdotal feedback from our guides was similarly positive'. Additionally, most visitors (over 90%) indicated that they had learned something new [E10]. The curator added: 'It was a powerful reminder of [the] value [of stored collections], both as an academic resource, but more importantly, as a way to use research to reach out to the public. It was, in every way, a huge success' [E10].

5. Sources to corroborate the impact (indicative maximum of 10 references)

E1: E1a: Scicult Chickens, (2016). *Why did the chicken cross the curriculum?* [video] Available at: https://www.youtube.com/watch?v=JfMFmUAuF_4 [Accessed 17 February 2021].

E1b: University of Oxford Natural History Museum, (2018). *Annual Review 2016-2017*. [online] Oxford: Oxford University Museum of Natural History, p.15. Available at: <https://www.oumnh.ox.ac.uk/annual-review2016-7> [Accessed 17 February 2021].

E1c: City of London Academy Southwark. (2016). Testimonial, undated.

E2: E2a: TES. (2020). Screenshot showing number of downloads of resources from TES website, 31 December.

E2b: TES. (2020). PDF of TES dashboard, 27 November.

E2c: TES. (2019). *DNA and genetic inheritance*. [online] Available at: <https://www.tes.com/teaching-resource/dna-and-genetic-inheritance-12083359> [Accessed 17 February 2021].

E3: E3a: Link Ethiopia. (2019). *Causing a Flap in Education*. [online] Available at: <https://www.linkethiopia.org/blog/causing-a-flap-in-education/> [Accessed 17 February 2021].

E3b: Link Ethiopia. (2018). *Linking and Learning - Angereb School visit to Backwell*. [online] Available at: <https://www.linkethiopia.org/blog/2018/07/11/angereb-visit-to-backwell/> [Accessed 22 February 2021].

E4: Gorman, J., (2016). Chickens weren't always dinner for humans. *The New York Times*.

E5: Best, J. (2014). *Rise with the crow: AHRC public engagement at Glastonbury Festival - Science in Culture*. [online] Available at: <https://www.sciculture.ac.uk/rise-with-the-crow-ahrc-public-engagement-at-glastonbury-festival/> [Accessed 17 February 2021].

E6: E6a. Giddins, D., (2015). *Being Human - Chicken Nuggets*. [video] Available at: <https://vimeo.com/115333166> [Accessed 17 February 2021].

E6b. sciculture.ac.uk. (2014). *Chicken Nuggets: A History of the World in 100 e.gs. - Science in Culture*. [online] Available at: <https://www.sciculture.ac.uk/2014/12/16/chicken-nuggets-a-history-of-the-world-in-100-e-gs/> [Accessed 25 February 2021].

E7: Scicult Chickens, (2016). *Why did the chicken...?* [video] Available at: <https://bit.ly/3kqn89U> [Accessed 17 February 2021].

E8: Giddins, D. (2020). *Causing a Flap*. [video] Available at: <https://vimeo.com/455270676> Accessed 25 February 2021].

E9: E9a: Gastropod. (2018). *The Incredible Egg*. [online] Available at: <https://gastropod.com/the-incredible-egg/> [Accessed 17 February 2021].

E9b: *Gastropod*. (2019). Email, 23 February.

E10: Fishbourne Roman Palace. (2019). Testimonial letter, 11 December.