

Turkey tracker

With an academic background in zoology and ethology, IKERBASQUE **Professor Inma Estevez** at Neiker-Tecnalia is a specialist in poultry behaviour and welfare. With collaborators in the AWIN project, she has developed an innovative app that can improve the health and welfare of turkeys



How were you inspired to create an app for animal welfare?

My background in biology and behavioural ecology has shaped my perspective on animal welfare. Many years ago, I used the transect methodology to conduct a basic study on thrush population dynamics. Confronted with the challenge of designing a new practical approach to assess turkey welfare – within the EU Seventh Framework Programme (FP7) on Animal Welfare Indicators (AWIN) – it occurred to me that a similar transect methodology could work for this purpose. This idea was accepted and the methodology was tested by the team of scientists working with turkeys as part of the AWIN project at The Basque Institute for Agricultural Research and Development Neiker-Tecnalia, Spain, and the University of Milan, Italy, in collaboration with Purdue University, USA. Once we tested the methodology, the next logical step was to create a platform for data collection, analysis and visualisation. An app seemed the easiest, simplest and fastest way to make the tool accessible to users across the world.

Could you provide an overview of the i-WatchTurkey app?

The app is designed to quantify the health and welfare status of commercial turkey flocks in a standardised, science-based way. Once an evaluation is conducted, the built-in statistics tool allows farmers and veterinarians to compare their results to previously evaluated flocks in a simple and quantitative manner. Because the tool requires the user to enter information about housing and general management practices, these characteristics can be linked to bird performance, health and welfare.

What have been the main challenges of developing a product that is practical for on-farm application, and easy for farmers and industry technical staff to understand and use?

After the 'eureka' moment of envisioning the potential of the transect methodology for poultry welfare assessment, the main challenge involved testing the validity of the methodology. For this, much credit goes to soon-to-be Dr Joanna Marchewka, who worked extensively on this validation as part of her PhD project, as well as to Dr Valentina Ferrante and Tatiane TN Watanabe from University of Milan and Dr Maja Makagon from Purdue University. I was very lucky to work with the people who were involved in the project, all of whom helped with the maturation and validation of the transect methodology that the app uses.

Regarding the development of the app, we of course went through several phases working with the software developers until we achieved the configuration we desired; however, after spending many hours in the field, I had a very clear idea of what I was looking for.

As with any software, the current product is just the beginning, and the app will continue



to evolve according to the feedback we receive from its users and through the inclusion of additional useful tools. The main challenge so far has been encouraging users to spend the first five minutes – if that – inputting the specifications for their farm. Once they have done this, I think they will find the app an easy-to-use and practical tool.

How did European funding help in carrying out your research? What impact did it have on producing a viable working solution for poultry farmers?

It is clear that i-WatchTurkey would not exist without the EU funding. The impact that it will have on driving viable working solutions remains to be seen, but I am certainly optimistic. First, awareness of the tool needs to be raised among the poultry industry farmers and veterinarians its benefits as well as the great potential that i-WatchTurkey could offer in the near future.

How has the wider scientific community received the results of i-WatchTurkey?

We have presented the results at various international conferences and poultry forums. The paper of the validation study for turkeys has been published in the journal *Poultry Science*, and it is open access. Most people have expressed astonishment at the simplicity of our approach and the results we have obtained thus far. The indicators we have implemented could have a major economic impact for industry, and our goal is that the tool will improve both the welfare of turkeys and the economic return for farmers by helping them produce healthier flocks. Going forward, we are currently working on the development of a sister app designed specifically for broiler flocks, which should be on the market in about a month.



Smart turkeys

Researchers from the **Basque Institute for Agricultural Research and Development Neiker-Tecnalia**, Spain, in collaboration with the University of Milan and Purdue University, engaged in an EU-funded project that has led to the development of an economically viable app that is highly effective at evaluating the health and welfare of commercial turkey flocks

RECENT DECADES HAVE seen significant advances in understanding the complex cognition and social behaviour of animals, which in turn has driven the development of animal welfare science. Today, increasing attention is being paid to the concept of animal welfare for both societal and economic reasons, testifying to the need for simple yet sophisticated tools and assessment protocols that ascertain the welfare status of farm animals. It is essential that such tools and protocols are science-based, reliable and practical for use on farms. This has been the goal of IKERBASQUE Professor Inma Estevez, who is based at the Basque Institute for Agricultural Research and Development Neiker-Tecnalia, and is focused on improving the health of commercial turkey flocks.

AN INNOVATIVE APP

Welfare assessments on commercial meat poultry farms can be especially difficult because of the large size of the flocks, which number several thousand birds. "Health assessments in these poultry flocks are essential to ensure the birds are growing as expected and to detect and correct any possible health issues as soon as possible," Estevez points out. "These health assessments are traditionally performed via a walk-through, visual inspection, meaning that the inspection is qualitative and varies according to the experience of the responsible person." While such inspections are useful, they are subjective and do not provide quantitative data that can be used to make comparisons between the health status of birds within or between farms.

In response, Estevez and her collaborators have been working on the development of a reliable protocol for on-farm turkey welfare assessment. Funded by the EU Seventh Framework Programme

(FP7) Animal Welfare Indicators (AWIN) project, their studies have resulted in the creation of an innovative app: namely, the i-WatchTurkey app. The first of its kind, this innovative app facilitates the quantification and rating of the health and welfare status of turkeys immediately following inspection. The data obtained can give farmers vital information about the health of their current flock, as well as enabling them to make comparisons with previous flocks and determine measures for health and welfare improvement. Moreover, regular check-ups using the app could lead to the early detection of potential health issues and thus allow farmers to introduce mitigating strategies, therefore improving the welfare of the flock and increasing the overall economic return to farmers.

TRANSECT WALKS AND INDIVIDUAL SCORING

i-WatchTurkey grew out of a collaboration between Estevez, PhD student Joanna Marchewka (also from Neiker-Tecnalia), and Dr Valentina Ferrante and PhD student Tatiane TN Watanabe, both from the University of Milan. They began investigating alternative methods for measuring and quantifying turkey health and welfare, using a transect walk approach. "We noticed that walk-through inspections performed by animal caretakers in commercial meat poultry establishments draw parallels with the line transect methodology used for years in wildlife studies," Estevez explains. Therefore, she and her collaborators decided to see if this method could not only provide useful observations about locations, but turkeys too.

The researchers began by conducting a proof-of-concept study on several Spanish farms. In this work – which was published in *Poultry*



Science and was the fourth most read paper in October 2013 – Estevez and her collaborators evaluated six identically managed broiler flocks, comparing their health and welfare as assessed by individual sampling and transect walks. The individual sampling method involved collecting the measurements of 150 birds, including weight, dirtiness, hock and footpad dermatitis, lameness and immobility. As for the transect observations, the researchers performed a welfare assessment by walking slowly along randomised paths within each house and recording incidences of birds that were immobile, lame, dirty, sick, terminally ill and dead. "The results of the study revealed excellent intra-observer reliability of the transect assessment," Estevez enthuses.

After establishing the feasibility of the transect approach in this study, the researchers collaborated with Dr Maja Makagon, a faculty member from the Purdue University Center for Animal Welfare Science, USA, to conduct a similar study on 10 US commercial turkey flocks. Makagon's study confirmed that the transect approach is a reliable and efficient tool for on-farm turkey welfare assessment, as it produced very similar results to sampling the complete flock of birds at load out. In addition, data analysis revealed a high direct relationship of the frequencies of lame and immobile turkeys with highly relevant economical parameters, such as

INTELLIGENCE

i-WATCHTURKEY

OBJECTIVES

- To enable farmers and veterinarians to screen the health performance of their flocks over time using a smartphone application
- To motivate farmers to provide self-evaluation and better welfare to their turkeys

KEY COLLABORATORS

Joanna Marchewka, PhD student; Dr Roberto Ruiz, the Basque Institute for Agricultural Research and Development Neiker-Tecnalia, Spain • Dr Valentina Ferrante; Tatiane TN Watanabe, University of Milan, Italy • Dr Maja Makagon; Giuseppe Vezzoli, PhD student, Purdue University, USA • Alberto Carrascal, Daia Intelligent Solutions, Spain

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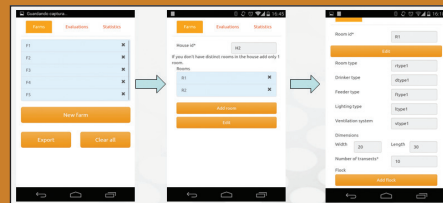
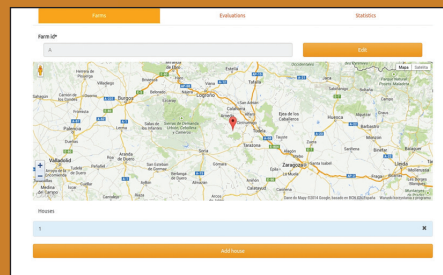
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INMA ESTEVEZ has a Bachelor's degree in Zoology and a PhD in Ethology. She joined the Department of Animal and Avian Sciences at the University of Maryland, USA, where she was promoted to Full Professor in 2007. She then joined Neiker-Tecnalia as an IKERBASQUE Research Professor in 2008. Over the course of her career, she has won several awards for her work with animal behaviour; authored a US patent; published numerous papers in peer-reviewed national and international journals; published book chapters; and presented at more than 100 conferences.



AN ADVANTAGEOUS APP

The main benefits of i-WatchTurkey include:

- Ease of data entry following standard health check procedures
- Accuracy and reliability
- Simplicity of data collection
- Immediate availability of the health report following the assessment
- Science-based, quantitative information
- The performance of flocks can be screened over time and compared to other flocks

carcass downgrades and condemnations at the slaughter plant.

From these studies, the team concluded that the best on-farm turkey welfare assessment protocol would be a method that makes provision for the dynamic and time-effective nature of walk-through inspections, is reliable and allows quantitative comparisons to be made between flocks, farms and different livestock management practices. And thus, i-WatchTurkey was born.

A HEALTHIER FLOCK

As a free tool available to any stakeholder interested in turkey welfare assessment, the i-WatchTurkey app facilitates the standardised data collection of critical health and welfare indicators based on the transect method. It allows the user to quickly and easily record the frequency of birds with specific health deficiencies – such as lameness, wounds or unwanted behaviours – per transect, without requiring the user to handle or disturb the birds.

After downloading i-WatchTurkey from Google Play, farmers or veterinarians simply need to complete a short survey that asks questions about their poultry houses, list the information pertinent to their flock, and then walk around their poultry house and click the screen of their tablet to insert information about the turkeys. "The real beauty of the app is that it requires farmers to do what they always do for flock health assessments – except that they use their

smartphone or tablet to input their observations of critical health and welfare indicators," Estevez elaborates.

Upon using the app, the frequencies of each detected health and welfare issue are automatically translated into percentages as measured against the total number of birds in the flock and the number of transect walks conducted. Furthermore, the app automatically records the geographical location of the farm and the weather conditions at the time of the health inspection. These data are combined with the initially entered relevant information – including the age and strain of the birds, as well as the housing and management conditions – and the system generates a report that is available to the user immediately after the inspection. "Regular check-ups using the app could lead to the early detection of potential health issues and thus allow farmers to introduce mitigating strategies, therefore improving the welfare of the flock and increasing the overall economic return to farmers," Estevez enthuses.

Looking ahead, the use of this app would provide farmers, veterinarians and other interested parties with constant and easy access to reliable information – both historical and current – about the health and welfare status of the poultry flock under consideration. Estevez's aim is that i-WatchTurkey will prove a useful asset for decision making regarding farm management practices, simultaneously improving the welfare of the turkeys and adding economic value to the flock as a whole.



Visit Google Play to download the free i-WatchTurkey app:

<https://play.google.com/store/apps/details?id=com.daia.iwatchturkey>

