

SHORT TERM SCIENTIFIC MISSION (STSM) – SCIENTIFIC REPORT

The STSM applicant submits this report for approval to the STSM coordinator

Action number: CA15224

STSM title: Identification of fractures at the point of occurrence and comparison of assessment methods (N°2)

STSM start and end date: 18/03/2018 to 26/03/2018

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PURPOSE OF THE STSM/

The purpose of this STSM was to learn methods and use of radiography, palpation, thermography, and visual examination after dissection, to document the occurrence of KBD (Keel bone damage) immediately following collisions in the dusk/dark period. Michael Toscano's group has a lot of expertise in this field. They have been working on bone damage in laying hens in aviary systems for long time. They have developed a methodology using radiography to allow rapid and highly accurate representation of the keel bone for assessment of damage.

In Serbia, the change from the conventional cage system to the alternative systems is still in process, although it is certain that it will be the responsibility of producers by 2020. 80% of producers who have switched to alternative systems opt for enriched cages. So far we don't have a single farm with aviary system. STSM was a great opportunity to get more knowledge about aviary system of keeping laying hens (advantages and disadvantages), since in my country there is not one producer that rears hens in aviary systems.

The main aim of the study was to determine the exact time, fracture occurrence, and the way of formation. Radiography, in combination with thermal imaging, can document the various changes (skeletal, thermal/inflammation) in response to collision in the period immediately following the causative event.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

During my stay at the Veterinary Public Health Institute, Animal Welfare Division, Zollikofen, we worked on first day with 160 white laying hens within a single pen of Barn 4. We collected them and radiographed using an established protocol.

At the same time, keel bones of each hen have been thermal imaged. Observations made at this initial timepoint (t: -4h) served as the baseline samples to control for any existing damage. Each hen was given a numbered leg band that coincided with the radiograph and thermal images.

From 16:30 (i.e., t: 0h), at the start of dawn, two persons were stationed on either side of the aviary (corridor and AKB sides) and identified any hens that fell, noting the time, final location, and other relevant information of the crash. The hens were immediately collected and brought to

the radiography team for radiograph and thermal imaging, then returned to the flock. For hens that had the initial fall at 0h only, an additional radiograph and thermal image were taken at +18, +42, and +64 h to document changes in response to the collision event. Finally, at +108 h, the hens were collected, palpated, thermal images taken, and then dissected.

Additional images were taken of focal hens in the two-hour period before collisions occurred (-4h) to establish the presence of existing fractures, and then at subsequent days to identify the specific skeletal changes that occurred in the period immediately following the fracture. At +108 h post fracture, assessments were also made by palpation, thermography, and visual examination (after dissection) to provide comprehensive assessment of accuracy and resolution of each method.

I also made a presentation, to give an overview of my research in Serbia, and activities regarding COST project.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

As for the results of our experiment, we did not get the results we expected. Our assumption that we will be able to find a chicken with fresh fracture, using radiographs on the first day, was not confirmed. During the experiment, we did not detect fresh fractures immediately after a fall. They did not actually happen when we were observing falls, but we discovered new fractures on the following day. So we do not know the time, final location, and other relevant information of the crash.

We came to the conclusion that the use of thermal cameras in KBD detection is not possible. Feather is a good thermal insulator. The feathering of chickens was different in the breast area, so thermal camera images are not usable and cannot be compared to each other. Also, a correlation between radiographic and thermal images cannot be established.

We confirmed that keel bone deformities couldn't be determined with certainty by radiograph analysis, because some deformities of the keel bone can only be confirmed by palpation. Therefore, a combination of palpation and radiograph analysis seems to be necessary to examine the complete extent of keel bone damage.

By reviewing x-ray images, we have come to the conclusion that probably the gizzard of chickens has an effect on the appearance of deformation of the keel bone (the tip of the bone). Especially in young chickens (from 20 weeks of age), because the keel bones have not yet been scarred. My opinion is that the pressure created when a chicken perches with a full gizzard causes the bone bending. According to Brand (1976) "It is not the absolute loads applied to a part, but repetitive pressure that is responsible for tissue breakdown, especially when such repetitive loads are applied without any interim period for the tissues to recover".

Also, when a bird falls from the perch after feeding, collapse and collides with equipment in the object, it can cause deformity of the keel bone and its distortion.

During the eight days of my stay at the Veterinary Public Health Institute, Animal Welfare Division, I got a lot of knowledge about the aviary system, as well as the problems with the breeding of hens in this system. Getting to know the radiography was particularly useful, it's a good method for determining bone fractures, and the knowledge I've gained can be applied to my faculty. Discussions with Mike and his team during the STSM were substantive and fruitful, and showed me other approaches to consider KBD.

The STSM was a great experience; I was given the opportunity to exchange experiences and knowledge. I like to meet other researchers, their work in the field of KBD in laying hens.

FUTURE COLLABORATIONS (if applicable)

Through the COST action, we will explore further opportunities for collaboration in the area of precision livestock farming.

Considering the fact that in Serbia the interest of the producers for the aviary system starts

slowly, the experience of colleagues from of the Research Centre for Proper Housing: Poultry and Rabbits (ZTHZ) will be a great help.