SHORT TERM SCIENTIFIC MISSION (STSM) – SCIENTIFIC REPORT

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

Action number: FA1308
STSM title: Training on behaviour analysis as a novel sensitive tool for stress evaluation of dairy animals
STSM start and end date: 05/01/2018 to 20/03/2018
Grantee name: Wellington Coloma (MSc), PhD student, Autonomous university of Barcelona.

PURPOSE OF THE STSM/

During my PhD I investigated the effect of pre-natal stress on the offspring of goats. There is evidence that the environmental conditions affecting goats during gestation modify foetal programming through physiological and epigenetic changes. As a consequence, the behaviour, health and productivity of their offspring are permanently conditioned. Although I carried out an experiment on this topic, there is limited experience in the area of animal behaviour and welfare in the research group where I am carrying out my PhD. Thus, the aim of my STSM at the Agriculture and Food Development Authority "Teagasc" is to acquire new and better knowledge and experience of research in the areas of animal behaviour, experimental designs and statistical models to treat the data I have collected in dairy goats during the experimental period of my PhD studies. This will mean I will be better able to understand the relationship between the different mechanisms evaluated during my PhD (performance, physiology and metabolism) altered by stressors (heat stress) and behavioural responses and the use of possible indicators. As well as this, I wanted the opportunity to participate in additional projects related to the use of behavioural and welfare measures. The STSM provided me with the opportunity to work on an additional project with a ruminant species comparing the overall welfare of dairy cows exposed to a range of grazing allowances, stocking rates, and housing conditions (indoors vs. grazing fulltime).

DESCRIPTION OF WORK CARRIED OUT DURING THE STSM

Firstly, regarding the study of the welfare of dairy cows, I assisted with an experiment which was conducted in a dairy farm which is part of the Teagasc research facility. For this study, a total of 130 dairy cows were exposed to two experimental treatments: Indoor housing or grazing. I worked closely with a PhD student who was evaluating the welfare of the cows on the experimental treatments. We assessed the health status of the animals using the following measurements: Locomotion, hock, hygiene and

cleanliness scores, ocular, nasal and vulvar discharges, faecal scores, and hoof health.

I was trained to carry out, and had responsibility for recording several of the measurements myself, and assisted the PhD student with the remainder.

Locomotion scoring was carried out weekly and consisted of letting each cow walk past the trained observer at her own pace being the spine curvature, speed, tracking, head carriage and adduction/abduction assessed on a 1-5 scale.

Hock scoring consisted of visual evaluation of the lateral and anterior rear hocks in the parlour and the hair cover, swelling and presence of lesions or abrasions to be assessed on a 0-3 scale.

Hygiene or cleanliness scoring were scored on each cow's rear legs and udder in the parlour on a scale from 1-5 (from completely clean to caked in dirt/manure).

Ocular discharge scoring was assessed by the presence or absence of discharge from the cow's eyes.

Nasal discharge scoring was defined by the presence or absence of discharge originating from the cow's nostrils.

Vulvar discharge scoring also was assessed by the presence or absence of purulent discharge originating from the cow's vulva, or evidence of such on the cow's tail.

Faecal scoring was assessed by the presence or absence of signs of loose, watery manure (diarrhoea) on the tail head and the upper flanks to either side of the tail head.

Ocular, nasal, vulvar discharges and faecal scores were established on a 2 point scale.

Hoof Health consisted of weekly visual evaluation of each cow's rear hooves in the parlour. For that, spraying of each hoof was necessary to remove the dirt and debris and being able to be scored for the presence and severity of dermatitis on 1-3 scale.

To build upon the previous work I had carried out in my Phd (the behavioural study of the dairy goat kids), I shared my information with Dr. O'Driscoll to obtain assistance in interpretation of the results. The following behavioural parameters had been recorded previously in two different behavioural tests (novel arena test, NAT; and novel object test, NOT): Distance travel (forward movement), number of squares entered, numbers of jumps, numbers of sniffs of the arena, latency of the first sniff to the object and the number of times the object was sniffed. These parameters were analysed as a repeated measures model using the GLIMMIX and GENMOD, under a Poisson or negative binomial distribution for count data or PROC MIXED for time data. The models included treatment (goat kids affected with (HS) or without (TN) heat stress during the prenatal period) as a fixed effect and the interaction with the day in the case of repeated measures. The study was presented at a seminar, and the variables were discussed with members of the Teagasc research team to improve assessment of the behavioural data analysis and interpretation of the results. Dr. O'Driscoll has extensive experience in the area of assessment of animal welfare using this type of testing procedure, as well as experience in carrying out experiments investigating the effects of pre-natal stress on piglet performance, behaviour and welfare. As such, she has been able to provide valuable insight into the analysis and interpretation of my data.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

(max. 500 words)

Regarding the experiment on dairy cows, the results are not yet available because the experiment is currently in progress. However, the results are being compiled, and it is anticipated that a peer-reviewed publication will be submitted to a peer-reviewed journal at the conclusion of the experiment.

In the case of the evaluation of the behaviour of the goat kids, in the first test (NAT), HS kids performed 21% less sniffs of the environment (P = 0.008) compared to the TN ones. Our results agree with those indicated by Roussel et al. (2005) in kids born from goats exposed to transport stress at the end of pregnancy, also observing a decrease in sniffing when the mothers were treated with corticotrophin. NAT test has been used to evaluate the expression of fear in goats and sheep (Forkman et al. 2007),

suggesting that greater sniffs correspond to low levels of fear in goats (Ruiz-Miranda & Callard 1992). Furthermore, a trend to reduce the numbers of squares entered (P = 0.101) and numbers of vocalizations (P = 0.099) was observed in HS kids possibly indicating a less reactive behaviour. Finally, no differences were observed between TN and HS goat kids in any of the other variables evaluated (number of jumps or the forward movement). Regarding NOT, there was also a trend to be reduced the number of sniffs of the arena in the goats HS compared to TN ones (-16%; P < 0.10). Despite only numerical differences, the number of squares entered (P = 0.126) and the number of sniffs to the novel object (P = 0.135) were lowered by HS kids. The rest of the variables measured did not respond to HS treatment. The data were presented at an international conference, and a manuscript is being prepared for submission to a peer-reviewed journal.

FUTURE COLLABORATIONS (if applicable)

(max.500 words)

The collaboration with Agriculture and Food Development Authority "Teagasc" will be continued with further behavioural analysis, relation of behaviour variables with other performance, physiological and metabolic variables and the redaction of the manuscript.