

SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: CA15224

STSM title: Effect of ramps and genetic line on the prevalence of keel bone damage and foot lesions in hens housed in commercial aviaries

STSM start and end date: 26/06/2017 to 28/07/2017

Grantee name: Nikki Mackie

Purpose of STSM

The purpose of the short scientific mission was to collaborate with the Flemish Research Institute for Agricultural, Fisheries and Food (ILVO) on the issue of providing ramps on farm for laying hens. Previous work by Heerkens et al. showed that provisions ramps and genetic hybrid can influence keel bone damage and foot pad disorder prevalence (1). However, the research was experimental and used small groups of birds and has not been replicated on farm level. The main aim of the study was to determine whether ramps and genetic hybrid influence the prevalence of keel bone or foot damage on farms with aviary systems.

Methods

A total of 18 aviary farms were visited across Belgium and the Netherlands (Table 1), farms were visited consecutively between the 3rd and 27th of July 2017. One farm per day was visited and they were visited in order from Farm 1-18 (Table 1). Farmers were asked if they would like to take part in the study by phone and/or email. Farmers were given a questionnaire (as part of a larger project contributing to a Master thesis) about personal preference of ramps as well as details about their farm.

Table 1 All 18 farms used in the study along with breakdown of data for each farm

| <i>Farm</i> | <i>Hybrid</i> | <i>Ramp</i> | <i>Aviary System</i> | <i>Flock Size</i> | <i>Age (week)</i> | <i>Outdoor Access</i> | <i>Height</i> |
|-------------|---------------------------|-------------|---------------------------|-------------------|-------------------|-----------------------|---------------|
| 1 | Lohmann Classic Brown | No | Jansen Comfort | 18,000 | 56 | Yes | 2.7m |
| 2 | Bovan Brown | No | Jansen Comfort | 17,000 | 65 | No | 2.5m |
| 3 | Lohmann Classic Brown | No | Venomatic RED-L | 40,000 | 55 | Wintergarden | 2.9m |
| 4 | Lohmann Classic Brown | No | Venomatic Bollegg Terrace | 18,000 | 44 | Wintergarden | 2.7m |
| 5 | Dekalb White | No | Big Dutchman Natura | 41,000 | 72 | No | 2.7m |
| 6 | Lohmann Classic Brown | Yes | Venomatic Bollegg Terrace | 36,000 | 71 | No | 3.2m |
| 7 | Lohmann Classic Brown | No | Venomatic Bollegg Terrace | 48,000 | 58 | Yes | 2.7m |
| 8 | ISA Brown | Yes | Venomatic Bollegg Terrace | 19,500 | 85 | No | 2.7m |
| 9 | Lohmann LSL Classic White | No | Venomatic RED-L | 40,900 | 47 | No | 3.4m |
| 10 | ISA Brown | Yes | Jansen Comfort | 19,500 | 85 | No | 2.7m |
| 11 | Bovan Brown | Yes | Jansen Comfort | 29,800 | 69 | Wintergarden | 2.6m |
| 12 | Lohmann Classic Brown | Yes | Big Dutchman Natura | 30,000 | 67 | Wintergarden | 2.7m |
| 13 | NOVOgen Brown Classic | Yes | Jansen Comfort | 42,000 | 42 | No | 2.7m |
| 14 | Lohmann Classic Brown | No | Venomatic Bollegg Terrace | 9,000 | 62 | Yes | 2.8m |
| 15 | NOVOgen Brown Classic | Yes | Jansen Comfort | 42,000 | 43 | No | 2.7m |
| 16 | Bovan Brown | No | Venomatic Bollegg Terrace | 29,000 | 67 | No | 2.8m |
| 17 | Dekalb White | No | Venomatic Bollegg Terrace | 20,000 | 54 | No | 2.9m |
| 18 | Dekalb White | No | Venomatic Bollegg Terrace | 29,000 | 67 | No | 2.8m |

Individual bird scoring

Approximately 70 birds were randomly selected and scored for each characteristics per farm. Keel bone fractures were scored as 0 = no break, 1 = slight break, 2 = severe break (2). The region of the keel where the break was detected was also recorded and scored as either caudal or medial (anything that was not caudal), caudal was classed as the bottom 1cm region of the keel bone. Deviations were also scored as present or absent. Deviations were only scored when an obvious (>0.5cm) bend in the bone was present. If there was also a fracture present at both ends of the deviation, only the fracture was scored due to uncertainty into whether the deviations was caused by the break. Dermatitis (0= no dermatitis to 4 = severe dermatitis), hyperkeratosis (none, slight and severe) and bumble foot (4 = no bumble foot to 1 = severe bumble foot) were all scored. Feather scoring and wound scoring from Tauson et al (3) was used on all birds with only the neck, tail and back being scored. Feather scoring ranged from 1= severe feather damage to 4 = almost perfect feather coverage. Comb condition was also recorded, whether the comb was red or anaemic.

Behaviour scoring

The number of transitions (upward and downward movements) by all birds in a 2m section of each system was recorded during a 15-minute period while lights were still on and a 15-minute period at the beginning of the dimming period. Two observers counted upward & downward movements, falls and collisions at each time-point, creating two observation points per time of day.. A movement was considered a fall when the bird intended to move but missed the landing area or the bird was pushed or had fallen. A collision was when there was a visable crash into a structure or another bird in the system.

Results

Data at this stage is still preliminary and further analysis for publication is ongoing. Only results relating to keel bone fracture, foot pad dermatitis, bumble foot and behavioural observations are discussed in this report. For investigating the effect of the ramps, we compare brown hybrids from the 7 aviaries without ramps with the brown hybrids from the 7 aviaries with ramps. For the effect of genetic line, we compare the aviaries without ramps housing either white (n=4) or brown hens (n=7).

Keel bone fractures

Ramp

Brown hybrid flocks with ramps had slightly more birds without keel bone fractures compared with brown hybrid flocks without ramps (Table 2). Preliminary data suggests that keel bone fractures are more severe (more medial and score 2 fractures) in brown hybrid flocks without ramps. The number of new breaks recorded in both groups was low.

Hybrid

Brown hybrid flocks had a slightly lower prevalence of keel bone fractures compared with white hybrid flocks (Table 2). White hybrids had more slight fractures (score 1) compared with brown hybrids.

Table 2 Keel bone fracture prevalence depending on hybrid and ramp status of farm

| Keel bone fracture status | White/no | Brown/no | Brown/yes |
|---------------------------|-------------|-------------|-------------|
| 0 | 25.3 (15.4) | 31.5 (13.2) | 37.4 (7.3) |
| 1 Caudal | 22.9 (7.1) | 20.3 (7.7) | 25.3 (7.3) |
| 1 Medial | 27.1 (7.6) | 23.0 (10.1) | 18.9 (10.6) |
| 2 Caudal | 4.7 (3.2) | 2.8 (1.8) | 2.1 (2.0) |
| 2 Medial | 18.9 (12.9) | 22.4 (12.4) | 16.1 (4.3) |
| New Break | 1.1 (0.7) | 0 (0) | 0.2 (0.5) |
| 1 (caudal and medial) | 50.0 (2.6) | 43.3 (10.5) | 44.2 (6.5) |
| 2 (caudal and medial) | 23.6 (14.8) | 25.2 (13.3) | 18.2 (4.0) |
| Caudal (1 and 2) | 27.6 (5.3) | 23.1 (8.1) | 27.4 (7.3) |
| Medial (1 and 2) | 46.0 (19.7) | 45.4 (14.7) | 35.0 (8.8) |

0 = no break, 1 = slight, 2 = severe, White = white hybrid, Brown = brown hybrid, no = no ramp access, yes = ramp access
Data presented as Mean (SD)
All data are percentages

Foot pad health

Ramp

Brown hybrid flocks with ramps had slightly fewer foot pad dermatitis lesions compared with flocks with no ramps (Table 3). The prevalence of bumble foot in flocks with ramps was lower than those without ramps (Table 4). There was a very low prevalence of severe bumble foot (scores 2 and 3) in both groups.

Table 3 Prevalence of foot pad dermatitis in flocks grouped according to hybrid and ramp status.

| <i>Foot pad dermatitis score</i> | <i>White/no</i> | <i>Brown/no</i> | <i>Brown/yes</i> |
|----------------------------------|-----------------|-----------------|------------------|
| 0 | 58.9 (19.8) | 75.5 (9.4) | 80.6 (13.1) |
| 1 | 14.3 (5.8) | 11.8 (4.0) | 11.9 (8.6) |
| 2 | 15.0 (7.8) | 10.5 (6.0) | 6.7 (5.6) |
| 3 | 11.8 (6.6) | 2.2 (2.5) | 0.8 (2.2) |

0 = no dermatitis, 1 = small lesion, 2 = moderate lesion, 3 = large lesion
 White = white hybrid, Brown = brown hybrid, no = no ramp access, yes = ramp access
 Data presented as Mean (SD)
 All data are percentages

Table 4 Prevalence of bumble foot in flocks grouped according to hybrid and ramp status.

| <i>Bumble foot score</i> | <i>White/no</i> | <i>Brown/no</i> | <i>Brown/yes</i> |
|--------------------------|-----------------|-----------------|------------------|
| 0 | 81.1 (6.5) | 87.2 (10.2) | 95.7 (5.0) |
| 1 | 10.3 (4.6) | 7.5 (5.4) | 3.5 (3.5) |
| 2 | 6.1 (2.7) | 4.7 (5.4) | 0.8 (1.6) |
| 3 | 2.5 (4.1) | 0.6 (1.1) | 0 (0) |

0 = no bumble foot, 1 = slight bumble foot, 2 = moderate bumble foot, 3 = severe bumble foot
 White = white hybrid, Brown = brown hybrid, no = no ramp access, yes = ramp access
 Data presented as Mean (SD)
 All data are percentages

Hybrid

White hybrid flocks had more foot pad dermatitis lesions than brown hybrid flocks (Table 3). White hybrid flocks had more moderate and severe foot pad lesions compared to brown hybrid flock. Brown hybrids had a slightly lower prevalence of bumble foot compared with white hybrids (Table 4). Once again there was a relatively low prevalence of severe bumble foot in both groups but white hybrids had slightly more severe cases than brown hybrids.

Behavioural Observations

Ramp use was recorded separately and was not included in the number of transitions, only flights or jumps, up and down were included as transitions (Figure 1). In each case, flocks with ramps had fewer downward transitions compared with those without ramps. White hybrids moved more compared with the brown hybrids without ramps, except during dimming when moving upwards.

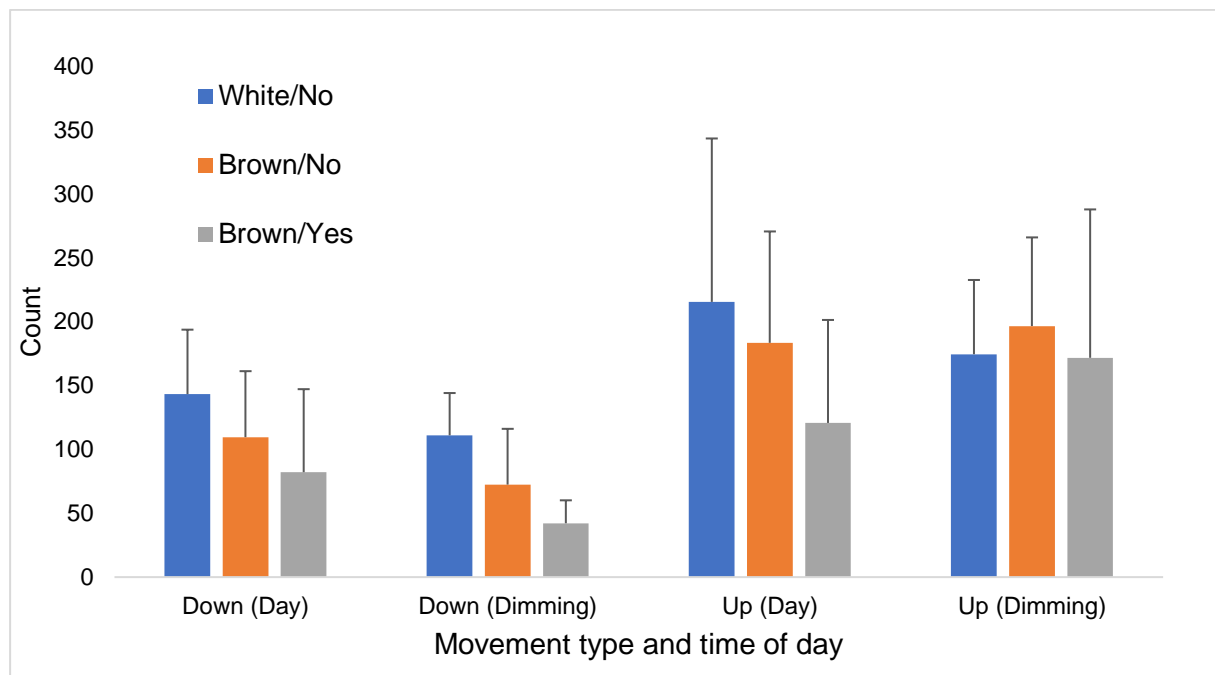


Figure 1 Transitions (upward and downward movements) depending on time of day

Uncontrolled movements represent counts of both the falls and collisions summed together per farm. On average, there was more uncontrolled movements during the dimming period compared to the daylight period within each group (Figure 2). Brown birds with ramps had fewer uncontrolled movements during the day compared with brown hybrids without ramps (Figure 2). White hybrids had fewer uncontrolled movements during the day compared with brown hybrids but the reverse is true at dimming.

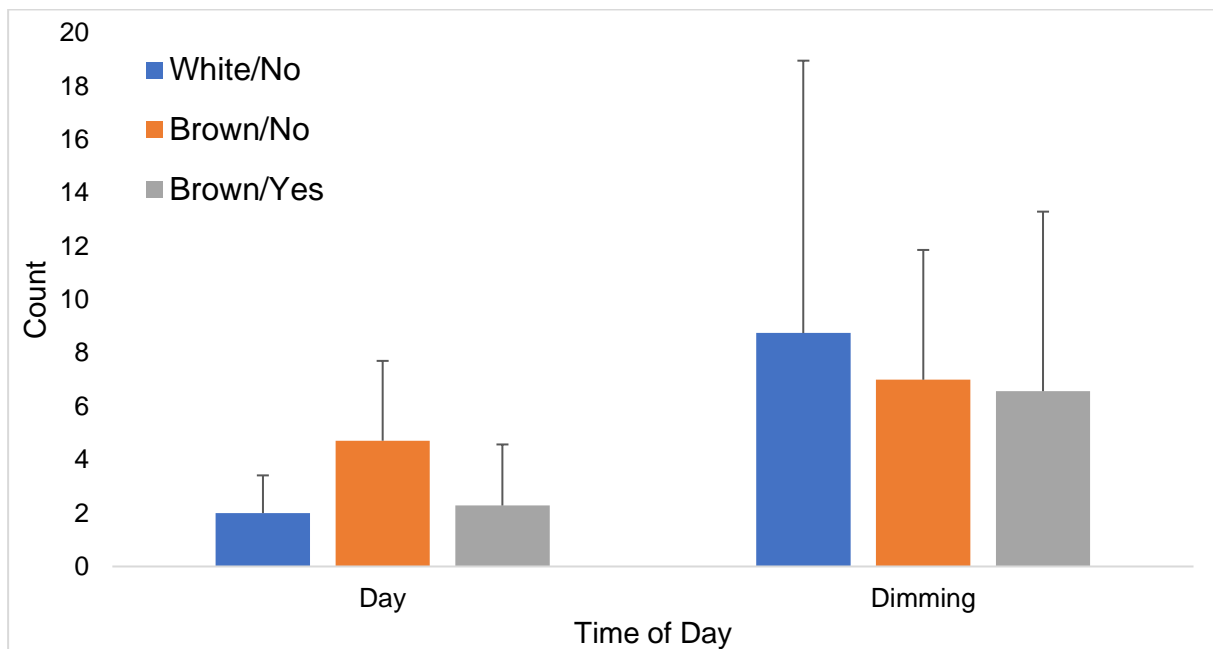


Figure 2 Counts of uncontrolled movements depending on time of day

Conclusion

Although statistical analysis is still outstanding and full analysis should be awaited before any final conclusions can be made, it appears that birds with access to ramps have slightly improved keel bone fracture prevalence but the difference is not so apparent as in other studies (1, 4). High variability in the study may be due to ramp characteristics that differ between farms and placement of ramps in different locations may have different effects on how the birds move..Farms were visited at different ages and this will influence the prevalence of keel bone fractures in a flock because fracture score increases with age (4, 5). It is the first time movements between tiers within commercial aviary systems have been studied with the aim to determine whether having access to ramps and genetic hybrid affect movement.

Future work and collaborations

Data was collected in conjunction with a UGent Master's student (Sofie De Knibber), who is currently working on questionnaires for the farmers who had taken part in this study. The questions focus on individual farmer perception of ramps and whether they believe that ramp provision would improve welfare and if studies show that ramps improve welfare, would they choose to use ramps. The study has also created a new data set that will hopefully be used as the basis for an academic publication. Detailed

statistical analysis of this data set will form another collaboration with Bart Ampe and Frank Tuytens from ILVO. The data generated is large and consists of other health parameters; feather condition, comb health, body wounds as well as counts of birds on perches. Further collaboration to develop these findings further is planned.

References

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