

Effects of keel bone fractures on individual productivity of laying hens

C. Rufener¹, S. Baur², A. Stratmann¹, H. Würbel³, U. Geissbühler², and M. Toscano¹

¹Center for Proper Housing: Poultry and Rabbits, Animal Welfare Division, University of Bern, Switzerland

²Department of Clinical Veterinary Medicine, Clinical Radiology, University of Bern, Switzerland

³Animal Welfare Division, University of Bern, Switzerland

Corresponding author: christina.rufener@vetsuisse.unibe.ch

Abbreviated Title: Keel bone fractures productivity

Summary:

Up to 90% of laying hens housed in aviary systems are affected from keel bone fractures (KBF) which likely cause pain and suffering. In this study, the link between KBF and productivity was investigated as a measure of welfare. Brown and white hens were housed in 10 identical pens containing a commercial aviary system (15 focal hens of one hybrid + 210 non-focal hens of the other hybrid per pen). Eggs from focal hens were identified by orally administering a dye on three consecutive days, resulting in specific colour patterns in the yolk. At 11 time points (22-62 weeks of age; WoA), eggs were collected over a five day period to determine individual laying performance. Egg quality was assessed in all eggs laid on the first three days of collection. Radiographs of the keel bone were performed on the last day of data collection to detect fractures. Linear mixed effects models were used for statistical analyses. Fractures occurred more often in white hens until 38 WoA and more often in brown hens from 39 WoA until 62 WoA ($p=0.001$). The presence of new fractures had no effect on productivity ($p>0.05$). Egg mass was affected by age ($p=0.016$) and hybrid ($p=0.007$). Laying performance ($p=0.02$), shell breaking strength ($p=0.0001$) and shell width ($p=0.001$) changed with age and were all lower in eggs of brown hens. Our results suggest that laying hens did not alter their individual productivity in the period after a fracture occurred, though future analysis will consider characteristics of KBF like severity, fracture type and/or location. Additionally, a hen with a broken keel bone might develop other strategies (e.g. increased feed intake, reduced mobility) to adapt to this physiological challenge. These potential strategies have to be investigated further in order to better understand the effect of KBF on laying hen welfare in its entirety.

Key words: Laying hen welfare, keel bone fractures, productivity