The effect of keel fractures on egg production parameters, mobility and behaviour in individual laying hens

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In alternative systems, the majority of laying hens fracture their keel bones during the laying cycle. It is not easy for a farmer to identify hens with fractures and hen survival rate seems high. Thus the effect of both recent and healed fractures on bird welfare is unclear. We aimed to investigate the impact of these keel bone fractures on hens' production and behaviour. Egg production, mobility and behaviour of Lohmann hens without keel fractures (n= 26) were compared with that of old healed fractures of varying severity (n= 76). In addition, the keel bone strength and body temperature around the fracture site was measured for each group. Hens with no fractures laid more eggs than hens with fracture (94.51±1.39 vs 89.10±1.58; t= 2.57; P= 0.01) and had a higher egg quality score (derived from measures of egg weight, egg surface area, shell weight, shell percentage and shell density). Hens without keel fractures had the highest keel area temperature (37.90±0.17°C vs 37.29±0.12°C; t= 2.95; P= 0.006), strongest keel bones, directly below the manubrial spine (28.53±1.06 kg vs 26.38±0.61 kg; t= 1.77 P= 0.08) and at the mid lateral surface (15.07±0.55 kg vs 12.64±0.31 kg; t= 3.91; P= 0.000), accessed perches (50 and 100 cm height) more frequently, and took a shorter time to negotiate a walkway obstacle test (9.41±2.15s vs 16.74±2.11s; t= -2.43; P= 0.019) and to fly down from raised perches of different heights as 50cm height (9.33±2.02s vs 33.63±9.18s; t= -2.58; P= 0.01), 100cm (25.90±6.94s vs 80.10±11.99s; t= -3.91; P= 0.000) and 150cm height (78.70±24.50s vs 127.78±12.57s; t= -1.82; P= 0.07). Hens without keel fractures were better in all investigated parameters than hens with keel fractures, indicating a detrimental effect of fractures on both welfare and economic return.