Published April 25, 2019

2018 Reciprocal Meat Conference – Animal Welfare

Meat and Muscle Biology™

Drum Evaluation of Broilers Over 20 Years of Selection

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Keywords: genetic selection, lameness, poultry, welfare
Meat and Muscle Biology 2(2):1 **doi:10.221751/rmc2018.001**

Objectives

As a result of genetic selection pressures, economically important traits continue to make gains in fast growing boilers. To understand the impact that has taken place over time on profitable traits, such as live weight, as well as indirectly selected traits, whole leg and tibia parameters of 2 genetic broiler lines representing the 1995 and 2015 broiler maintained at the University of Arkansas were compared.

Materials and Methods

One hundred 20 broilers, evenly split between the 1995 RAN and 2015 RAN lines, were reared straight-run with ab libitum access to industry standard feed and water (IACUC Approval #15039). Fifteen birds were weighed, then euthanized at each time point from each line (d 0, d 14, d 28, and d 42). Left legs were disarticulated, weighed and cleaned of flesh and tendons. The following tibia measurements were collected; tibia weight, tibia lengths, proximal width-frontal, distal width-frontal, midpoint width, proximal width-sagittal, distal width-sagittal. Max load, load break, load extension, and compressive strain was calculated for d 14, d 28, and d 42 using an Instron Universal Testing Machine (IUTM). Spacing used for IUTM test are as follows: 2 cm for d 14, 4 cm for d 28, 5 cm for d 42. To compare means between data collected for each age of both lines, JMP Pro v. 12 was used though *t* tests with a significance level ($p < 0.05$).

Results

Body weight was significantly larger in 2015 RAN line compared to 1995 RAN at ages d 14, d 28, and d 42. Tibia weight was significantly smaller in the 2015 RAN line at d 0 ($p = 0.0304$), but surpassed the RAN 1995 line at d 14 of age ($p = 0.0206$). Mean weight was not significantly different between the 2 lines at d 28 and d 42. Mean leg weight to body weight ratio is significantly larger in the 1995 line on d 0 and d 28 ($p = 0.0031$ and $p = 0.0290$, respectively), and indicate no significant differences on d 24 or d 42. This trend is also seen in tibia weight to body weight ratio being significantly larger in the 1995 line on d 0 and d 28 ($p = 0.0170$ and $p = 0.0070$, respectively). Drum weight to body weight ratio indicate significantly larger ratios for 1995 RAN line on d 0 ($p = 0.0008$), but this trend does not continue in older ages. Dimensional ratios of tibia proximal width (sagittal) to tibia length ($p = 0.0370$), tibia distal width (sagittal) to tibial length ($p = 0.0118$), and tibial midpoint width to tibial length ($p = 0.0161$) all indicate significantly larger ratios in d 0 1995 RAN compared to d 0 2015 RAN lines, but this trend does not continue in older ages. No differences were detected in the max load, load at break, load extension, and compressive strain force measures.

Conclusion

Interestingly, many of the parameter reported indicated that at day of hatch, broilers of the 2015 RAN have reduced size associated with the tibia. Allocations of nutrients during embryonic development may be contributing to the discrepancy in birds between the 2 lines at d 0 and can act as a focus in future genetic selections aimed to reduce the incidence of lameness in broilers.