P-10-18

Influence of Pre-Slaughter Management on the Incidence of Myopathy in Broiler Chickens (#534)

Renata A. T. Abreu, Elisabeth M. Hashimoto, Mayka R. Pedrão, Fabio Coro, Margarida M. Yamaguchi, MRP and FC are CNPQ research fellows.

Federal Technological University of Parana, PPGTAL, Londrina, Brazil

Introduction

Global consumption of chicken has reached 90 million tonnes in 2017. In order to meet the growing demand, poultry industry strongly invests in genetic, sanitary and nutritional improvements leading to better growth, feed conversion and breast yield (Barbut et al., 2008). Once the growth rates exceed the physiologically sustainable, however, muscular damages may compromise meat quality (Kuttappan et al., 2013) due to histological and biochemical modifications, leading to myopathies. Research suggests that genetic selection, environmental factors, temperature, antemortem and postmortem mortem stress may lead to that condition (Bailey et al., 2015), causing losses as those are condemned and deemed improper for consumption. As such, this paper seeks to more closely examine and understand factors increasing the occurrence of myopathies.

Methods

This study was held in a northern Paraná (Brazil) slaughter plant, between january and september of 2017. 2,855 lots containing 61,072,612 birds were analyzed, weighing between 1.856 and 3.657kg of ages between 36 and 57 days. The analysis of date of slaughter, number of heads slaughtered, live weight, average weight, lineage and gender of the lot was carried carried out by means of data collection of the documents used by the company. Myopathy occurrence rates were correlated with head per lot, weight, line, gender and transport distance. Data was processed in R 3.4.2 trough Poisson, quasi-Poisson and negative binomial regression models, with the latest most closely fitting the data.

Results

Through negative binomial regression, parameters were estimated for each factor, as shown in table 1. For gender, it is observed approximately 73.9% higher myopathy incidence rate on male birds, similar results found by Trocino et al. (2015).As for lot size, every thousand increase caused approximately 4.2% higher incidence rate. It's observed that for each extra kilometer of travel between the poultry farms and slaughter plant increased incidence by approximately 0.06%. This result is similar to that obtained by Zahoor, Koning e Hocking et al. (2017), where thermal stress induced damage to cell walls and mitochondria were pointed as a key component to the pathogenesis. In Figure 1 is the boxplot of variance of observed myopathy as a function of lines (Fig. 1a) and gender (Fig. 1b). It was observed that male birds have higher tendency than females of developing the condition, possibly suggesting that their higher weight and breast yield may make them more susceptible than female birds. On the other hand, there was no significative difference between lines, with line A having the most disperse results within lots. This result diverges from that found by Bianchi et al. (2001), where it was found that about 80% of Cobb lots had incidence rates lower than .5%, while over 60% of Ross lots had incidence rates lower than .5% with 11.2% having higher than 3% incidence rates. As for the studies by Bailey et al. (2015), they've shown similar results for the lines analyzed, corroborating with the results found here, which point to genetics having some influence but not being the main factor.

Table 1 – Parameter estimates as determined by negative binomial regression

Parameter	Estimate	Standard deviation	p-value
Intercept	3,59343	0,03862	<0,0001
Gender	0,55333	0,03254	<0,0001
Lot count	0,04151	0,00115	<0,0001
Distance	0,00056	0,00024	0,02280
Phi	1,72570	0,04310	

Conclusion

Lot size, weight, distance traveled in transport and gender were all factors which presented significative correlation with myopathy incidence, gender being the one with the strongest correlation, suggesting male birds tend to have higher incidence rate than females. There was no significative difference in the occurrence rate between the bird lines studied.

References

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Notes

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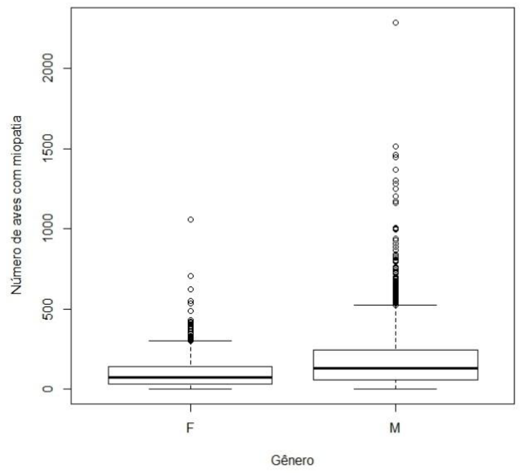

Figure 1
Stratified Boxplot per gender (b)

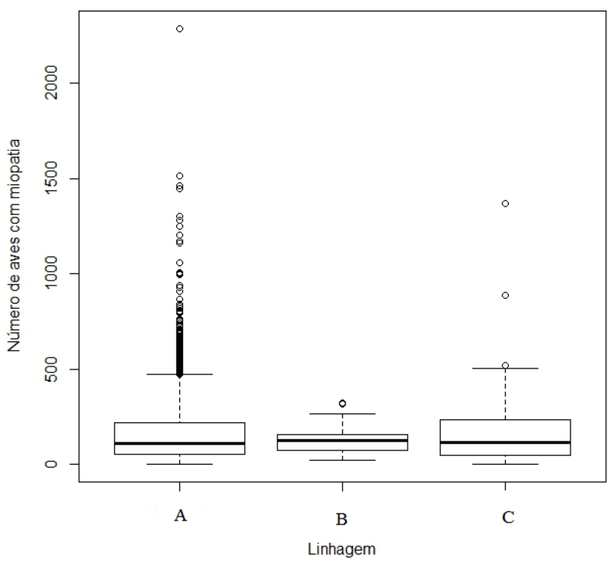

Figure 1
Stratified Boxplot per line (a)

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