Using daily weights as an indicator of *Gallus Gallus* health and welfare in a research environment.

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Abstract

During the course of infectious disease research at The Pirbright Institute, multiple parameters are used by animal technicians to assess the welfare of birds during disease progression. These have historically been subjective in nature, however a consistent, reproducible, quantitative measure of disease progression was desired. This study illustrates the initial results obtained from taking daily measurements of bird mass as a standard approach to assessing bird welfare. This includes the initial optimisation of the process, preliminary results from “normal” birds, and some immediate examples of how a review of daily weight gain has improved the early detection of avian health. Daily calibration, and separating bird weights according to sex allows background variation to be reduced. Daily weight gain assessment has also allowed early detection of ill health after infection with avian influenza to be detected, as well as an ability to differentiate procedure related from non-procedure related harms.

Introduction

Decreases in weight gain / weight loss are widely accepted signs of ill health (Enzien, 2008), however the majority of studies in chickens examining this do so by comparing a single time point post treatment, with a control group. For example, Gharaibeh (2008) observed a significant (P=0.004) weight decrease in a flock of broiler chickens infected with low pathogenic avian influenza (AIV) serotype H9N2 when compared to the uninfected control group. There is very little information examining daily weight gains in poultry in the context of infectious disease research.

Materials and Methods

- Initially, birds were weighed daily from hatch by placing the scales on a flat surface, each bird gently picked up, its wing band number checked, then placed on the scales (Figure 1).
- The birds’ weight is recorded on the weight recording sheet and then transferred onto an excel spreadsheet (Figure 2).
- Colour coding was added to highlight events such as regulated procedures.
- Due to initial results, however, we added the requirement of weighing a 100g calibration weight before each weighing bout to ensure the scales were reading accurately. If not the scales are adjusted until they do.
- This process is repeated for each bird. When working in an isolator, however, the calibration is checked after every bird due to the surface being uneven.

Figure 1: Weighing bird on scales accurate to 1g

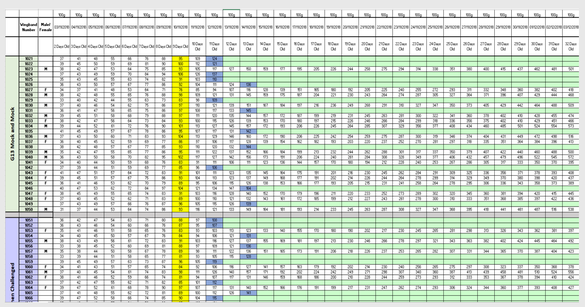

Figure 2: Microsoft Excel spreadsheet containing raw data of bird weights. Each individual chickens’ weight is plotted every day.

Results

The results show the difference between non-calibrated scales and calibrated scales. Figure 3 shows a large amount of variation when a calibration weight was not used compared to Figure 4 where a 100g calibration weight was used prior to weighing the birds. There is still variation seen in Figure 4 but this will be explored further in future studies.

Figure 5 demonstrates how the pathogenicity of a virus can be monitored using weight data. Between 23 and 25 days old a number of bird lost weight. The directly infected birds started showing weight loss one day before the contact birds. The infected birds reached their humane end point within 2-3 days of the first observed weight loss and were then humanely culled.

Figure 6 shows the difference between male and female weights and how ill health can be easily identified. The male bird (highlighted with red arrow) was found to have congenital heart failure. This male was the same weight as the lightest females in the group from the hatch date but then lost weight 1-2 days before he was culled.

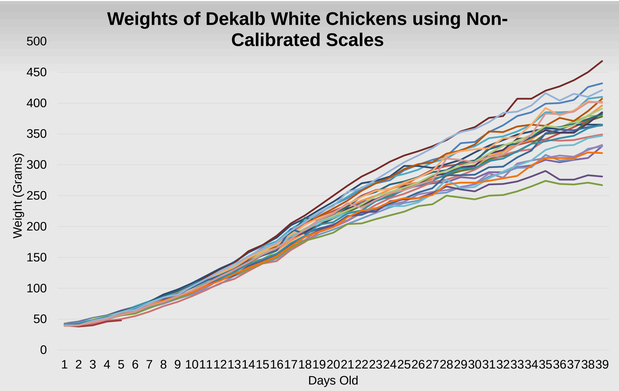

Figure 3: Showing the variations of weight increases/ decreases as a result of using non-calibrated scales when weighing Dekalb White chickens.

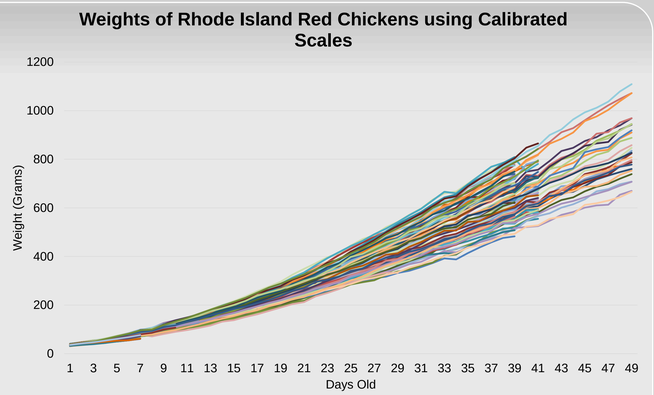

Figure 4: Showing the variations of weight increases/decreases when 100g calibration is used.

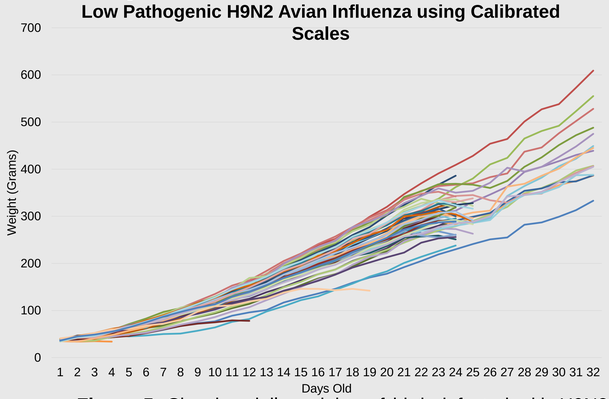

Figure 5: Showing daily weights of birds infected with H9N2 avian influenza virus

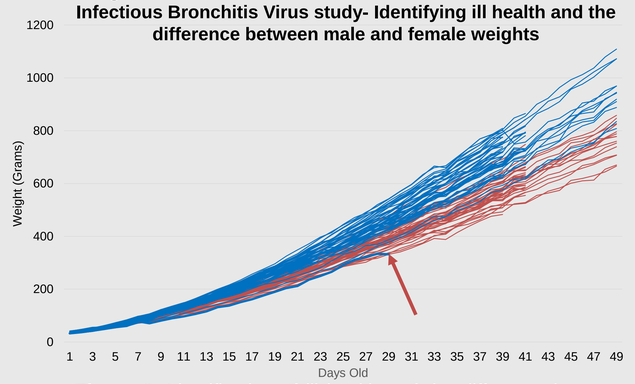

Figure 6: Identification of ill health and the difference between male (blue) and female (orange) weights. The red arrow highlights a sick male bird.

Discussion

- By calibrating the weighing scales, the weight data is more accurate compared to not using calibrated scales. This is important because variation may hide information such as ill health and virus pathogenicity.
- Being able to predict the pathogenicity of a virus using weight data enables technicians and scientists to predict when an animal will reach its humane end point. When there are patterns in weight gain/loss that coincide with virus pathogenicity and other clinical signs, welfare can be improved by identifying the humane endpoint at an earlier stage. With further data, it is hoped that it will be possible to predict when the bird will show severe signs so it can be humanely culled to reduce pain, suffering, distress and lasting harm.
- Ill health not related to procedures and/or virus can also be identified using weight data. This is beneficial as an ill bird does not make a good study bird so this bird can be removed from the group before the study begins. Knowing male and female weights aids in identifying ill health as a healthy male bird should not be the same weight as a smaller female in the group.

Future Studies

- Carry this study forward to gain more data for different breeds.
- Look at ways to reduce the variation of the chicken weights.
- Weigh the food enrichment to observe whether it has an effect on the rate of growth.
- Look at correlations between various virus and weight increase/decrease.
- Measure vocalisation and behaviour of the birds between regularly handled and sporadically handled.

Acknowledgments

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References

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Gharaibeh.S, (2008), Pathogenicity of an Avian Influenza Virus Serotype H9N2 in Chickens, *Avian Diseases*, 52(1):106-110