71st ICoMST
GIRONA - CATALONIA - SPAIN
3rd-8th August - 2025

IMPACT OF FEED WITHDRAWAL ON POULTRY GASTROINTESTINAL TRACT CHARACTERISTICS PRIOR TO ENTERING THE PROCESSING PLANT

Ashley A. Tarcin[1*], Elena G. Olson[1], Steven C. Ricke[1]

[1] Meat Science and Animal Biologics Discovery, Dept. of Animal and Dairy Sciences, University of Wisconsin-Madison, 1933 Observatory Drive, Madison, WI 53706 USA
*Corresponding author email: sricke@wisc.edu

I. INTRODUCTION

Feed withdrawal (FW) is commonly employed in the poultry industry as a strategy to prevent carcass contamination from the gastrointestinal tract (GIT) contents [1]. However, this process can induce stress within the bird and create an environment that enables *Salmonella* proliferation in the gut, which poses a food safety concern [2, 3]. Gaining a more comprehensive understanding of FW is imperative for developing targeted interventions to address this concern. A pilot study sought to assess differences in organ weight and pH of all GIT compartments of birds experiencing a 12-hour FW or no FW. It was hypothesized that FW would significantly impact GIT characteristics, such as organ weight and pH, compared to birds not undergoing FW.

II. MATERIALS AND METHODS

Broiler chickens were housed in floor pens at the UW-Madison Poultry Research Laboratory and provided access to water and a commercially available diet *ad libitum*. At 7 weeks of age, the birds were divided into two treatment groups and subjected to either no feed withdrawal (NFW, n = 4) or a 12-hour feed withdrawal (FW, n = 10). Birds were humanely euthanized in the Poultry Research Laboratory or the UW-Madison Meat Science and Animal Discovery Building USDA-inspected facility. Immediately following the euthanasia, the weight and pH measurements of all organs in the GIT (crop through ceca) were obtained for both treatment groups. GIT contents were collected for further analysis. Data was assessed with Welch's T-Test in RStudio (version 2024.12.1) using the *t.test* function. Differences were considered significant at $P \leq 0.05$.

III. RESULTS AND DISCUSSION

Both the gizzard and jejunum demonstrated significant reductions in organ weight in the FW group compared to the NFW group (Figure 1; $p = 0.0037$ and $p = 0.0006$, respectively). The ileal compartment also showed trending differences in organ weight decline for the FW treatment with respect to the NFW group. (Figure 1; $p = 0.0598$). Notable distinctions were observed in the pH of the duodenum ($p = 0.0186$) and ileum ($p = 0.0001$) across the two treatment groups (Figure 1). One of the upper GIT compartments, the proventriculus, revealed trending differences in pH between the two groups ($p = 0.0793$, Figure 1). Ultimately, implementing a 12-hour FW period revealed significant impacts on both the upper and lower GIT, emphasizing the importance of characterizing the physiological impact of this process on the bird. These shifts in the GIT environment can create an opportunity for pathogenic microorganisms such as *Salmonella* to flourish and pose a food safety risk in the processing plant unless addressed with an intervention.

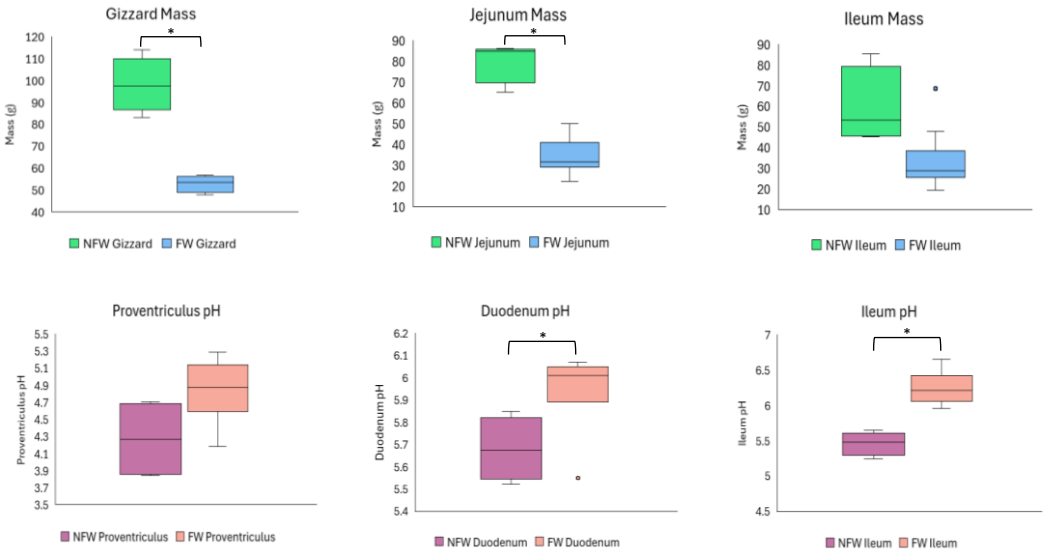


Figure 1. Significant impacts of feed withdrawal on gastrointestinal tract organ weight and pH

IV. CONCLUSION

This pilot study demonstrates the physiological impact of feed withdrawal on organ weight and pH of the GIT of broilers prior to processing. The results of the current study highlight the necessity to further describe these interactions in the space of potential microbial and metabolic activity changes during FW. Outcomes from this investigation also provide the opportunity to explore targeted interventions, such as *Salmonella*-specific bacteriophages, to combat food safety concerns.

ACKNOWLEDGEMENTS

This work is supported by the Hatch Act of 1887, project award no. AWD00000469, from the U.S. Department of Agriculture's National Institute of Food and Agriculture, for which the authors would like to thank. The authors would also like to acknowledge the staff at the Poultry Research Laboratory and the Meat Science and Animal Biologics Discovery USDA plant for their guidance and support with this project

REFERENCES

1. Northcutt, J. K., Savage, S. I., & Vest, L. R. (1997). Relationship between feed withdrawal and viscera condition of broilers. *Poultry science*, *76*(2), 410–414.
2. de Beer, M., & Coon, C. N. (2007). The effect of different feed restriction programs on reproductive performance, efficiency, frame size, and uniformity in broiler breeder hens. *Poultry science*, *86*(9), 1927–1939.
3. Nelson, J. R., McIntyre, D. R., Pavlidis, H. O., & Archer, G. S. (2018). Reducing stress susceptibility of broiler chickens by supplementing a yeast fermentation product in the feed or drinking water. *Animals*, *8*(10), 173.