Meat Duck Trial 2020

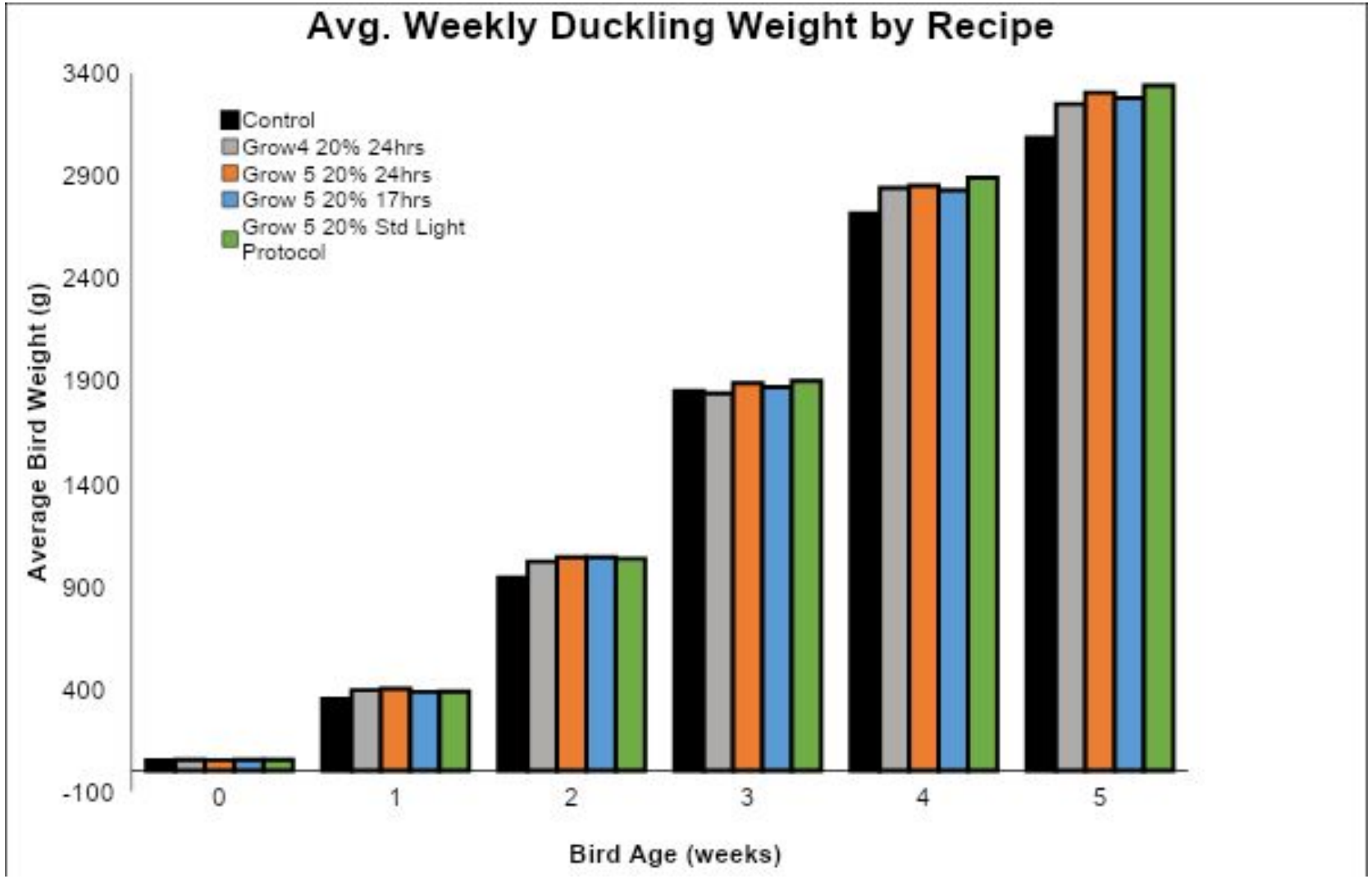
Birds: Meat Ducks provided by commercial facility

Lighting:
XTI – 17hrs & 24hrs

Feed: Hubbard Duck Feed

- Birds under XTI lighting gained more weight than birds under standard lighting

- A standard lighting protocol with XTI lights produced a **7.6% increase** in weight at 5 weeks



Purdue Study of PAWS on Meat Ducks

"As with all meat birds, the already-fast growth rate of ducks can lead to skeletal abnormalities and lameness. It is of importance to ensure PAWS does not cause detriment to the skeletal system while enhancing the growth rate of ducks."

- **Average muscle weight of the femurs from PAWS 4 were greater than PAWS 2 (60.13 g vs. 47.07 g; $P < 0.05$).**
- **PAWS 4 had longer humeri than PAWS 2 (110.43 mm vs. 103.65 mm; $P < 0.05$) and PAWS 3 had wider femurs than the control (7.68 mm vs. 7.19 mm; $P < 0.05$).**

"The novel PAWS lighting does not result in an inferior skeleton compared to conventional lighting and may improve femur and humerus size."

Meat Duck Trial 2020

Birds: Meat Ducks provided by commercial facility.

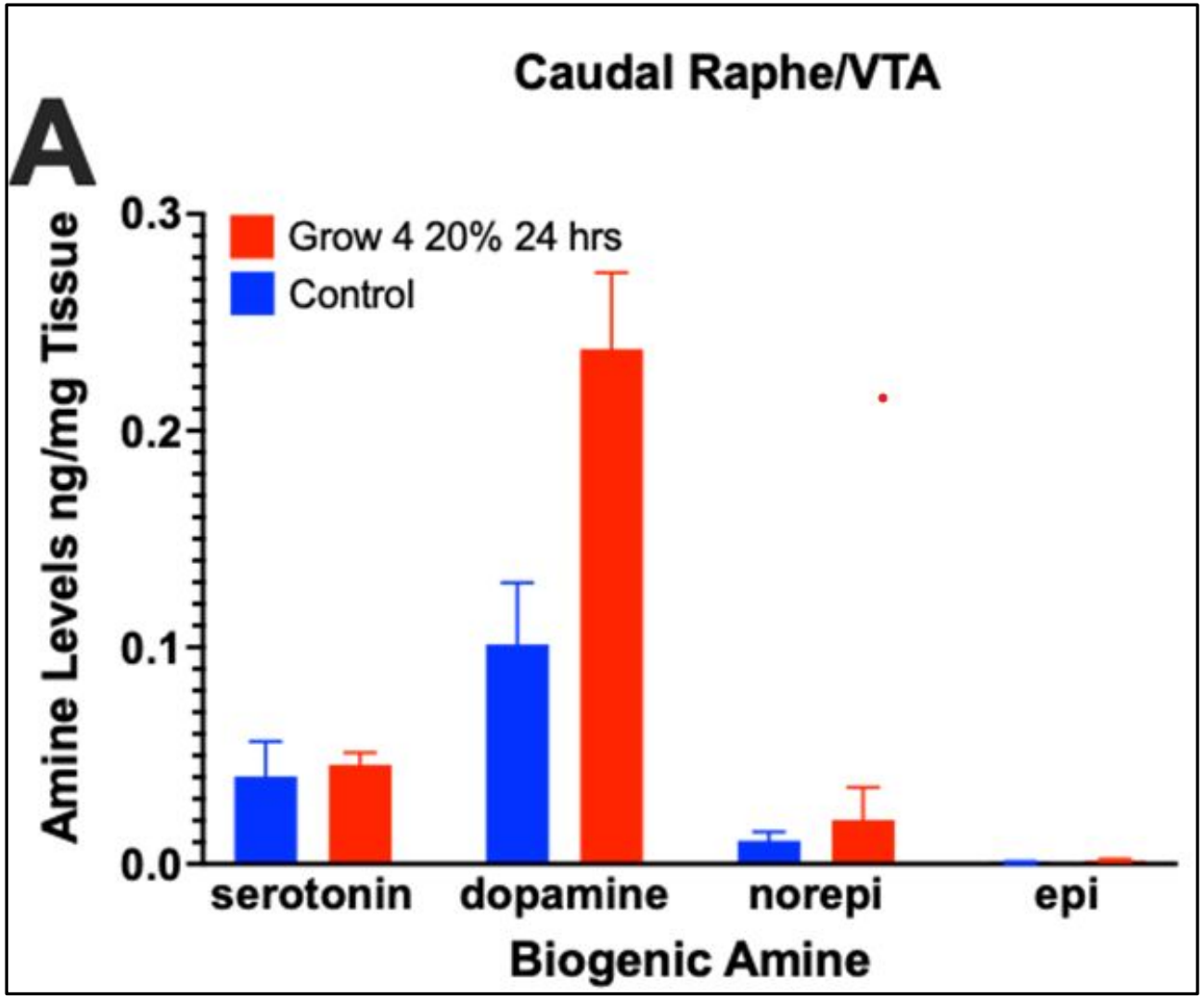
Lighting:
XTI – 17hrs & 24hrs

Feed: Hubbard Duck Feed

- Birds under XTI lighting showed higher levels of Dopamine in the Caudal Raphe/VTA

- Dopamine is involved is involved of reward, motivation, and attention. It also helps regulate movement, learning, and emotional responses

- Data collected and analyzed by Purdue University



Meat Duck Trial 2020

Birds: Meat Ducks provided by commercial facility.

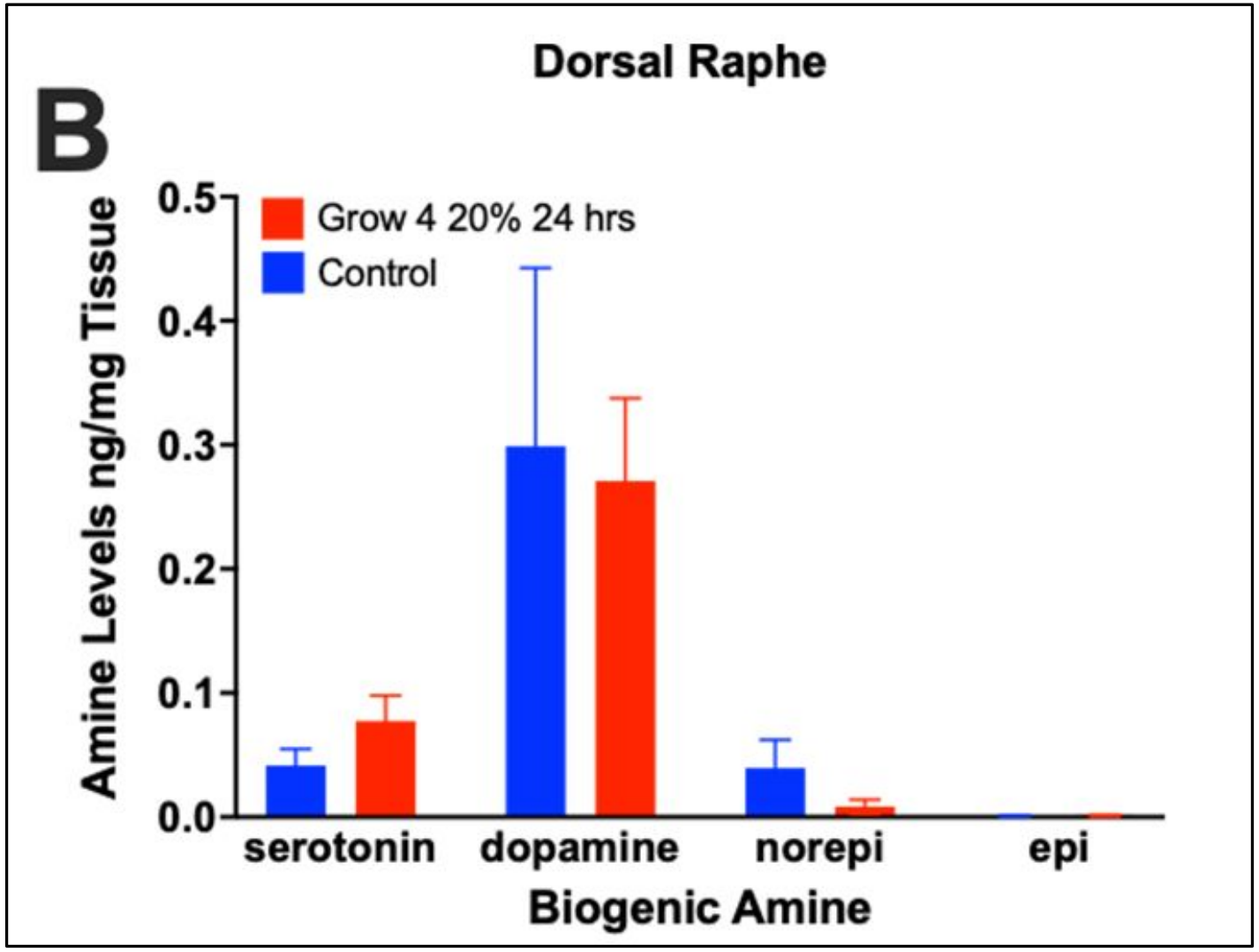
Lighting:
XTI – 17hrs & 24hrs

Feed: Hubbard Duck Feed

- Birds under XTI lighting showed higher levels of Serotonin in the Dorsal Raphe

- Serotonin functions to stabilize mood and sense of well-being. It also plays a role in the digestive system and sleep cycles

- Data collected and analyzed by Purdue University



Meat Duck Trial 2020

Birds: Meat Ducks provided by commercial facility.

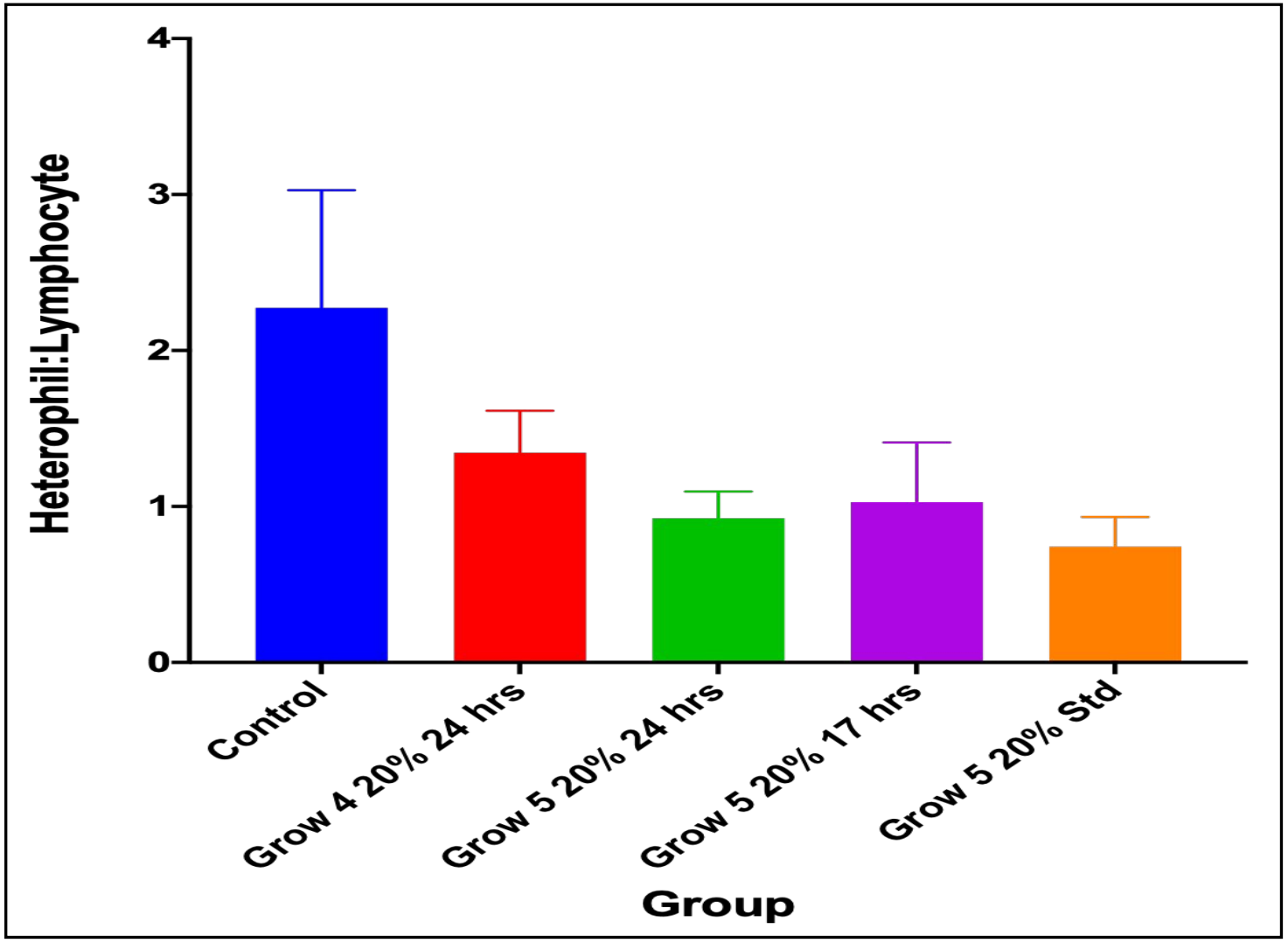
Lighting:
XTI – 17hrs & 24hrs

Feed: Hubbard Duck Feed

- Birds under XTI lighting had lower Heterophil:Lymphocyte ratios

- Heterophils are a type of white blood cell associated with stress, inflammation, and infection

- Data collected and analyzed by Purdue University



Meat Duck Trial Commercial Facility 2021

Birds: Meat Ducks at commercial facility

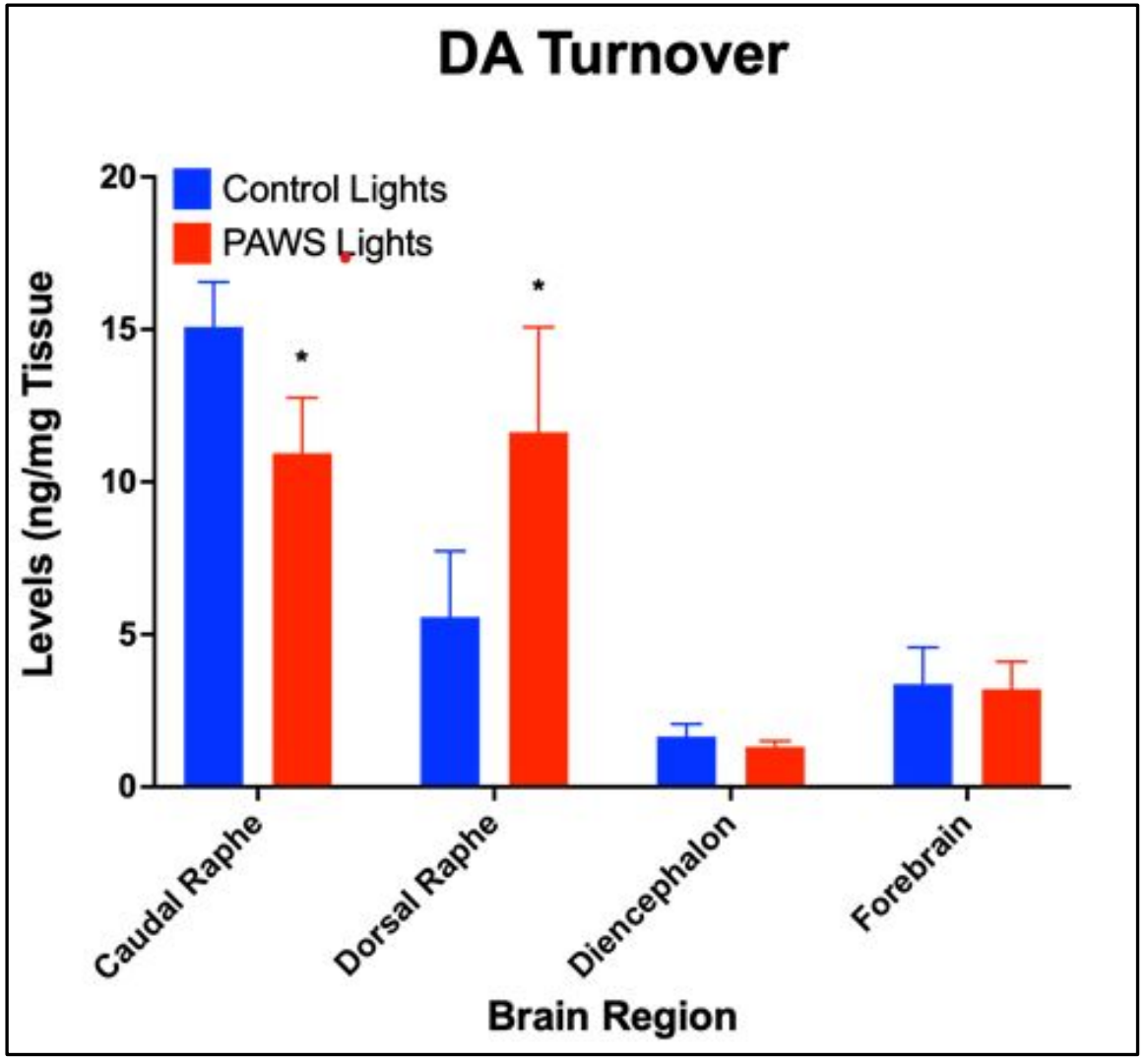
Lighting:
XTI – Standard lighting protocol

Feed: Per commercial producer

- Birds under XTI lighting had increased dopamine turnover – significance not yet known

- Dopamine is involved is involved of reward, motivation, and attention. It also helps regulate movement, learning, and emotional responses

- Data collected and analyzed by Purdue University



Meat Duck Trial Commercial Facility 2021

Birds: Meat Ducks at commercial facility

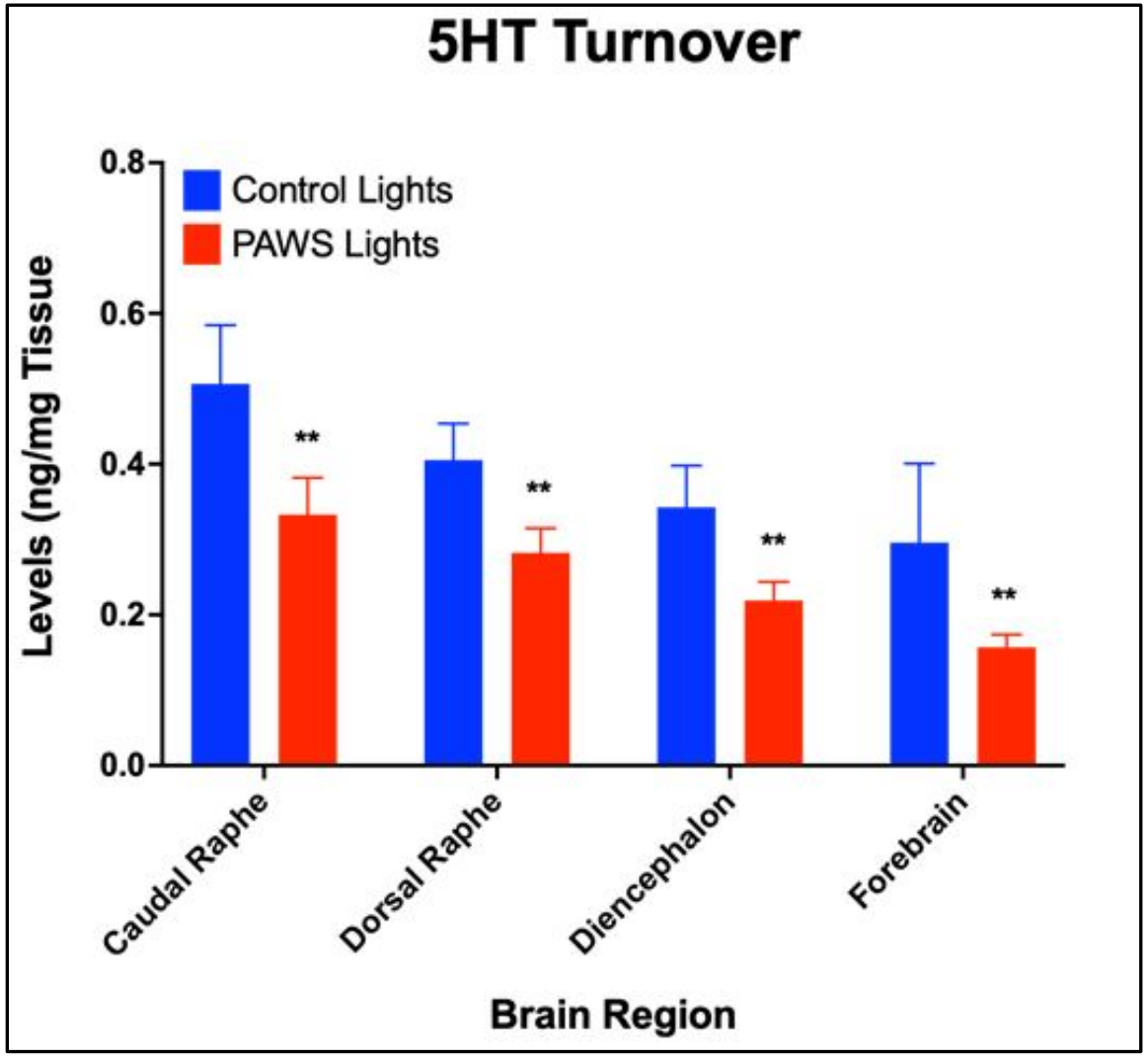
Lighting:
XTI – Standard lighting protocol

Feed: Per commercial producer

- Birds under XTI lighting had reduced serotonin turnover – similar to the effects of an Selective Serotonin Reuptake Inhibitor (SSRI)

- Serotonin functions to stabilize mood and sense of well-being. It also plays a role in the digestive system and sleep cycles

- Data collected and analyzed by Purdue University



Assessment of Pulsed Alternating Wavelength System (PAWS) on musculoskeletal quality of market-age Pekin ducks

B.J. Emmert, S. Tonnisen, J. Suntych, D. Syntych, M. Reinhardt, D.M. Karcher, and G.S. Fraley

The use of artificial lighting in poultry production is a necessity to mimic the long day lengths needed for optimal growth and production in enclosed housing systems. Even though lighting is critical for proper development of poultry, there is minimal research on the effects of different lighting technologies on growth and production, especially in ducks. Pulsed Alternating Wavelength System (PAWS) is a novel LED technology that is able to provide multiple wavelengths of light to growing animals, that may be beneficial for their growth and welfare as opposed to monochromatic light that has been shown to produce undesirable effects. As with all meat birds, the already-fast growth rate of ducks can lead to skeletal abnormalities and lameness. It is of importance to ensure PAWS does not cause detriment to the skeletal system while enhancing the growth rate of ducks. The objective of this study is to investigate the effect of PAWS on musculoskeletal quality parameters of market-age Pekin ducks. Ducks were raised on one of five lighting recipes (40 ducks per treatment): industry control (fluorescent light 18L:6D), PAWS 1 (Grow4 20%, 24L), PAWS 2 (Grow5 20%, 24L), PAWS 3 (Grow5 20%, 17L:7D), and PAWS 4 (Grow5 20%, 18L:6D). At 30 days of age, five ducks per treatment were sacrificed and the keel with breast muscle, and both wings and legs were collected. The humerus, femur, and tibia were separated, with muscle attached, from the wing or leg, respectively. Weight of the muscle surrounding each bone (keel, humerus, tibia, and femur) was calculated by weighing each piece intact (bone with muscle), cleaning all tissue from each bone, and subtracting the cleaned bone weight from the intact weight. Each tibia and humerus were measured for length and width, then the right bones were subjected to a 3-point bending test for breaking strength. Subsequently, the right tibia and humerus were ashed to determine bone mineral content. All data were analyzed using 1-way ANOVA in SAS 9.4. Average muscle weight of the femurs from PAWS 4 were greater than PAWS 2 (60.13 g vs. 47.07 g; $P < 0.05$). PAWS 4 had longer humeri than PAWS 2 (110.43 mm vs. 103.65 mm; $P < 0.05$) and PAWS 3 had wider femurs than the control (7.68 mm vs. 7.19 mm; $P < 0.05$). There were no differences between treatments for all other muscle weights and bone measurements ($P > 0.05$). Remaining bone quality parameters (breaking strength and bone mineral content) of both humeri and tibiae were similar across treatments ($P > 0.05$). The novel PAWS lighting does not result in an inferior skeleton compared to conventional lighting and may improve femur and humerus size. These results are encouraging and further studies on the potential benefits of PAWS on duck production and welfare measures are warranted.

Initial evaluation of Pulsed Alternating Wavelength System (PAWS) on growth and physiological markers of stress in grow-out Pekin ducks.

Tonnisen, S., J. Suntych, D. Syntych, M. Reinhardt, D. M. Karcher, and G.S. Fraley.

Lighting can have profound effects on the health, production, and welfare of all poultry species, and the duck is no exception. Like all poultry species, ducks are seasonal breeders grown in curtain sided barns, thus require artificial light in order to maintain long daylengths to maximize growth and fertility. However, there are no standards for lighting in commercial duck barns. Very few studies have evaluated the growth and welfare of ducks housed under different lighting systems. However, recent studies from several labs have reported that monochromatic light, particularly blue light, may not be appropriate for ducks, or waterfowl in general. A novel LED technology has recently been introduced referred to as Pulsed Alternating Wavelength System (PAWS) that provides a new approach to delivering multiple wavelengths of light to animals. The goal of this study is to determine the effects of PAWS on growth, FCR, and welfare of grow-out Pekin ducks. Five unique spectral recipes were evaluated with 40 ducks per light treatment: industry control (fluorescent light 18L:6D) PAWS 1 (24L), PAWS 2 (24L), PAWS 3 (18L:6D) and PAWS 4 (18L:6D). Body weight and FCR were calculated weekly on all ducks. At processing age, (day 30), we evaluated (N = 5 per treatment) heterophil:lymphocyte ratios, spleen and bursal weight, and collected brains for biogenic amine analyses within the caudal raphe/ventral tegmental area, dorsal raphe, diencephalon, and forebrain. All analyses were done at the level of the duck and evaluated using 2-way repeated measures ANOVA (BW and FCR), and 2-way ANOVA for physiological data. No differences were observed in BW, FCR, or relative spleen or bursal weights among the treatment groups. There was a decrease in HLR in PAWS treated ducks compared to controls that approached significance ($p = 0.1$). No differences were observed in any PAWS treatment for biogenic amines, thus final data were combined for description. No differences in norepinephrine or epinephrine were observed between PAWS and controls. There was a significant increase ($p < 0.05$) in dopamine levels in the VTA and forebrain in PAWS compared to controls. A non-significant ($p = 0.061$) increase in serotonin levels were observed in the dorsal raphe. Thus, there were no physical or physiological signs of acute or chronic stress; the most important outcome of this study is that the novel PAWS technology has no negative impact on production nor does PAWS elicit any physiological signs of stress. This was a small initial trial, but these data combined with the possibility that PAWS may impact brain biogenic amines warrants future larger studies.