

# Completed Research

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## Project #F027

### Hormonal manipulation of offspring sex ratio in white leghorn chickens

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In the commercial layer industry, approximately 50% of chicks are killed immediately after hatch, because they are male and have slow growth rate and inferior meat characteristics when compared to male broilers. If the poultry industry could manipulate layer hens such that a majority of chicks were female, productivity would dramatically increase. While attempts have been made to estimate embryo sex and eliminate eggs that produce males, it would be even more fruitful if hens produced more female-bearing eggs from the start.

The overall aim of this work was to identify an optimal treatment to stimulate hens to skew sex ratios of offspring towards females. We initially intended to use the reproductive hormone, progesterone. However, we quickly found that progesterone was nearly impossible to utilize as a treatment for these purposes because progesterone interrupted the laying cycle in 77% of the hens injected. As a result, we utilized the stress hormone corticosterone, which has previously been shown to skew sex ratios towards females in avian species. Specific objectives were to (1) confirm previous findings that corticosterone stimulates offspring sex ratio skews towards females and determine the lowest effective dose, (2) determine the optimal treatment levels of corticosterone for sex ratio manipulation towards females, and (3) identify potential adverse effects on reproductive success of females resulting from short-term corticosterone treatment.

Treatment of hens with a high dose of corticosterone 5h prior to ovulation resulted in the production of 83% male offspring. This result is the opposite of that expected, because work in other avian species has shown that long-term treatment stimulates a female-bias. Our work differs from previous work in that we provided a single, higher short-term dose, which could explain why the results differed in direction. A three-fold lower dose of corticosterone did not exert a similar effect, thus we determined that the lowest effective dose of corticosterone was our high dose. There was also no effect of the same high-dose treatment given at 4h prior to ovulation, suggesting that the optimal treatment regimen is a high dose at 5h prior to ovulation. There was no adverse effect on the fertility of eggs compared to either control-treated hens or uninjected hens. In addition, an injection of testosterone exerts similar effects, producing a male-biased sex ratio (73%) and very little impact on fertility or the laying cycle.

We have established optimal treatment and timing for producing a significantly biased, offspring, sex ratio in white leghorns. While the skew was not towards females, the effects of a corticosterone inhibitor may be explored in attempt to produce a female-biased sex ratio.



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