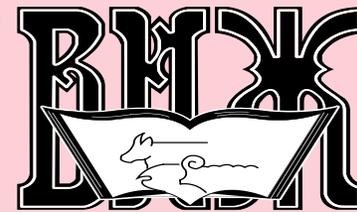




# Testosterone production by theca cells of large preovulatory follicles is affected by growth hormone depending on the hen age and the presence of granulosa cells



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## Introduction

Testosterone produced by theca cells may be involved in regulating the growth and ovulation of hen preovulatory follicles (Rangel Gutierrez, Gen Comp Endocrinol, 203:250, 2014). In the current research, we studied effects of **growth hormone (GH)**, a known regulator of the hen ovarian function, on in vitro testosterone production by the **theca layer (TL)** from the two largest yellow follicles in relation to the hen age and the presence of the **granulosa layer (GL)**.

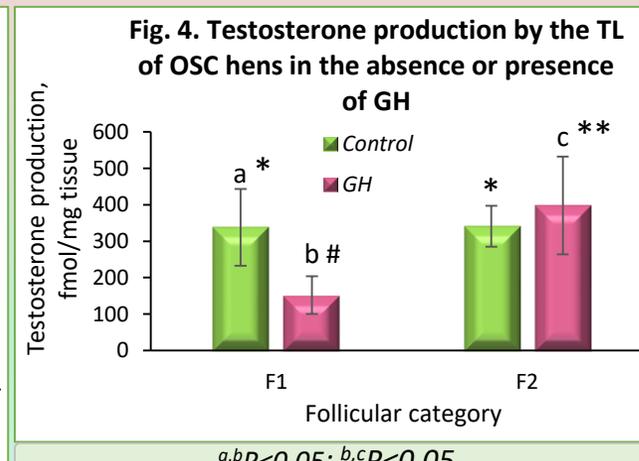
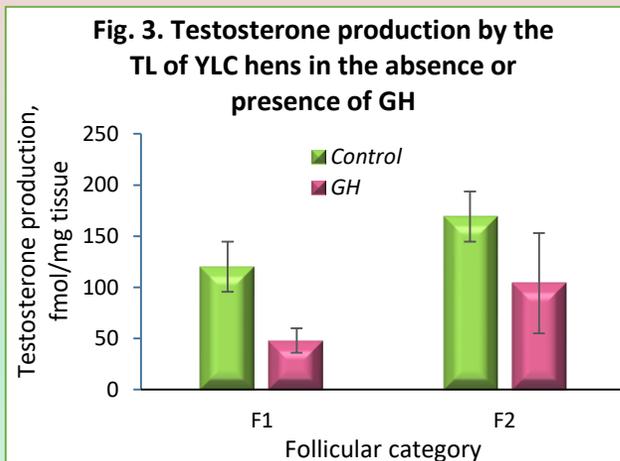
## Methods

Young hens with long clutch (**YLC**, 32-33 week-old, >10 eggs per clutch) and **old hens with short clutch (OSC)**, 74-76 week-old, 3-6 eggs per clutch) were used. After isolation (**Fig. 1**), TL from F1 and F2 follicles (**Fig.2**) (n=8-9) was cultured for 18 h in two systems, separately or together with the corresponding GL, in the presence or absence of chicken GH (25 ng/ml). Concentrations of testosterone in the spent media were measured by ELISA. The data were analyzed by RM-ANOVA.

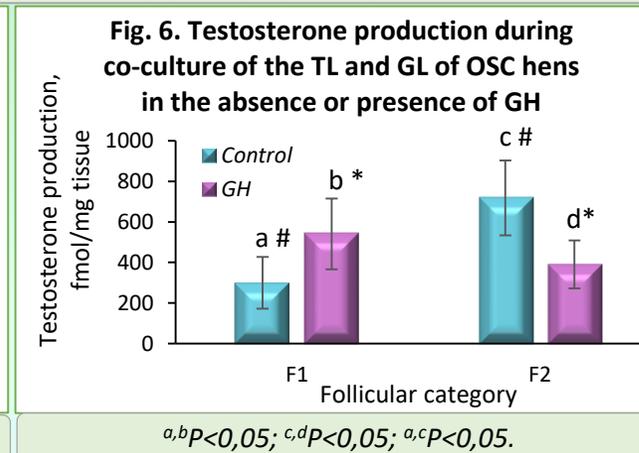
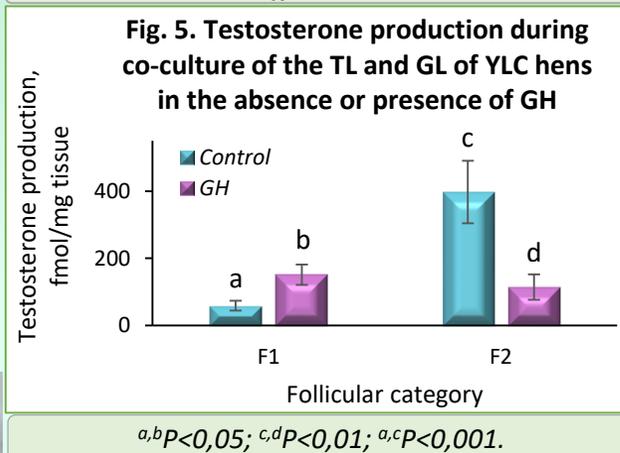
Fig. 1. Hen follicular layers



Fig. 2. Follicular hierarchy



Differences between YLC and OSC hens: # $P < 0,1$ ; \* $P < 0,05$ ; \*\* $P < 0,01$ .



Differences between YLC and OSC hens: # $P < 0,1$ ; \* $P < 0,05$ .

## Results:

In the case of separate TL culture, GH did not change significantly testosterone production in both follicles of YLC hens (**Fig. 3**) and reduced it from  $338 \pm 105$  to  $152 \pm 52$  fmol/mg tissue ( $p < 0.05$ ) in F1 follicles of OSC hens (**Fig. 4**). When TL was cultured in the presence of GL, GH enhanced 1.8-2.6-fold ( $p < 0.05$ ) the secretion of testosterone in the case of F1 follicles and decreased it 1.8-2.5-fold ( $p < 0.05$ ) in the case of F2 follicles in both young and old hens (**Fig. 5 and 6**). Regardless of the treatment, follicular size or culture system, the production of testosterone in OSC hens was 2-5 times higher than in YLC hens.

## Conclusion:

- ❖ The interaction between TL and GL changes the steroidogenic response of theca cells from preovulatory follicles to GH in young and old hens.
- ❖ Testosterone production is obviously increased with reproductive aging of laying hens.

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