

# Effects of an Anti-Gonadotrophin Releasing Hormone vaccine on the morphology and structure of bull testes

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## Introduction.

Vaccination against gonadotrophin-releasing hormone (GnRH) is used as an alternative to surgical castration for the purposes of reducing pain and distress in the animals. Currently, no anti-GnRH vaccine has been authorized for use in cattle in the European Union.

## Objective.

The aim of the present study was to assess the effect of an anti-GnRH swine-specific vaccine (Improvac®, Zoetis, USA) on the morphology and structure of bull testes.

## Material and methods.

- **16 calves** were distributed into 2 equally sized groups depending on their live weight (LW) at the beginning of study → **LIGHT** (172.9 ± 30.00 kg) and **HEAVY** (323.8 ± 37.79 kg).
  - Half of the calves in each group were randomly selected to serve as the **control (C)** and **vaccinated (VA)** group.
- The calves were vaccinated with **Improvac®** (Zoetis, USA) at days 1, 21 and 104.
- At slaughter (day 164), testes were weighed and measured, and then tissue samples were collected and fixed in formalin.
  - Histological and immunohistochemical studies were performed to measure the diameter of the seminiferous tubules and assess the testicular cell populations.

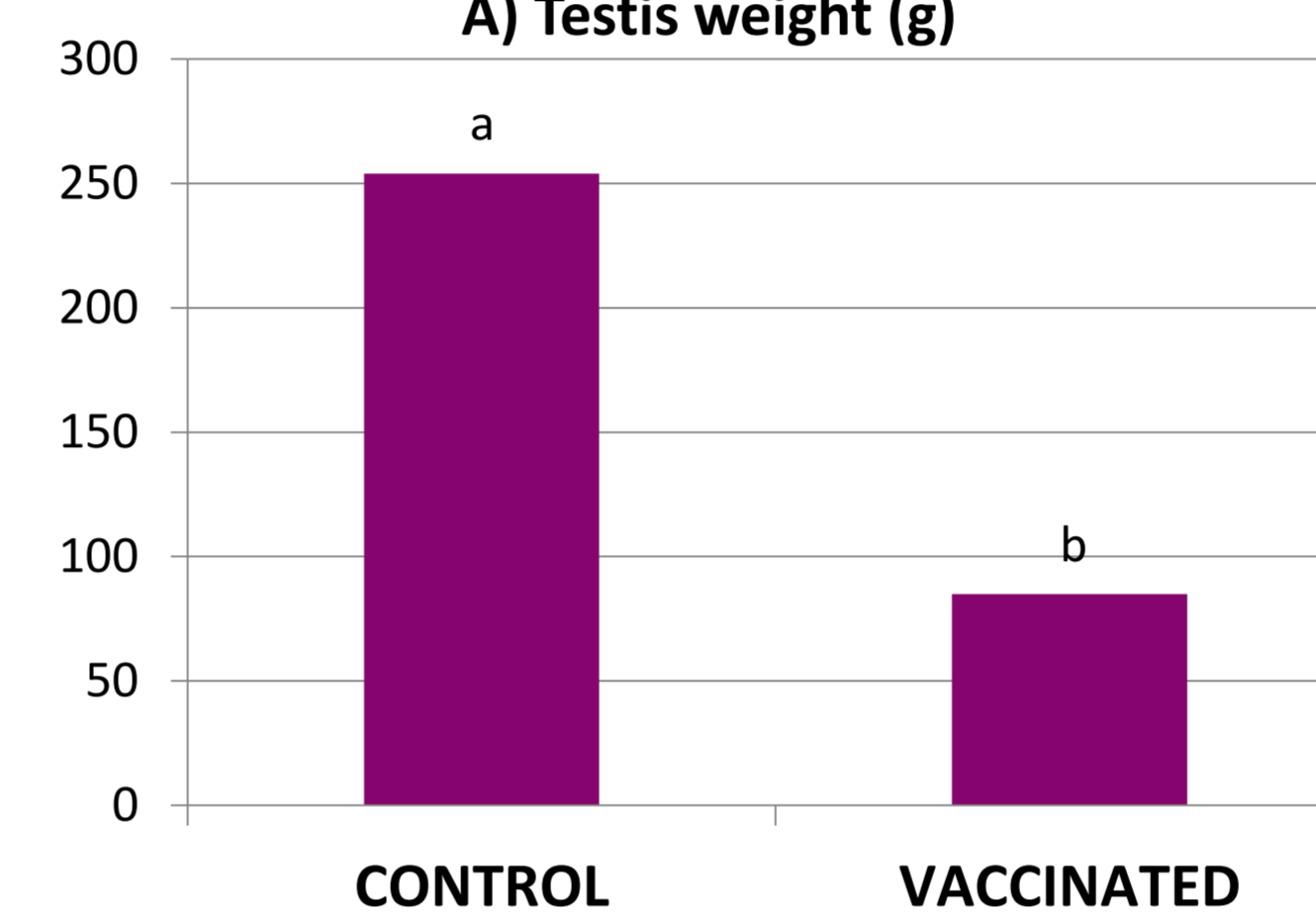
## Results

- Hypoplasia of the testes was found to be associated with vaccination

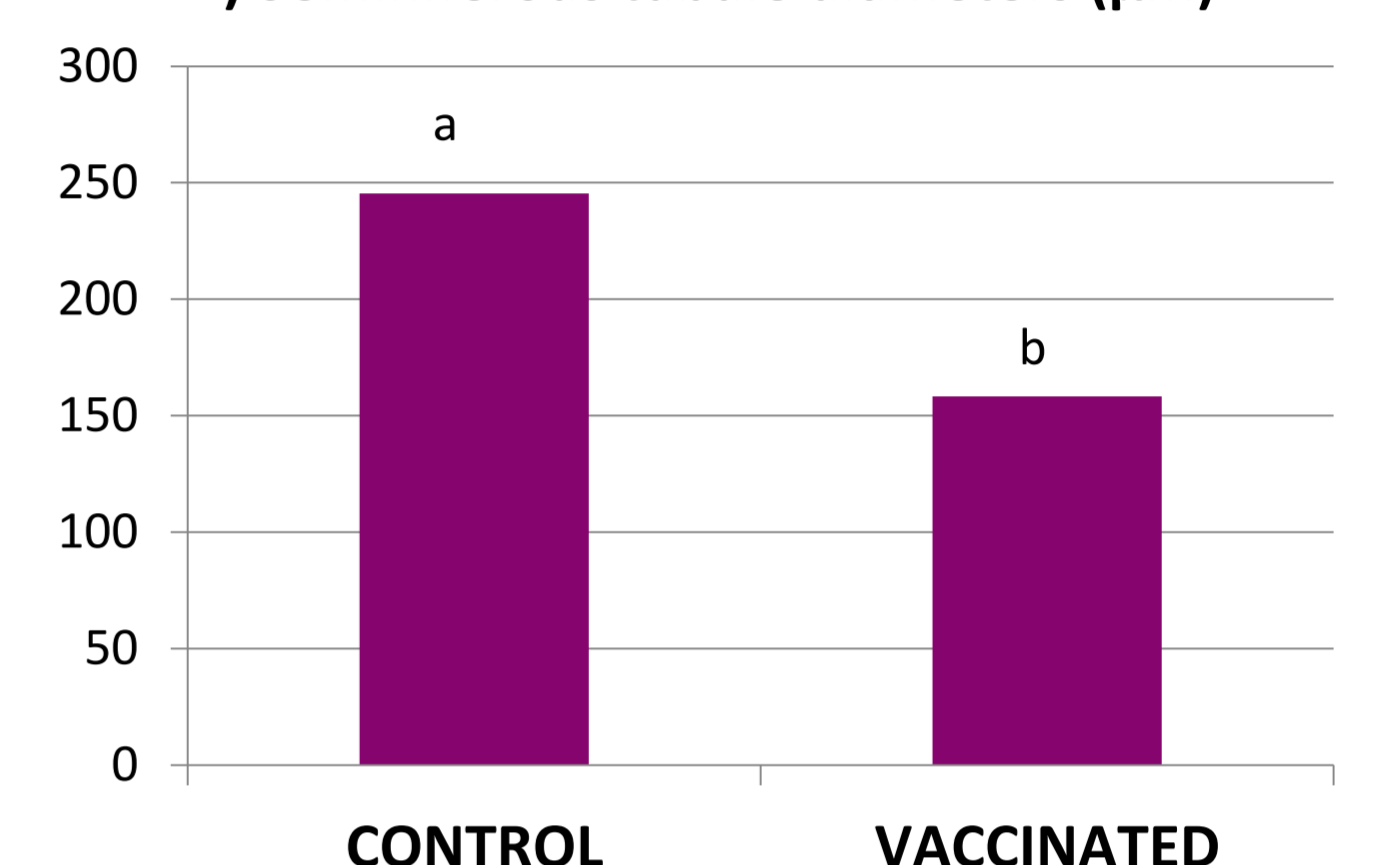
→ Weight (**A**), diameter and perimeter measurements, and volume of the testes were lower in VA calves than in C calves ( $P < 0.0001$ ).

→ The C calves exhibited higher diameters of the seminiferous tubules than the VA calves ( $P < 0.001$ ; **B**).

**A) Testis weight (g)**



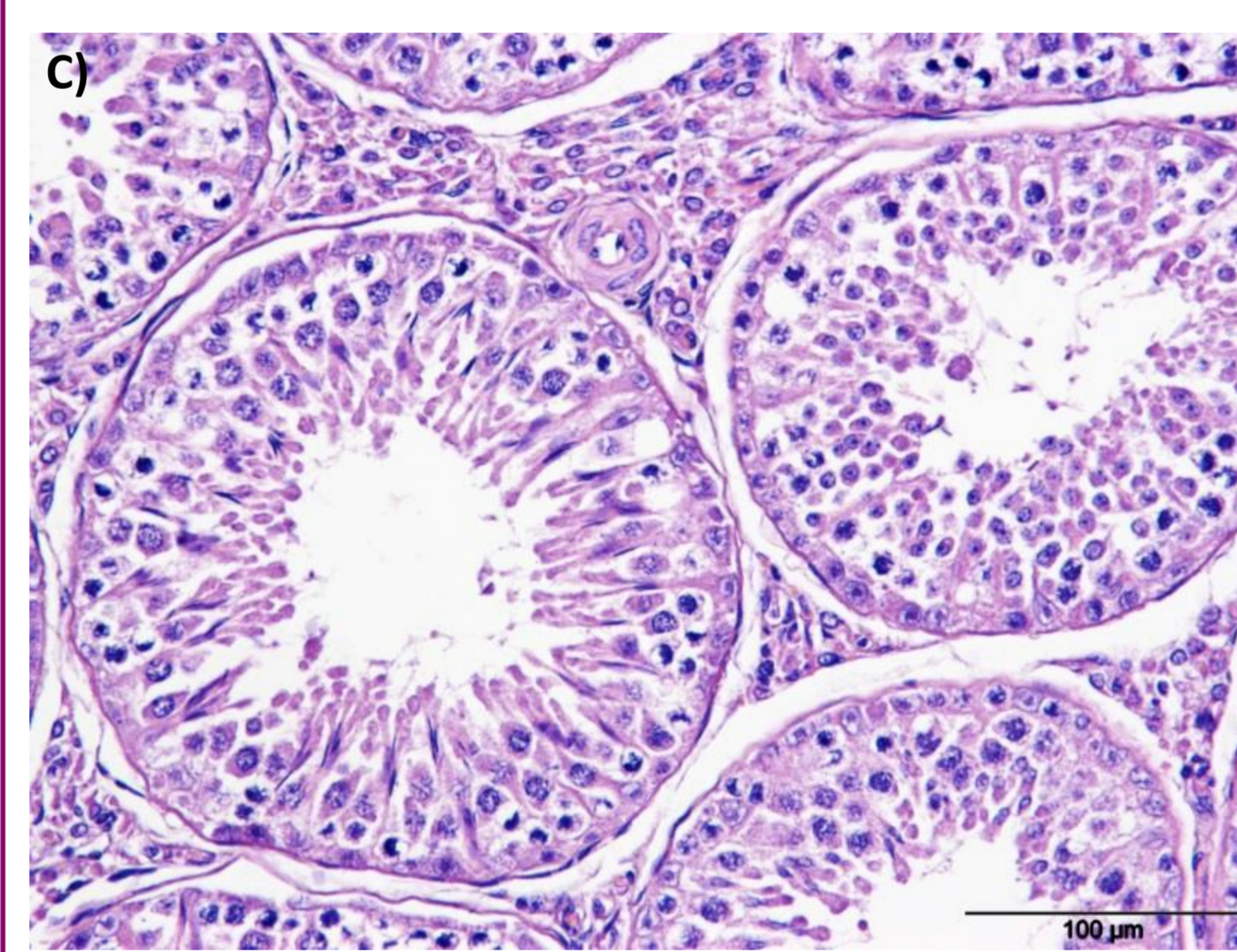
**B) Seminiferous tubule diameters (µm)**



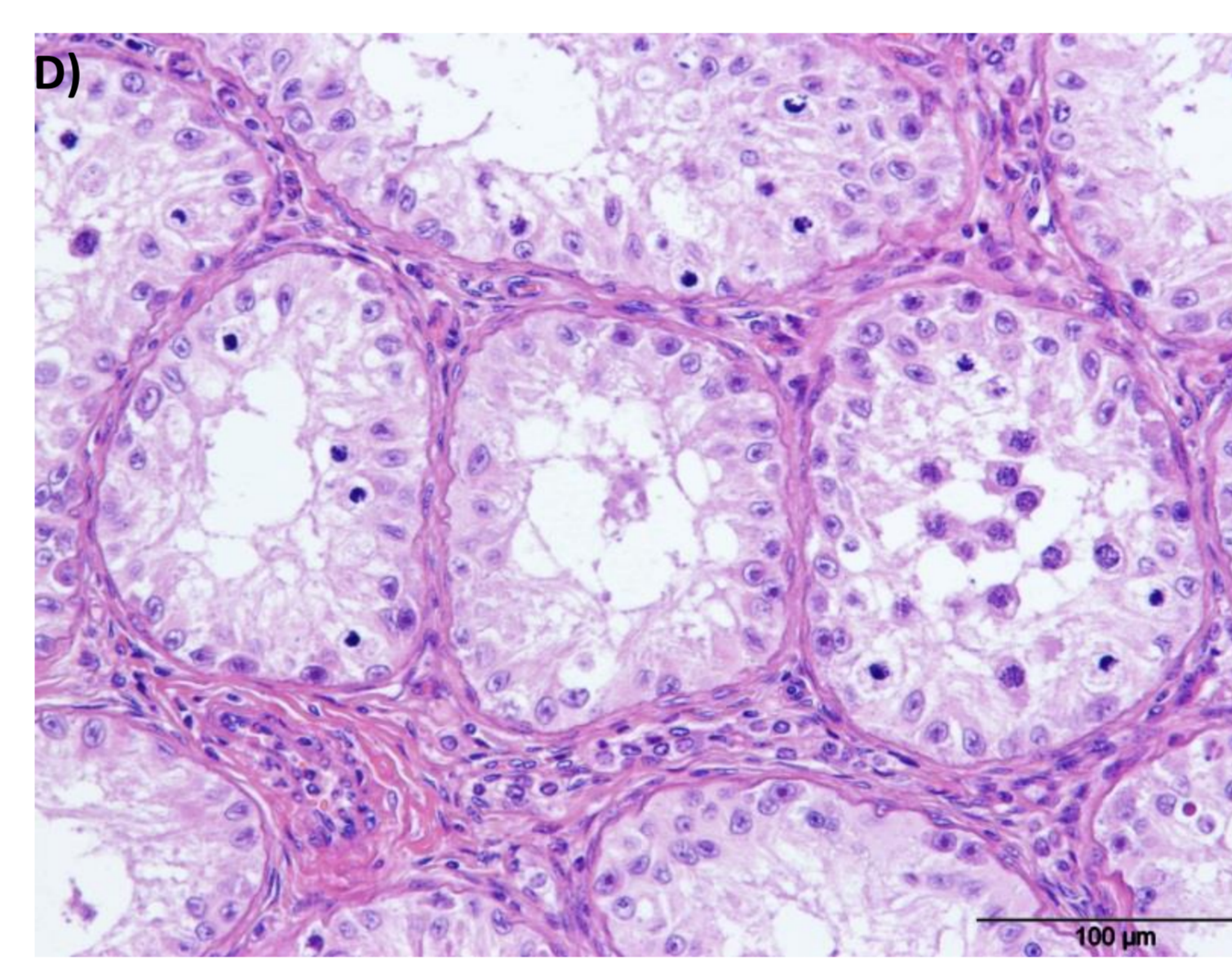
- All C calves exhibited fully developed spermatogenesis (**C**).

- Testes of all the VA calves except two exhibited a complete absence of spermatogenesis with a predominance of Sertoli cells in the seminiferous epithelium (**D**).

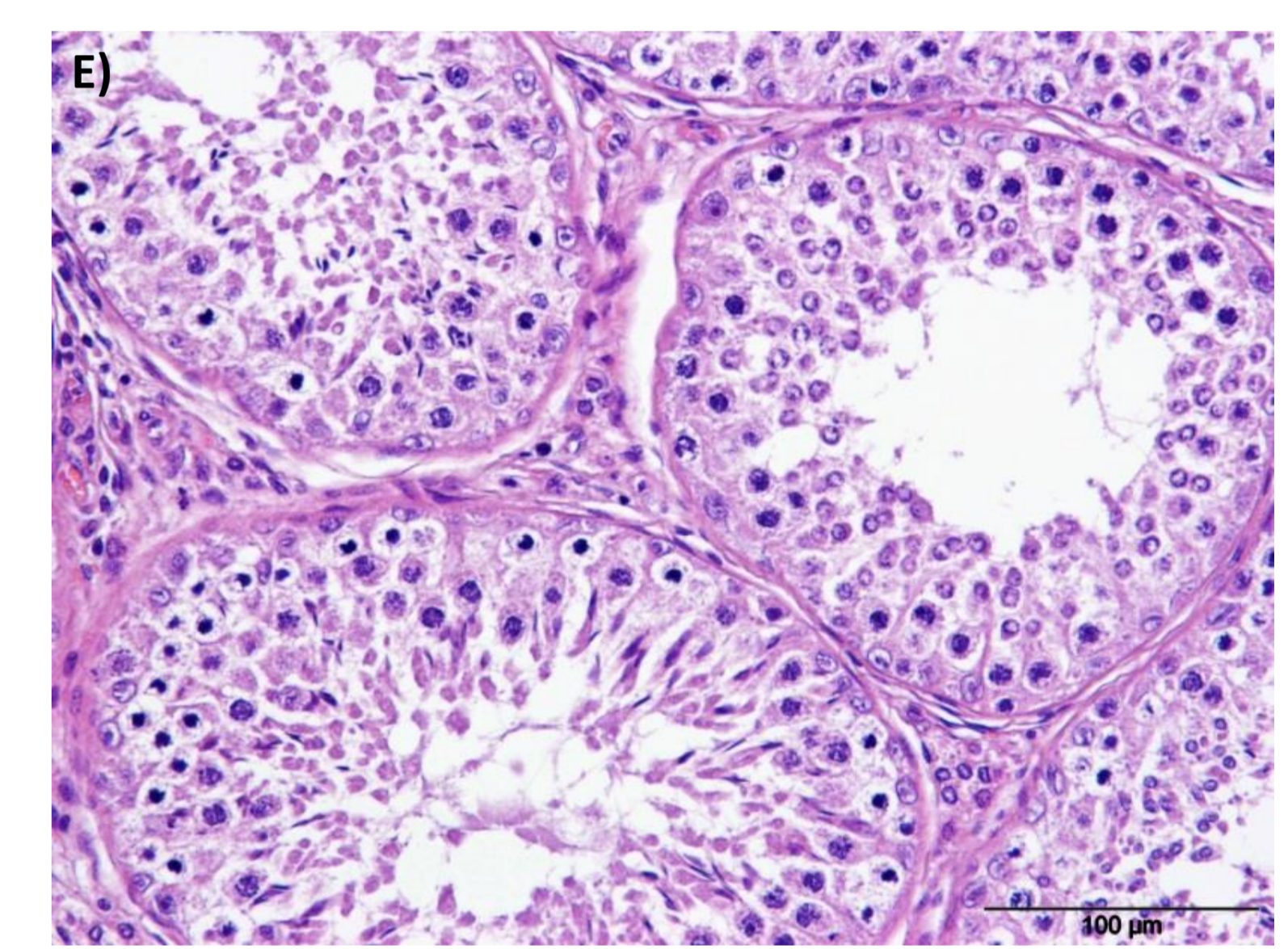
· Two of the VA calves (from the HEAVY group) exhibited normal microscopic features consistent with active spermatogenesis similar to C calves (**E**).



H&E. CONTROL



H&E. VACCINATED



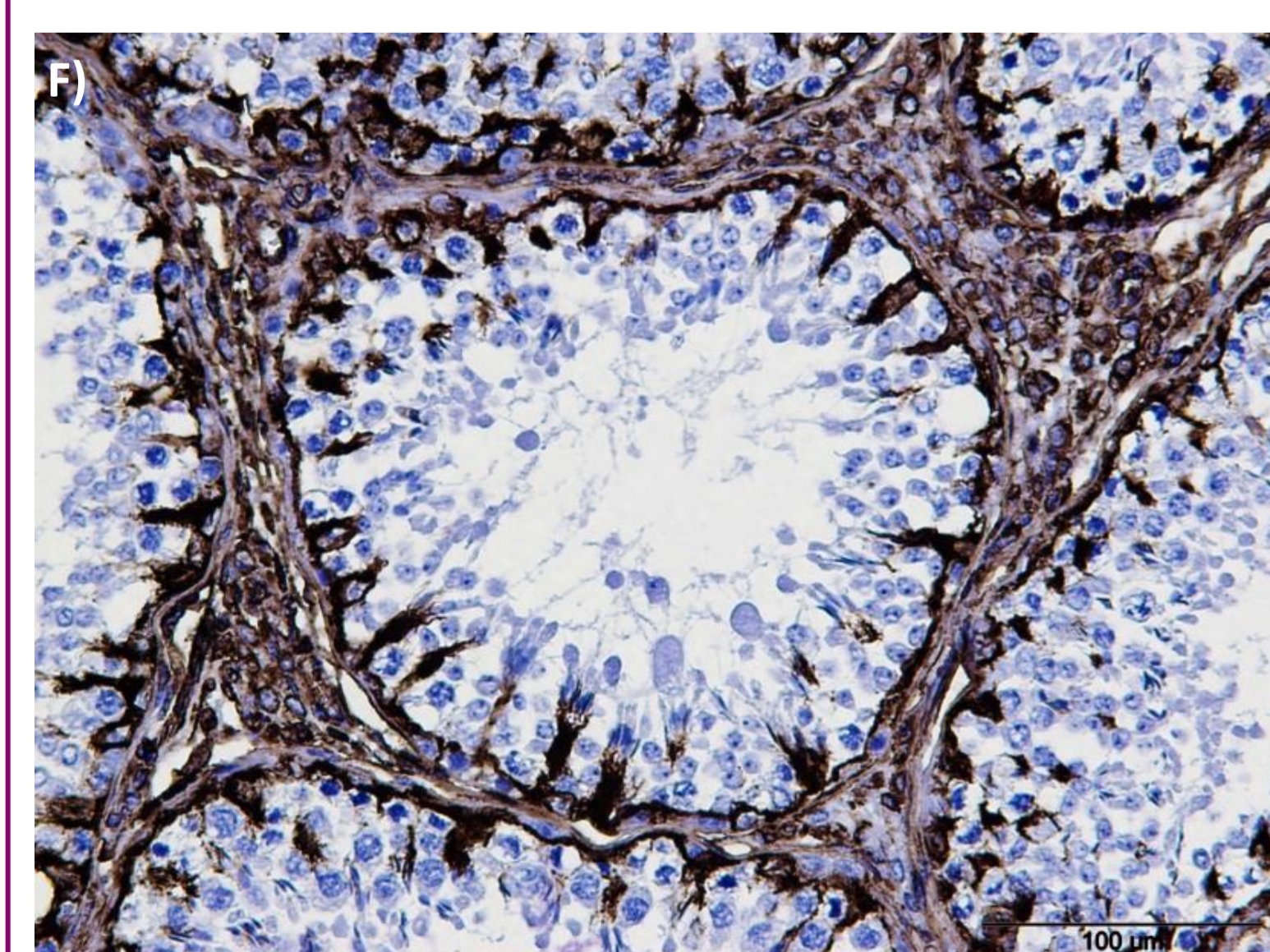
H&E. VACCINATED

- In C and the 2 VA calves from the HEAVY group, vimentin-positive Sertoli cells were evenly distributed between the spermatogenic cells (**F**), which comprised the majority of the cells.

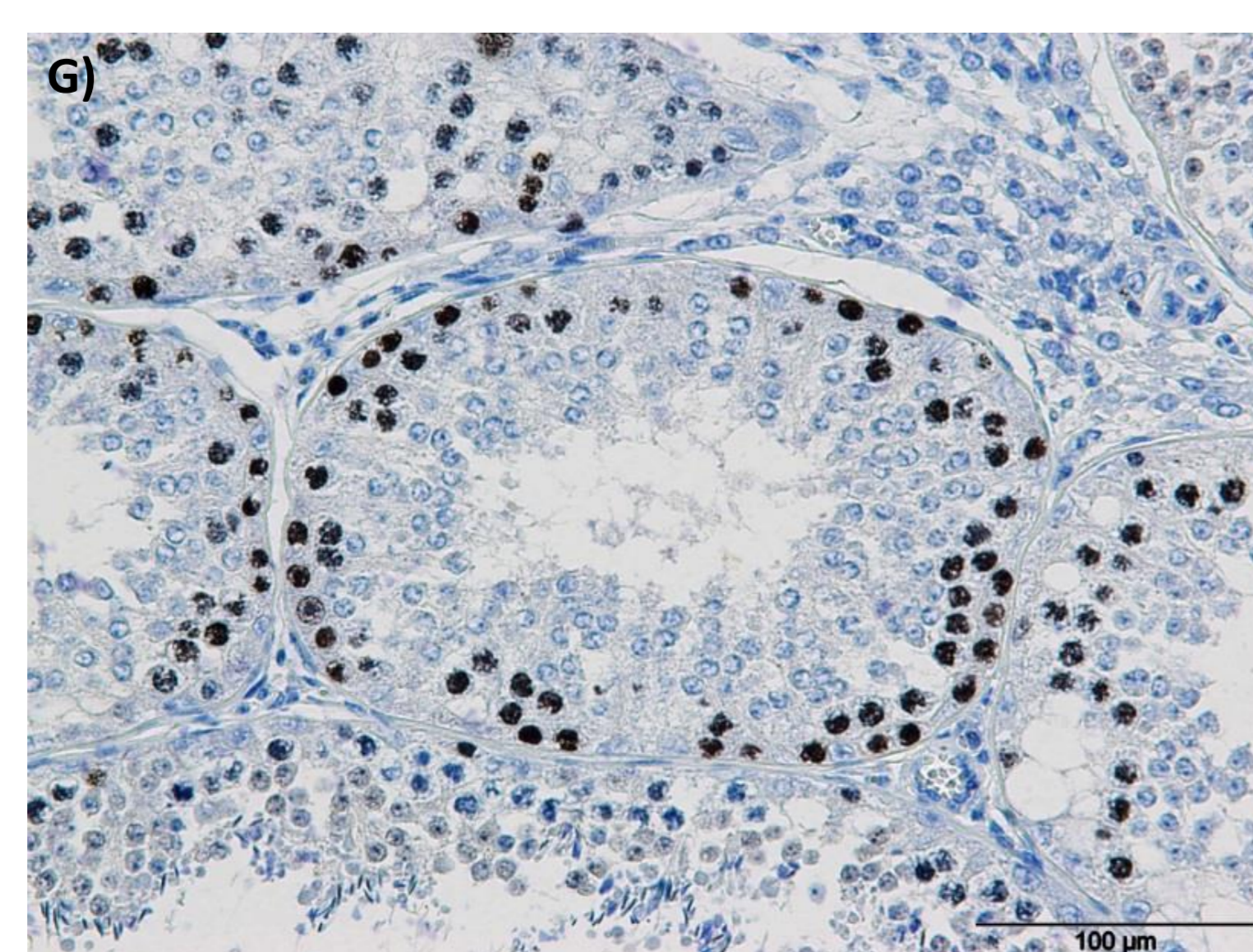
- Ki-67 antigen staining revealed the presence of a large number of active spermatogonia and spermatocytes (**G**).

- In the VA calves except the two from the HEAVY group, the seminiferous epithelium was immunolabelled with vimentin almost in its entirety (**H**), which indicated that it was largely composed of Sertoli cells.

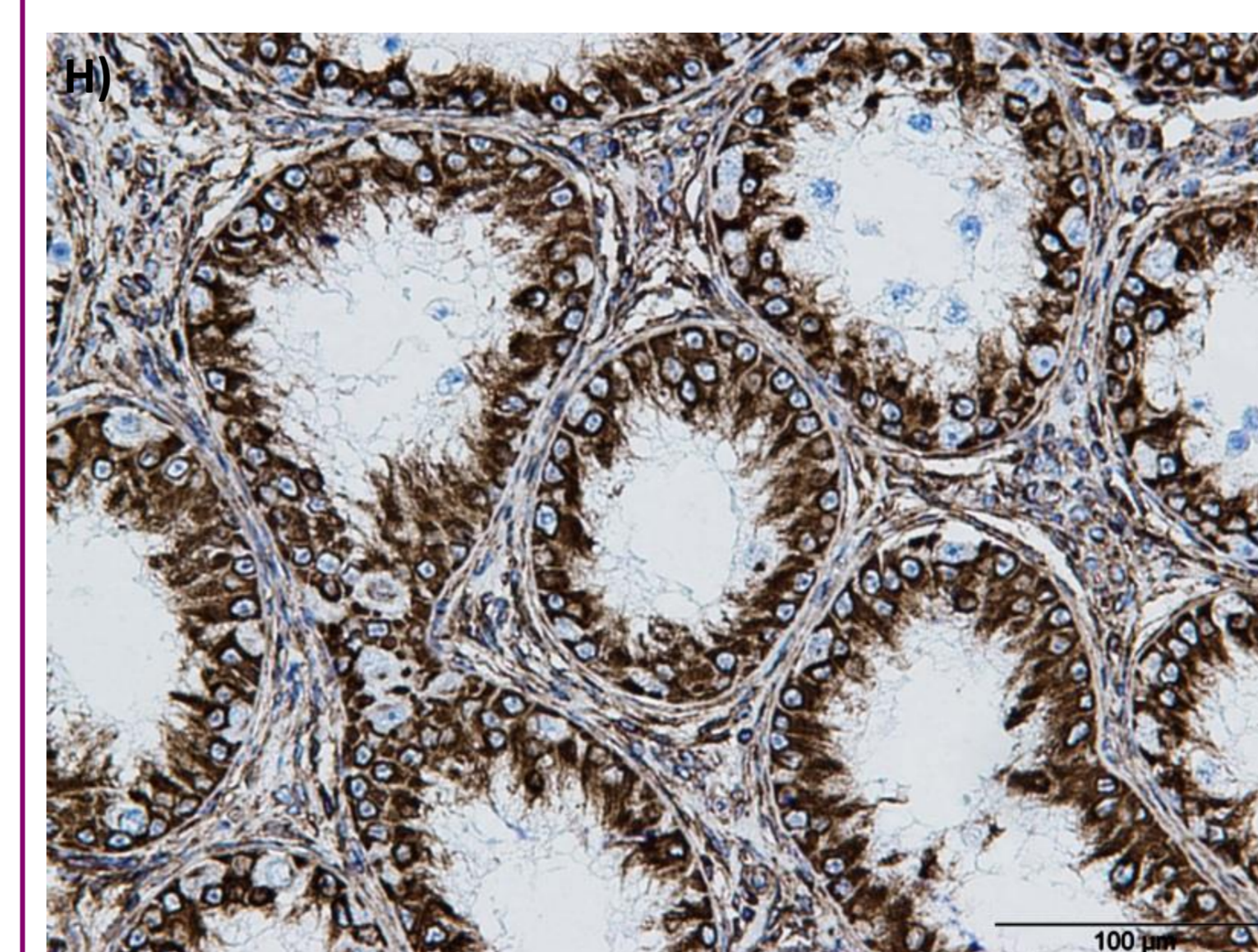
- Only a few vimentin-negative cells, which corresponded to spermatogonia, were observed in the basal seminiferous epithelium; moreover, only a few of these spermatogonia were mitotically active, as indicated by Ki-67 immunolabelling (**I**).



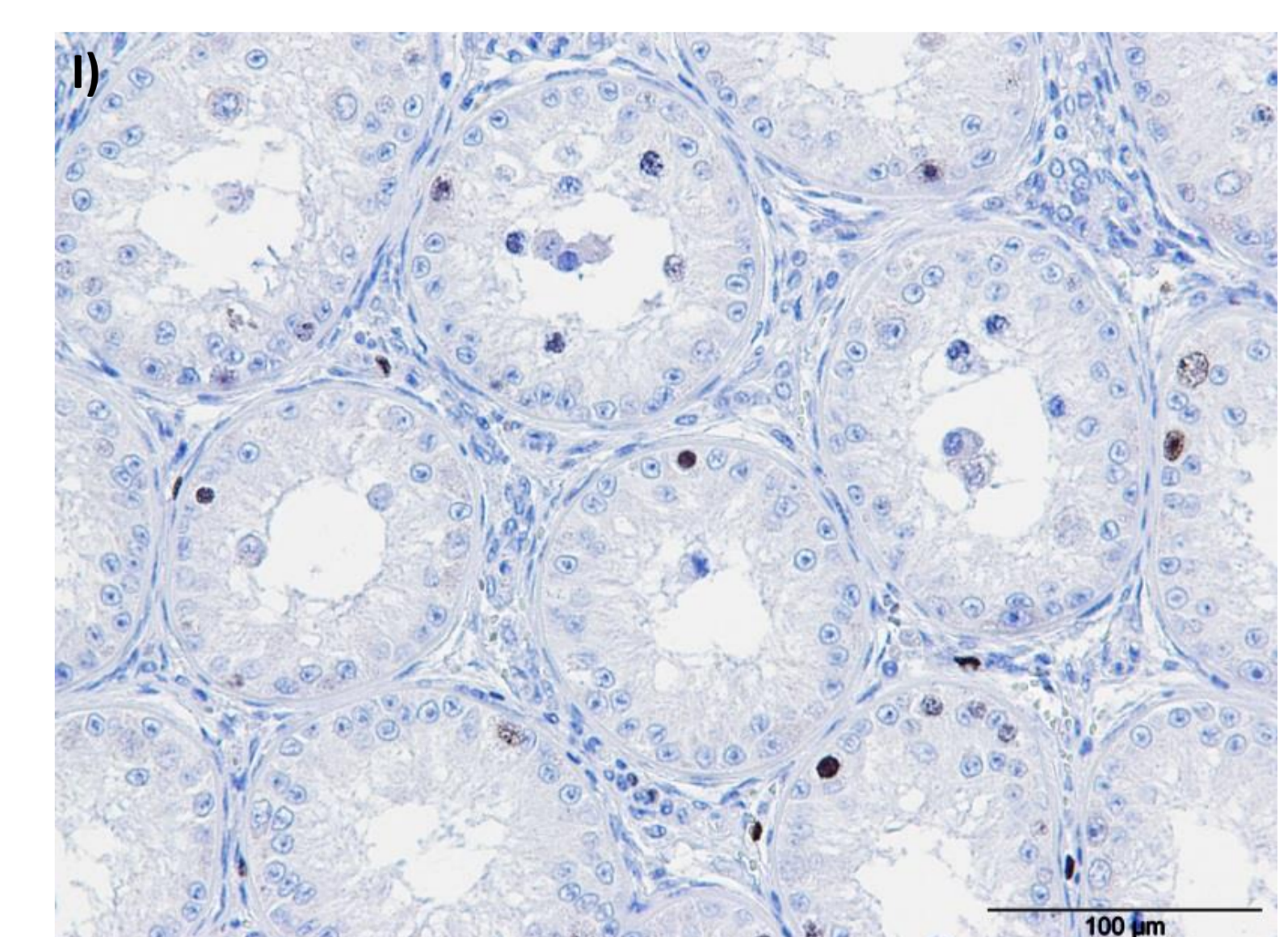
IHQ for vimentin. CONTROL



IHQ for Ki-67. CONTROL



IHQ for vimentin. VACCINATED



IHQ for Ki-67. VACCINATED

## Conclusion

- Immunization of male calves against GnRH with commercially available **Improvac®**, which was originally developed for use in boars, severely affects testicular morphology and structure.
- The effect of **Improvac®** is more pronounced and consistent in calves vaccinated at a low LW than at a heavy LW, which suggests that vaccination is more effective when calves are vaccinated prior to puberty.

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