Applied Veterinary Morphology
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Does rearing method of piglets influence the volume density of M cells in the GALT?

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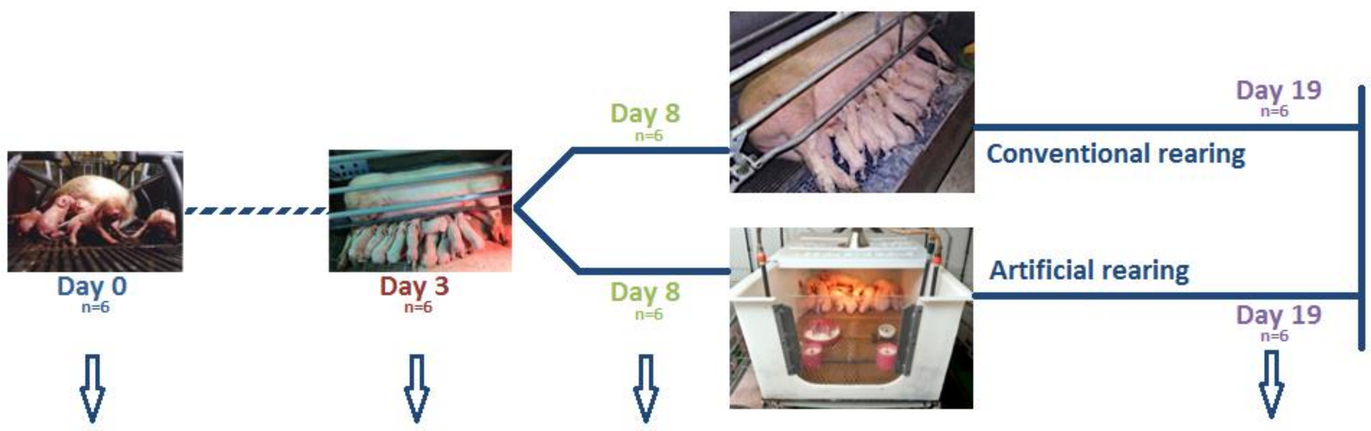
Introduction

The use of **hyperprolific sows** has become widespread in pork industry, since larger litters seem economically advantageous. However, many **supernumerary piglets**, fail to survive. Therefore, alternative rearing strategies, such as **artificial rearing**, are increasingly used. This latter method allows newborn piglets to suckle colostrum from the sow during the first days after birth. Subsequently, they are fed with milk replacers in commercial brooders.

Objectives

The development of the **gut-associated lymphoid tissue** (GALT), which plays an important role in the defence against ingested pathogens, is very important at this early stage in life. Therefore, a quantitative analysis of antigen sampling **M cells,** which are present in the epithelia lining the major inductive sites of the porcine GALT, i.e. the **tonsils** and **Peyer's patches** (PPs), was conducted. The obtained results may influence future **mucosal vaccination strategies** since M cells are responsible for transport of the vaccine particles across the mucosal barrier towards the underlying lymphoid tissue.

Materials and methods



- Samples: tonsil of the soft palate, distal ileum for ileal PPs (iPPs)
- Immunohistochemical marker for M cells: Cytokeratin 18 (Figs. 1 and 2)
- Quantitative analysis using stereology: Volume density (Vv)

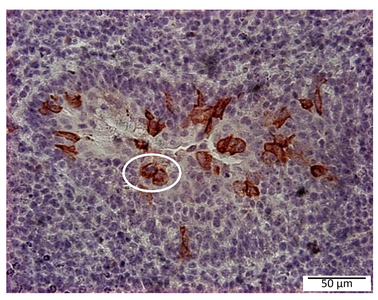


Fig. 1: Immunohistochemical detection of M cells (encircled) on paraffin sections based on the expression of cytokeratin 18. The cells exhibit a circular to ellipsoid shape in the follicle-associated epithelium (FAE) of the **tonsil of the soft palate**.

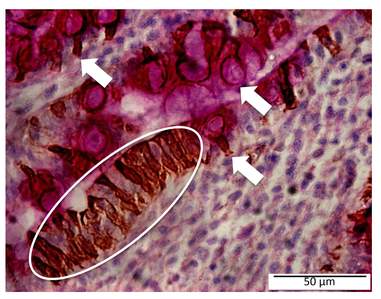


Fig. 2: Immunohistochemical detection of ellipsoid M cells (encircled) on paraffin sections of the porcine **ileal Peyer's patches** based on the expression of cytokeratin 18. Discrimination of goblet cells (arrows) was conducted using a PAS staining.

Results

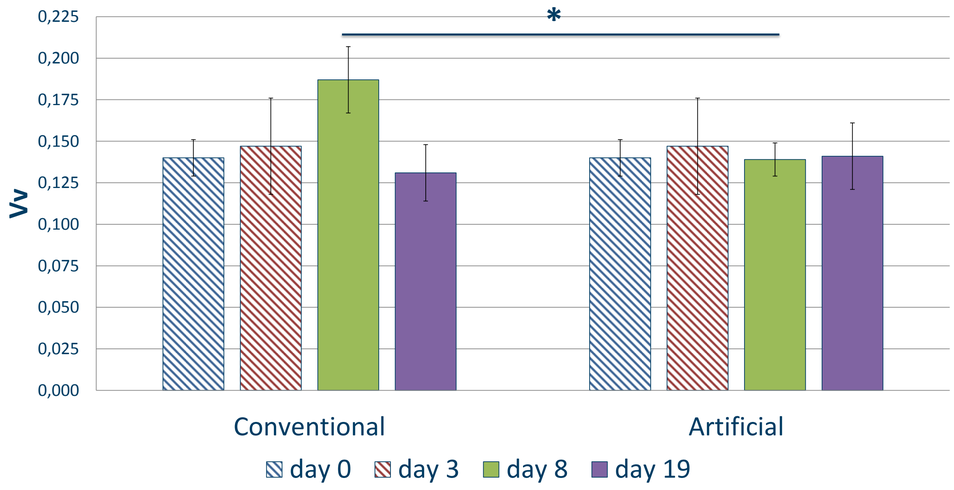
Tonsil of the soft palate

- No statistical differences were present between the Vv of M cells in the various age groups of conventionally reared piglets ($P = 0.352$, Kruskal Wallis).
- No statistical differences were detected between the Vv of M cells in the various age groups of artificially reared piglets ($P = 0.984$, Kruskal Wallis).
- A statistical difference was found at day 8 when comparing both rearing methods ($P = 0.030$, Mann-Whitney U); conventionally reared piglets had higher values (green).
- No statistical difference was found at day 19 when comparing both rearing methods ($P = 1.000$, Mann-Whitney U) (purple).

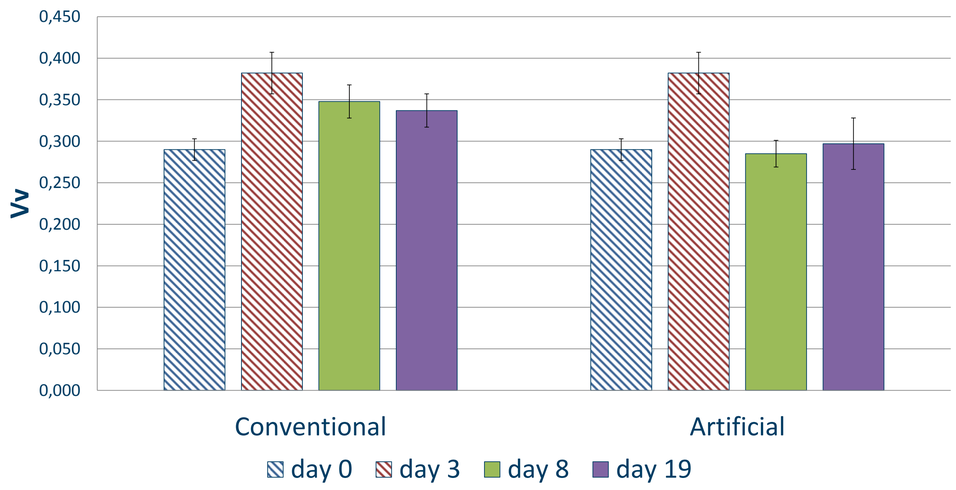
Ileal PPs

- No statistical differences were present between the Vv of M cells in the various age groups of conventionally reared piglets ($P = 0.072$, Kruskal Wallis).
- No statistical differences were detected between the Vv of M cells in the various age groups of artificially reared piglets ($P = 0.049$, Kruskal Wallis) after further multiple testing (Mann-Whitney U) (Bonferroni adjusted P-value = 0.017).
- No statistical difference was found when comparing both rearing methods ($P > 0.050$, Mann-Whitney U).

Volume density M cells – tonsil of the soft palate



Volume density M cells – iPPs



Conclusion

Overall, **no age related changes** in the Vv of M cells were found in the iPPs and the tonsils of the soft palate in conventionally and artificially reared piglets. Minor differences were detected when comparing both rearing methods. It can be concluded that **rearing strategy has limited effect** on the Vv of M cells in the iPPs and tonsils. Functional assays will be conducted in future studies to determine whether the morphologically described presence of M cells in the iPPs and tonsil during the suckling period is mimicked by a comparable transport capacity of antigens by M cells. The gained insights are valuable when optimizing the health status of artificially reared piglets by means of mucosal vaccination.

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