YEASTS PRODUCED ON MILK PERMEATE REDUCE POST-WEANING DIARRHEA IN PIGLETS

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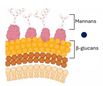
Background and Aim

- The highest antibiotic usage in livestock is found in pig production, with post-weaning diarrhea (PWD) as the main driver. Therefore, it is crucial to develop strategies that diminish piglet PWD, mainly caused by enterotoxigenic *E. coli* (ETEC) F4 and F18, without the use of antibiotics.

- Lactose-rich permeate is a side stream from the production of various dairy products.



- Components of yeast cells, i.e., α-D-mannans and β-D-glucans, have shown beneficial effects on health.

Aim: To investigate the preventive effect of a permeate-grown yeast product on post-weaning diarrhea and related parameters in an enterotoxigenic *E. coli* (ETEC) F18 challenge study.

Methods

- Two yeast strains were grown on permeate with urea added as nitrogen source. The produced yeast biomass was concentrated and subsequently spray dried.
- Sixty weaners (~28d) from 10 sows confirmed homozygous carriers of the FUT1 gene were used. The pigs were assigned to one of three groups (20/group; 2/pen): Non-challenge control (**Non-Challenge**); challenge control (**Challenge**); and challenge fed the control diet supplemented with 2.5% yeast product (**CH-Yeast**) (**Fig 1**).
- The challenge groups were inoculated with $1x10^{10}$ cfu ETEC F18 on d8 and 9 postweaning.
- Pigs were fed the diets for three weeks from weaning. Individual body weight and pen feed intake were registered. Feces and blood samples were collected.

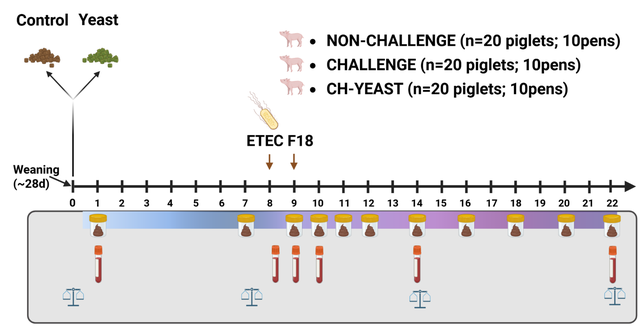


Fig 1. *Experimental design.*

Results

The yeast product contained 11.8% mannose and 16.6 % ß-glucan (**Table 1**)

Table 1. *Non-starch polysaccharide and ß-glucan composition of the yeast product (%DM)*

Total carbohydrate residues							β-glucan
Arabinose	Xylose	**Mannose**	Galactose	Glucose	Uronic acids	Total	
0.2	0.0	**11.8**	0.6	17.6	0.2	30.5	**16.6**

- The fecal consistency score by day and treatment showed the highest probability of scores ≥4 (considered diarrhea) in the Challenge group, specially from d12 to 18 post weaning, i. e., d4 to 10 after the first *E. coli* challenge, with intermediate levels in the CH-Yeast (**Fig 2.A**).
- The highest diarrhea incidence was measured on d4 to 6 post-first challenge day, with lower values for the Ch-Yeast than Challenge group on both days, i.e., d4 (P <0.05) and 6 (p <0.10) (**Fig 2.B**).
- Fecal DM% was lower (p<0.05) in the Challenge than in the Non-Challenge group during the study duration, with the Ch-Yeast group showing intermediate values (**Fig 2.C**).

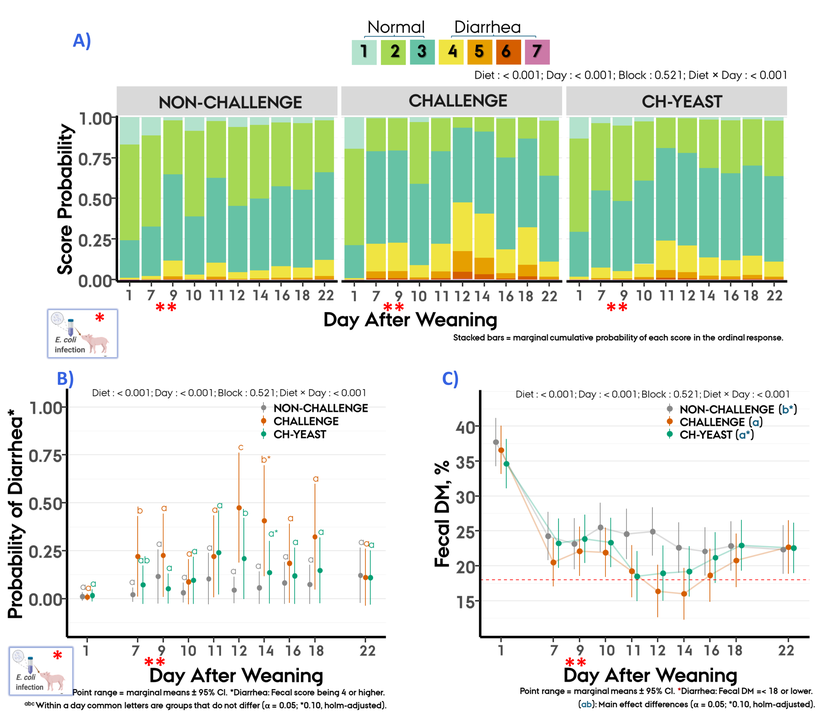


Fig. 2. *A) Fecal consistency score (probability in a to 7-point scale); B) Probability of diarrhea (fecal score ≥4); C) Fecal dry mater % during the study period.*

- Fecal shedding of ETEC F18 fimbria in the Non-challenge group was very low during the experimental period (**Fig. 3**).
- Coinciding with the highest fecal score and lowest DM%, fecal shedding of ETEC F18 fimbria was highest on d4 and 6 post-first challenge day, but with lower copy numbers in the Ch-Yeast than the Challenge on both days (p<0.10) (**Fig. 3**).

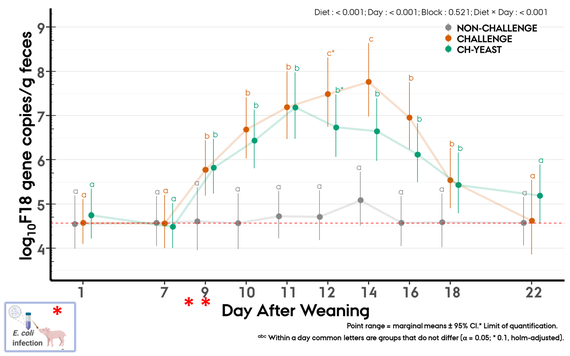


Fig 3. *Fecal shedding of ETEC F18 (log gene copy/g sample) during the study period.*

- Haptoglobin concentration tended to be higher in the Challenge group than in the Non-Challenge group, with the CH-Yeast having intermediate levels (**Fig 4.B**).

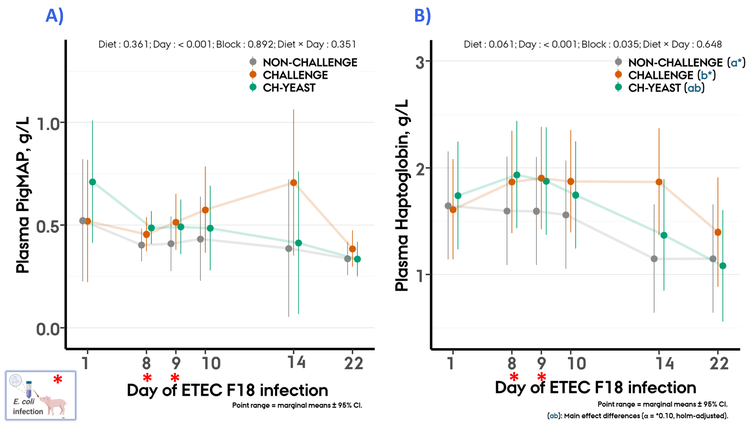


Fig 4. *Plasma concentration of the acute phase proteins PigMAP and haptoglobin (g/L)] during the study period.*

Conclusion

- ❖ The yeast product was able to reduce the probability of diarrhea and ETEC F18 fecal shedding during the days of maximum infection.
- ❖ The yeast product showed indications of ameliorating the impact of ETEC on infection markers, i,e., plasma haptoglobin.

Project partners

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See the poster here: