



Meta-analysis of the effects of inactivated *Pichia guilliermondii* yeast fed to sows on progeny performance before and after weaning

INTRODUCTION

Optimization of sow performance is a critical point to support profitability of pig producers. Any favorable impacts of a cost-effective, feed ingredient on overall performance would be advantageous for elevating efficiency and profit potential. Dietary strategies have been widely tested for this application. Inactivated yeast products have shown some promising opportunities in some sow research studies. In order to provide better understanding of the response to yeast, a meta-analysis of the effects of inactivated *P. guilliermondii* yeast product was conducted to evaluate its impact on sows during gestation and lactation while allowing for better representation of trial sample size, product dosage rate, and treatment duration.

Therefore, the intent was to conduct a meta-analysis of the effects of inactivated *P. guilliermondii* yeast product, supplemented to sows during gestation and lactation, on the productive and reproductive performance of sows, as well as the post weaning performance and survivability of piglets weaned from those sows.

MATERIALS AND METHODS

Study selection

- Systematic review (Pubmed and internal trial databases)
- Randomized trials, with side by side comparison between:
 - CT = Control Treatment fed to sows in gestation + lactation
 - Pg = CT + *P. guilliermondii* product fed to sows in gestation + lactation

Outcomes selected for analysis

- Performance of sows, until weaning:
 - piglets born alive, litter and piglet weights at birth and weaning
 - Survival (%) = 100 - (mortality pre-foster + mortality post-foster)
 - Adjusted number of piglets weaned = Survival * number born alive
- Performance of piglets after weaning
 - Feed intake, weight gain, feed conversion ratio, and mortality

Calculation of the Effect of Pg

- LSMEANS obtained from the mixed model (St Pierre, 2001), trial considered as random effect, treatment as a fixed effect
- Hedge's g Effect size (ES) calculated for each outcome and each trial.
- ES calculation and display of 90% CI with Forest plots.
- In case of significant heterogeneity shown by high I², ES adjusted by a random model.

Bias of the data set

- In case of publication bias (Egger et al. 1997), use of the Trim and Fill method (Taylor et Tweedie, 1992) to recalculate the new value of the ES.

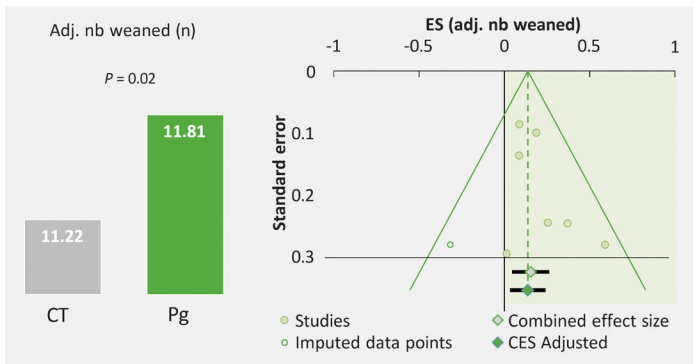
RESULTS & DISCUSSION

- Dose of Pg ranging from 1 to 2 kg/t, but with no influence on effect of Pg
- 1'446 sows included in suckling phase, 2'452 piglets for post-weaning phase

Effect of Pg fed to sows on litter performance at birth and weaning

	LS Means		Statistics		ES calculation			
	CT	Pg	SEM	P-value	N	ES	(90% CI)	P-value
Nb born alive	13.60	14.08	0.30	0.11	8	0.16	(0.06;0.26)	<0.01
Litter weight (kg)	18.58	19.22	6.98	0.06	7	0.19	(0.09;0.30)	<0.01
Piglet weight (kg)	1.41	1.39	0.02	0.29	8	-0.01	(-0.11;0.09)	0.87

- Lower weaning age in Pg vs CT (19.95 vs 20.17 days $P(ES) = 0.13$)
 - Lighter piglets at weaning in Pg vs CT (5.8 vs 6.0 kg, $P < 0.05$)
 - BUT weaning age related to management constraints in farms
- Same survival rate during suckling period (mean 84.5%, $P = 0.78$)



Effect of Pg fed to sows on piglet performance after weaning

Mean duration: 34.4 days, wean age: 20.5 days, wean weight: 6.1 kg similar across groups

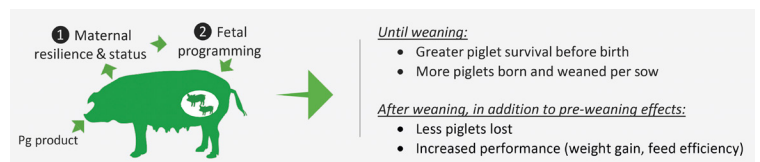
	LS Means		Statistics		ES calculation			
	CT	Pg	SEM	P-value	N	ES	(90% CI)	P-value
ADFI (g/d)	507.3	515.8	26.0	0.50	6	0.12	(-0.28;0.52)	0.55
ADG (g/d)	321.6	339.9	22.5	0.06	8	0.37	(0.03;0.70)	0.04
F:G (g/g)	1.536	1.490	0.056	0.05	6	-0.22	(-0.50;0.06)	0.11
End weight (kg)	17.62	18.18	1.20	0.12	8	0.22	(-0.08;0.52)	0.17
Survival (%)*	91.89	94.13	1.97	0.04	8	1.36	(1.00; 1.86)	0.06

* For calculation of means equivalence test was used - for ES calculation, Odds ratio is reported

SUMMARY

- More piglets born alive per sow, same birth weight
- More piglets weaned per sow
- Tendency for heavier final body weight and improved F:G in piglets born from sows fed Pg
- Increased ADG and reduced mortality in piglets born from sows fed Pg

Substantiated hypothesis that could explain effect of feeding Pg to sows during gestation & lactation on short and long-term performance of offspring



CONCLUSION

Pichia guilliermondii yeast product given to sows during gestation and lactation represents a nutritional tool to consistently improve progeny performance at birth, weaning, and post-weaning

ABSTRACT**XVTH INTERNATIONAL SYMPOSIUM ON DIGESTIVE PHYSIOLOGY OF PIGS ROTTERDAM, THE NETHERLAND - 17-20 MAY 2022**

A meta-analysis was carried out to determine whether feeding an inactivated *Pichia guilliermondii* yeast (Pg) to sows during gestation and lactation had the potential to consistently affect sow reproductive performance and subsequent performance of progeny from birth through the post-weaning period. Experiments included were trials reporting side by side comparisons of an appropriate control with inclusion of Pg. Mixed model (trial as random and treatment as fixed effects) and Hedges' g effect size (ES) calculations were used. After systematic review and exclusion phase, analysis included 8 trials for reproductive performance at farrowing and until weaning (1,446 sows), as well as for subsequent progeny performance after weaning (2,452 piglets). Sensitivity of results to individual trials was evaluated. Publication bias was assessed by creation of funnel plots and by performing Begg's test. In case of publication bias, the Trim and Fill method was used.

Pg dose ranged from 1 to 2 kg/t and did not influence the effect of the product on the outcomes. Overall, Pg increased number of piglets born alive per sow (+3.5%, $P(ES) < 0.01$), and did not influence survival during suckling ($P(ES) = 0.89$), resulting in more piglets weaned per sow (+3.0%, $P(ES) < 0.01$). When Pg was fed to sows during gestation and lactation, a carry-over effect was observed for progeny after weaning (mean weight of 6.1 kg and age of 20.5 days at weaning). Piglets born from

Pg supplemented sows had higher survival rate (+2.3%, $P(ES) = 0.06$), weight gain (+5.7%, $P(ES) = 0.04$), and numerically better FCR (-3.0%, $P(ES) < 0.11$) through the post-weaning phase (mean duration: 34.4 days). This carry-over effect may be related to fetal immune programming properties during gestation, or potentially caused by a microbiome shift in suckling pigs.

Feeding Pg to sows during gestation and lactation has successfully shown to be a nutritional tool to consistently improve sow reproductive performance, and pig performance after weaning.

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