66th Annual Meeting EAAP, 31 August – 4 September 2015, Warsaw, Poland – Session 13

Effects of the use of *Pediococcus acidilactici* in dry feed on fattening pig performance

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Introduction

Through colonization and lactic acid generation in liquid feed systems, Pediococcus acidilactici MA 18/5M (PA) can regulate the microbial ecosystems and secure hygiene of liquid feeds for pigs. An experiment was undertaken to assess the effects of Pediococcus acidilactici when used as a probiotic additive in dry feeds, on fattening performance, gut health and environmental parameters of growing-finishing pigs.

Material and methods

Experimental design

- 160 barrows and gilts (27.2 ± 1.6 kg; (LWxLd)x PP) were used in an experiment of 117 days.
- Two grower then finisher diets based on wheat, barley, wheat bran, corn, soybean and sunflower meals were manufactured without (Control) and with PA supplementation (Bactocell®, Lallemand SAS at 10^9 cfu/kg). Diets had a medium-high fiber level (168 then 179 g NDF /kg BW for growing and finishing pigs, respectively), contained 9.50 and 9.40 MJ NE /kg and 0.9 to 0.8 g digestible lysine /MJ NE, respectively. Diets were distributed as dry meal, *ad libitum* during the growing period (d0 to 49) and then up to 2.6 kg/d for gilts and 2.8 kg/d for barrows during the finishing period.
- Pigs were blocked to 16 single-sex pens of 5 pigs each, per treatment. Treatments were separated among 4 identical rooms (8 pens each), in order to measure NH_3 in extracted air, and sample manure for each treatment.

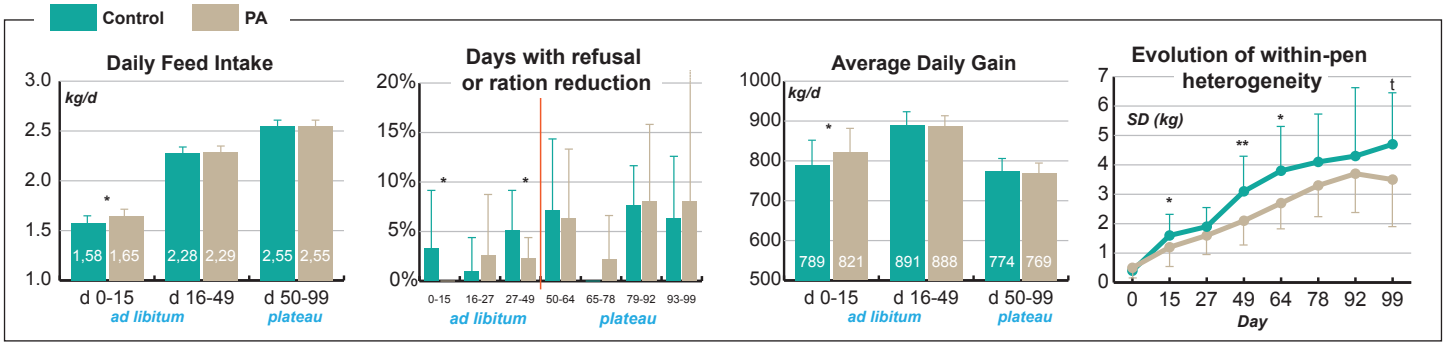
Measured parameters and statistical analyses

- Pigs were individually weighed at the beginning of the experiment (d0) then at 2 or 3 weeks intervals (d15, 27, 49, 64, 78, 92) until the day of slaughtering. Average daily feed intake (DFI) was measured per pen at each interval. Pigs were slaughtered in two batches, on d 99 and 117.
- Feces were collected on d42 and 85 from 40 barrows for microbial analysis. Fecal consistency was then determined, as well as each week, directly on the pen floor, using a classification scale from 1 to 5 (firm to watery). Samples of the total manure volume of each group of 4 pens (4 groups per treatment) were prepared for growing and finishing periods. Air quality was measured during 24 hours at the end of each period.
- Performance parameters and manure composition were analyzed using GLM procedure of SAS 9.2, with pen or manure channel as experimental unit. The model included the effects of diet, sex, block and interactions. For carcass measurements, slaughter weight was added to the model. Fecal microbial concentration was log-transformed and analyzed using the MIXED procedure with treatment and initial weight as fixed effects and animal as subject of random effect of the time. Individual and pen fecal scores were analyzed using the NPAR1WAY procedure to consider influence of treatment. P-values are indicated as follows: t = *0.05 < P < 0.1*; * *P < 0.05*; ** *P < 0.01*; *** *P < 0.001*.

Results

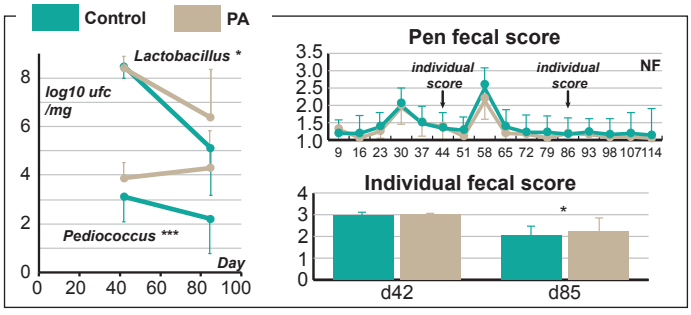
Fattening and carcass performance

PA diet increased DFI during the initial periods from d 0 to 15 (1.58 vs 1.65 kg/d, *P < 0.001*) and from d 16 to 27 (1.99 vs 2.04 kg/d, *P = 0.03*). Similarly, the percentage of days with a reduction of the feed intake was decreased for PA pigs during the growing period (*P = 0.03*). This resulted in a better ADG from d 0 to 27 (793 vs 831 g/d, *P < 0.001*) and a higher body weight at d 27 (48.6 vs 49.6 kg, *P < 0.001*), whereas FCR was not modified. From d 27 to harvest, DFI, ADG and FCR were similar for both treatments (*P > 0.05*). Within-pen heterogeneity was significantly decreased for PA pigs at d 15, 49 and 64, and tended to be lower at harvest (*P = 0.06*). Carcass weight and yield were unaffected by treatments (*P > 0.05*). However, PA pigs had a lower leanness percentage (60.5 vs 60.1, *P = 0.02*) resulting from a slightly higher fat depth (14.1 vs 14.6, *P = 0.07*), that could be explained by an improvement of fiber utilization.



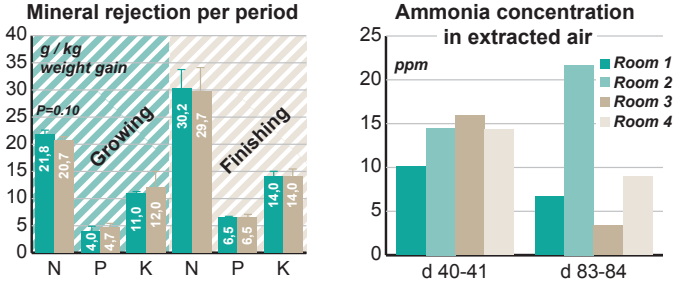
Gut microflora

Microbial analysis of feces showed higher PA and Lactobacillus counts with PA feeds. Weekly controls on pen floor of fecal consistency were similar for both treatments. Nevertheless, individual fecal score was slightly increased at d 85 by PA feed (2.03 vs 2.24, *P = 0.04*)



Manure and air quality

The manure composition for dry and organic matter, N, P, K and pH, and excretion rates per pig were similar for both treatments. However, PA fed pigs tended to have a lower N excretion per kg of gain (*P = 0.10*) during the growing phase. The 2nd air measurement showed also a lower NH_3 concentration in extracted air from PA rooms (NS).



Conclusion

The addition of *Pediococcus acidilactici* (MA 18/5M) in dry feed with medium-high fibre level distributed to fattening pigs influences some gut parameters, which may improve feed intake and homogeneity of pigs and could modify ammonia emission.

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Acknowledgments : *The authors thank M. Cassan, J. Saint-Affre, B. Thomas, Y. Denis, S. Pons and N. Lebas from IFIP research center in Villefranche-de-Rouergue (France) for their technical help. Financial support was provided by Lallemand SAS and by the French national program for agricultural development*