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Introduction

In pig production, problems such as overuse of drugs and poor health in pigs have become more serious because of many stress factors like weaning and changes in diet and environment. The European Union and China banned the use of antibiotic growth promoters (AGPs) in feed. Finding safe alternatives that can promote growth, reduce diarrhea, and support gut health become very important. Organic acids have long been used as feed preservatives as they can inhibit bacteria and lower feed PH. However, it is still unclear how they improve growth and intestinal health.



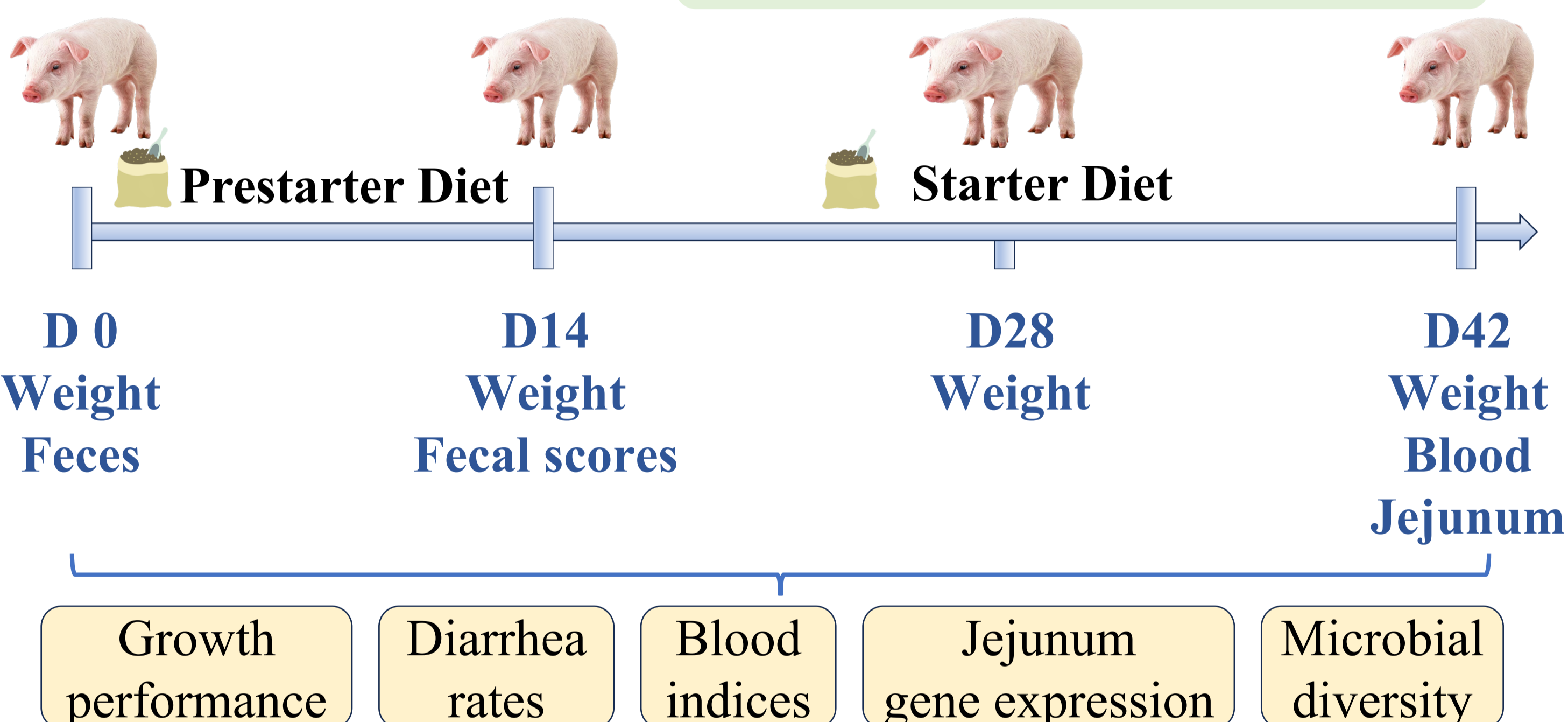
Objective

The present study aim to investigate the effect of dietary supplementation of OA on growth performance and diarrhea incidence on weaned piglets, and try to elucidate the beneficial effects from antioxidant capacity, intestinal barrier function, and fecal microbiota community aspects.

Material and methods

Animals and Diet

n=90
Age: 24±1 days
BW: 7.40 ± 0.11kg
3 Groups: 6 pens/group
5 piglets/pen



Results

Table 1. Effect of dietary organic acid on growth performance and diarrhea incidence of weaned piglets.

Items	NC	PC	OA	SEM	P-value
BW, kg					
Day 0	7.40	7.41	7.40	0.36	0.916
Day 14	9.50	9.49	9.34	0.47	0.463
Day 28	12.74	13.35	13.25	0.74	0.130
Day 42	17.10 ^{b,y}	18.92 ^a	18.38 ^{ab,x}	0.98	0.012
ADG, g					
Day 0-14	150	149	138	15	0.435
Day 14-28	222 ^y	266 ^{x,y}	270 ^x	31	0.062
Day 28-42	335 ^{b,y}	429 ^a	394 ^{ab,x}	30	0.013
Day 0-42	233 ^{b,y}	277 ^a	264 ^{ab,x}	20	0.011
ADFI, g					
Day 0-14	239	256	267	14	0.392
Day 14-28	386	420	433	53	0.350
Day 28-42	641 ^b	759 ^a	686 ^{ab}	48	0.034
Day 0-42	416	470	456	34	0.148
G: F, g/g					
Day 0-14	0.625	0.579	0.516	0.051	0.146
Day 14-28	0.580 ^y	0.650 ^x	0.627 ^{x,y}	0.033	0.079
Day 28-42	0.519 ^y	0.565 ^{x,y}	0.579 ^x	0.020	0.059
Day 0-42	0.558 ^{b,y}	0.591 ^a	0.580 ^{ab,x}	0.011	0.053
Diarrhoea incidence ² , %					
Day 0-14	13.25 ^{a,x}	6.67 ^b	9.05 ^{ab,y}	-	0.005

Figure 1. Effects of organic acid on the antioxidant and inflammatory cytokines indices in plasma of weaned piglets.

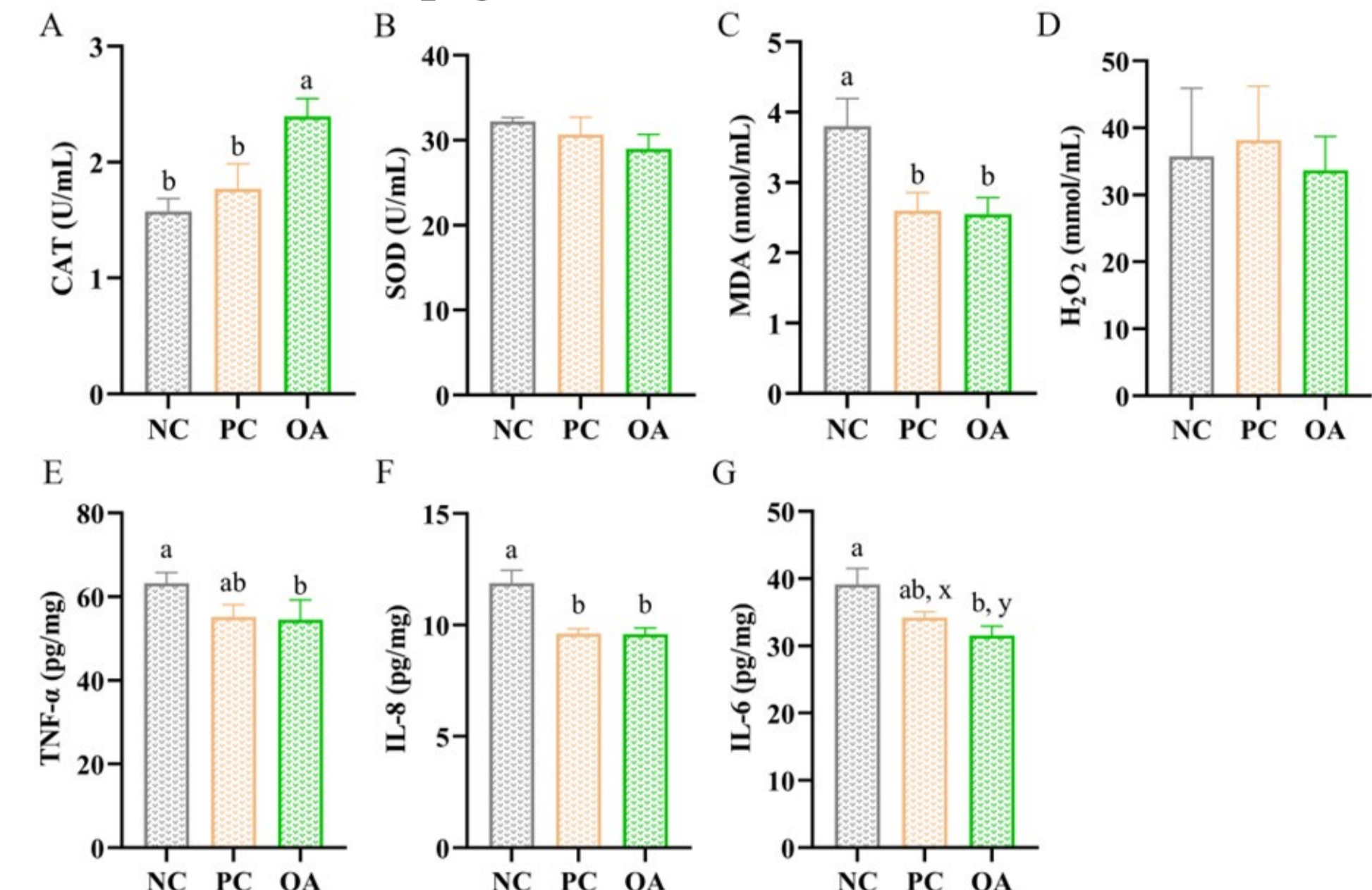


Figure 2. Effects of organic acid on jejunal Nrf2 signalling pathway genes expression in weaned piglets.

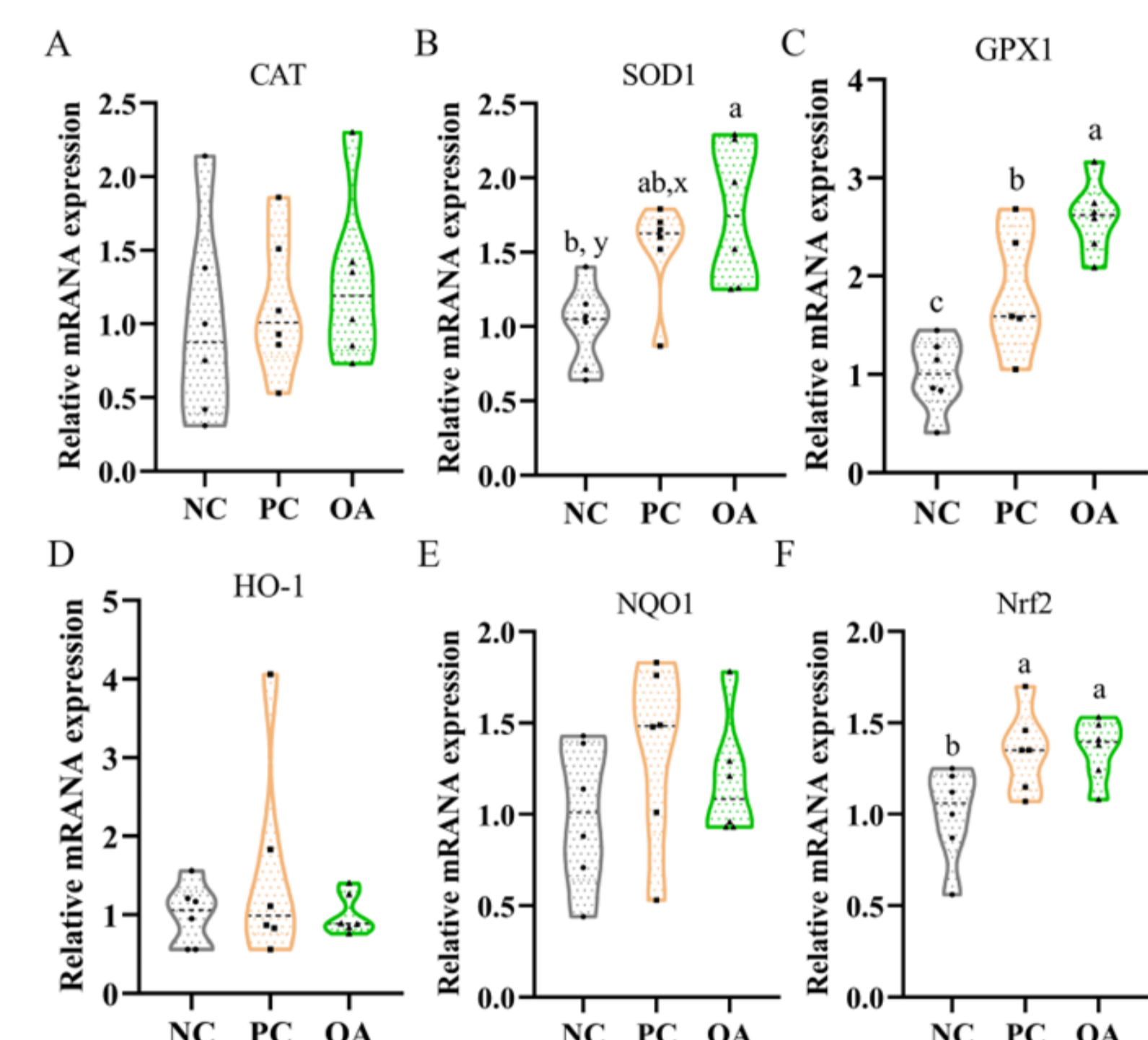


Figure 3. Effects of organic acid on jejunal barrier function genes expression in weaned piglets.

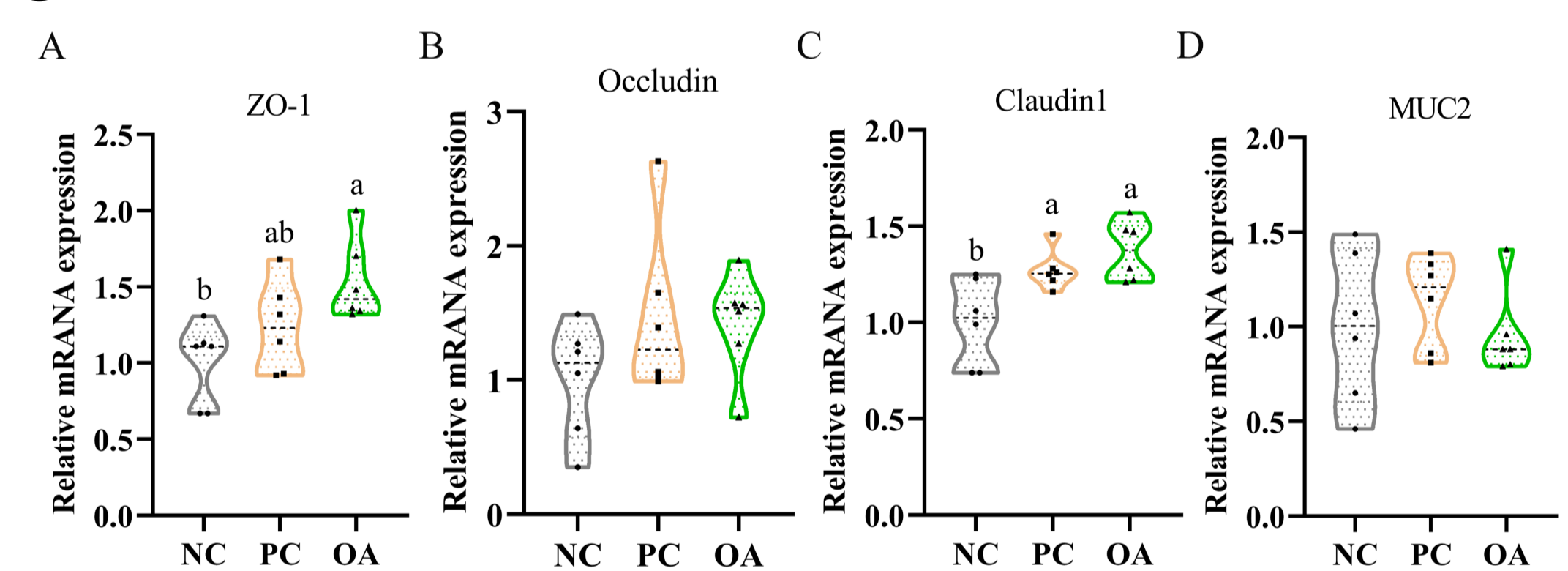
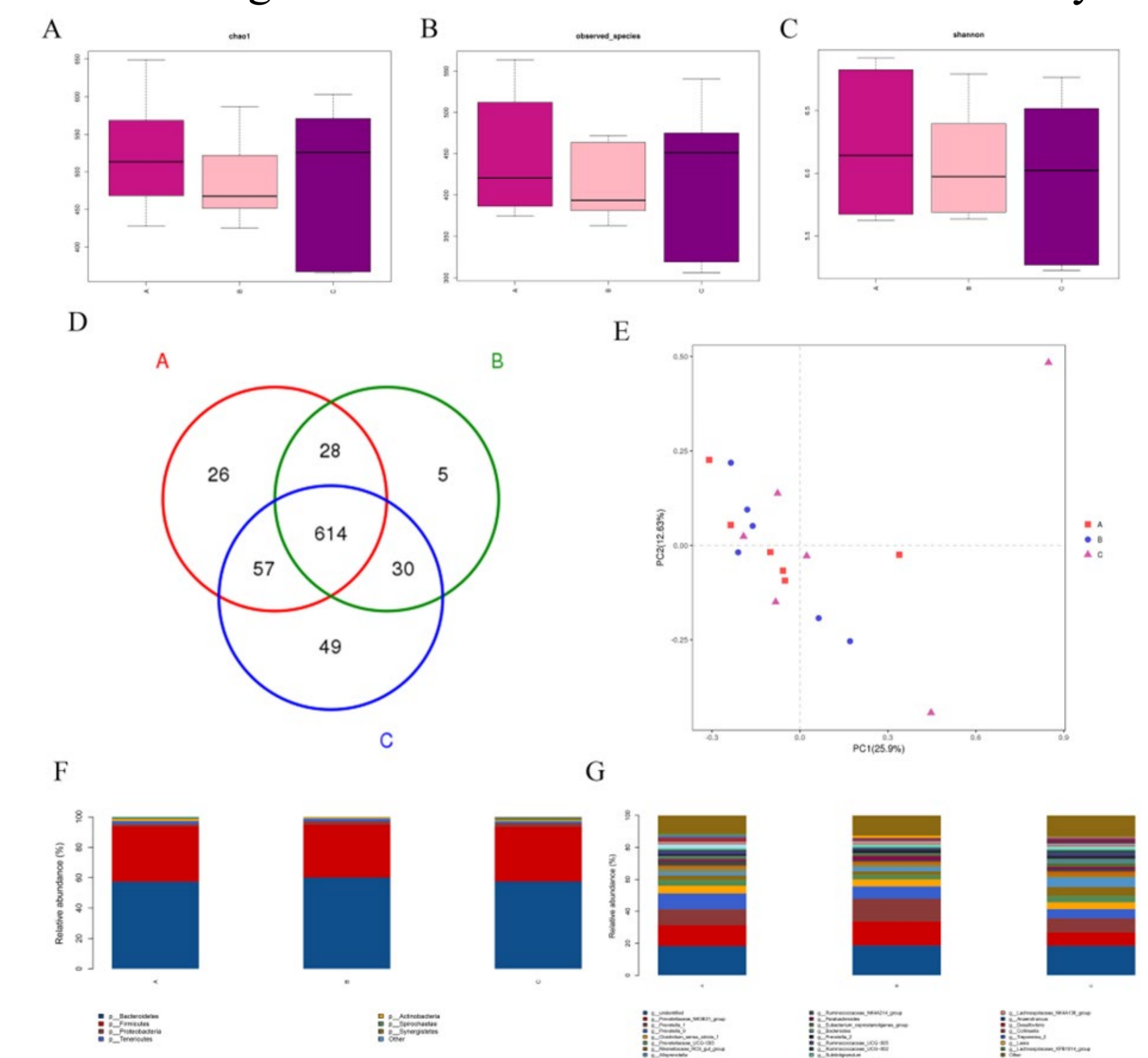


Table 2. Effect of dietary organic acid on jejunum morphology of weaned piglets.

Items	NC	PC	OA	SEM	P-value
Villus height, μm	402	398	409	22	0.842
Crypt length, μm	303	262	237	17	0.105
VH: CD, μm/μm	1.34 ^b	1.54 ^{ab}	1.75 ^a	0.08	0.018

Figure 4. Effects of organic acid on the fecal bacterial community of weaned piglets.



Conclusion

Dietary supplementation with OA could improve growth performance and attenuate postweaning diarrhea, which may be closely related to the improved the antioxidant capacity and intestinal integrity of weaned piglets. The beneficial effect of OA on weaned piglets was similar to antibiotics, which may provide the theoretical basis for using OA as an alternative to antibiotics in the pig industry.