

Supplemental Data S2: Effect of Modulators on Intestinal Microbiota and Phenotype of Pigs

Table S18: Effect of minerals on the phenotype and gastro-intestinal microbiota of pigs (1/2)

Ref	Intervention	Conditions	Methods	Phenotype						Immunity	Intestinal barrier	Microbiota			
				Weight	Food intake	FCR or FCE	Diarrhoea rate	Digestibility	Villi structure			Diversity	Lactic acid-producing bacteria	SCFA-producing bacteria	Pathogenic and/or Zoonotic bacteria
Broom 2006	Zinc	Large white x Landrace x Duroc Healthy	ZnO (3100 mg/kg of diet) 3 weeks (post weaning)	=	=	=	=	ND	ND	Serum: = [IgG] Intestinal: = [IgA]	ND	ND	Ileum: = Lactic acid bacteria	ND	Ileum: = E.coli
Wang 2018	Conventional Zinc	Topigs x Pietran Male and Female Healthy	ZnO (3200 mg/kg of diet) 1 weeks (post weaning) Culture	↑ ADG	=	=	=	ND	ND	Ileum: = TNFα, INFγ and IL-1β mRNA expression	Ileum: = transeptiheliale electric resistance in ileum = tigh junction gene expression	Ileum: = Richness = shanon diversity	Ileum: = Lactobacillus	Ileum: = Clostridium XIVa	Ileum: ↓ E.coli
	Alternative Zinc		ZnO (294 mg/kg of diet) 1 weeks (post weaning) Culture	↑ ADG	=	=	=	ND	ND	Ileum: = TNFα, INFγ and IL-1β mRNA expression	Ileum: = transeptiheliale electric resistance in ileum = tigh junction gene expression	Ileum: = Richness = shanon diversity	Ileum: = Lactobacillus	Ileum: = Clostridium XIVa	Ileum: = E.coli
Vahjen 2011	Zinc oxyde	Landrace x Pietran Healthy	ZnO (3042 mg/kg of diet) 2 weeks (post weaning) Sequencing	ND	ND	ND	ND	ND	ND	ND	ND	Ileum: ↑ Richness ↑ Shannon index ↑ Simpson index	Ileum: ↓ Lactobacillus reuteri ↓ Lactobacillus helveticus	ND	ND
Rattingan 2020	Zinc oxyde	Boars x Large white x Landrace Male and female Healthy	ZnO (3100 ppm) 1 week (post weaning) Sequencing	=	↑ ADFI	=	=	ND	ND	ND	ND	ND	ND	Colon: ↓ Roseburia ↓ Anaerostripes ↓ Oscillospira	Colon: = Campylobacter
		Boars x Large white x Landrace Male and female Low crude protein	ZnO (3100 ppm) 1 week (post weaning) Sequencing	=	=	=	↓	ND	ND	ND	ND	ND	ND	Colon: ↓ Roseburia	Colon: = Campylobacter
Li 2021	Cooper/Zinc Montmorillonite	Duroc x Landrace x Yorkshire Healthy	Zn (75 mg/kg) Cu (105 mg/kg) 2 week (post weaning) Sequencing	↑ ADG	=	↑ FCE	↓	ND	ND	ND	Jejunum: = Transépihéliale resistance ↓ FD4 flux ↑ ZO-1 mRNA expression ↑ Claudine-1 mRNA expression Colon: ↑ TER ↓ FD4 flux ↑ ZO-1 mRNA expression ↑ Claudine-1 mRNA expression	= α diversity	Colon: ↑ Lactococcus	ND	ND

Table S18: Effect of minerals on the phenotype and gastro-intestinal microbiota of pigs (2/2)

Ref	Intervention	Conditions	Methods	Phenotype						Immunity	Intestinal barrier	Microbiota			
				Weight	Food intake	FCR or FCE	Diarrhoea rate	Digestibility	Villi structure			Diversity	Lactic acid-producing bacteria	SCFA-producing bacteria	Pathogenic and/or Zoonotic bacteria
Kim 2021	Cooper		CuSO ₄ (125 ppm) 4 week Culture	=	=	=	ND	=	Duodenum, jejunum and ileum: = VH = CD = VH/CD ratio	Duodenum: ↑ Atox 1 ↑ SOD1	ND	ND	Ileum and Cecum: = Lactobacillus Colon: ↑ Lactobacillus	ND	Ileum, cecum and colon: ↓ E.coli
	Copper (Hot-Melt extruded)	Duroc x Landrace x Yorkshire Male and Female Healthy	HME-Cu (125 ppm) 4 week Culture	↑ ADG	=	=	ND	↑ Gross energy digestibility	Ileum: = VH = CD = VH/CD ratio Duodenum: ↑ VH = CD = VH/CD ratio Jejunum: ↑ VH ↑ CD ↑ VH/CD ratio	Duodenum: ↑ Atox 1	ND	ND	Ileum: = Lactobacillus Caecum and Colon: ↑ Lactobacillus	ND	Ileum, cecum and colon: ↓ E.coli
	Cooper chalted with methionine		Cu (125 ppm) 4 week Culture	↑ ADG	=	=	ND	↑ Gross energy digestibility	Duodenum and Ileum: = VH = CD = VH/CD ratio Jejunum: ↑ VH ↓ CD ↑ VH/CD ratio	Duodenum: ↑ Atox 1	ND	ND	Ileum, Caecum and Colon: ↑ Lactobacillus	ND	Ileum: = E.coli Cecum and colon: ↓ E.coli
Heyer 2019	Calcium and phosphore	Landrace x Pietran Healthy	Ca (8,3g/kg of diet) P (7.5 g/kg of diet) Diet: Corn and soybean 9 week Sequencing	ND	ND	ND	ND	↑ Phosphorus digestibility ↓ Calcium digestibility	ND	ND	ND	ND	Cecum and Colon: ↑ Lactobacillus = Bifidobacterium	Colon: ↓ Clostridium cluster XIVa	ND
			Ca (8,3g/kg of diet) P (7.5 g/kg of diet) Diet: Corn and fiels peas 9 week Sequencing	ND	ND	ND	ND	↓ Calcium digestibility	ND	ND	ND	ND	Cecum and Colon: ↑ Lactobacillus = Bifidobacterium	Colon: ↓ Clostridium cluster XIVa	ND
Lv 2015	Sodium Selenium	Yorkshire x Landrace x Duroc Healthy	Na (0.46mg/kg of diet) 6 week (post weaning) Culture	↑ ADG	=	↓ FCR	↓	ND	ND	Blood: ↑ GPx acticity	ND	ND	Feces: = Lactobacillus = Bifidobacterium = Enterococcus	ND	Feces: = E.coli

Table S19: Effect of polyphenol on the phenotype and gastro-intestinal microbiota of pigs

Ref	Intervention	Conditions	Methods	Phenotype				Microbiota				
				Weight	Food intake	FCR or FCE	Villi structure	Phylum	Lactic acid-producing bacteria	SCFA-producing bacteria	pH	SCFA
Wu 2017	Chlorogenic acid	Yorkshire x Landrace x Duroc Healthy	CA (0.05% of diet) 9 weeks Sequencing	ND	ND	ND	ND	Small intestine: ↑ Acidobacteria	Small intestine: ↓ Enterococcus = Lactobacillus	Small intestine: = Roseburia = Prevotella	ND	ND
Biagi 2010	Tannins	Landrace x Pietrain Male and Female Healthy	Tanins (4.5 g/kg of diet) 4 weeks (post weaning) Culture	↑ ADG	=	↓ FCR	Jejunum and Cecum: = VH = CD Ileum: = VH ↓ CD	ND	Jejunum and Cecum: = Lactobacillus Caecum: = Enterococcus	ND	= (Ileum, Cecum and Jejunum)	Cecum: = Total SCFA = [butyrate] = [acetate] = [propionate]

Table S20: Effect of immunoglobulin on the phenotype and gastro-intestinal microbiota of pigs

Ref	Intervention	Conditions	Methods	Phenotype				Immunity	Intestinal barrier	Microbiota		
				Weight	Food intake	FCR or FCE	Diarrhoea rate			Lactic acid-producing bacteria	SCFA-producing bacteria	Pathogenic and/or Zoonotic bacteria
Tan 2019	IgY	Yorkshire x Landrace x Duroc Healthy	Ig (500 ppm) 2 week (post weaning) RTqPCR	=	=	=	↓	Jejunum: = IL-1 β , IL-6, INF γ and TNF α mRNA expression	Jejunum: = Claudine-1 and Occludin-1 mRNA expression	Ileum, Cecum and Colon: = Lactobacillus = Bifidobacterium Caecum: ↓ Enterococcus	Ileum, Cecum and Colon: = Clostridium	Ileum: ↓ E.coli Cecum and Colon: = E.coli

Table S21: Effect of probiotics on the phenotype and gastro-intestinal microbiota of pigs (1/2)

Ref	Intervention	Conditions	Methods	Phenotype						Immunity	Microbiota				
				Weight	Food intake	FCR or FCE	Diarrhoea rate	Digestibility	Villi structure		Diversity	Phylum	Lactic acid-producing bacteria	SCFA-producing bacteria	Pathogenic and/or Zoonotic bacteria
Wang 2016	Enterococcus faecium	Large White x Landrace x Duroc Healthy	Enterococcus (6.10 ⁸ cfu/mL) 3 weeks (after birth) Sequencing	↑ BW ↑ BWG	ND	ND	↓	ND	ND	ND	Cecum ↑ Richness	Cecum: ↑ Bacteroidetes ↓ Proteobacteria ↓ Actinobacteria	Cecum: = Lactobacillus = Enterococcus	Cecum: ↑ Bacteroides ↑ Faecalibacterium ↓ Blautia	ND
Broom 2006	Enterococcus faecium	Large White x Landrace x Duroc Healthy	Enterococcus (1.4.10 ⁹ cfu/mL) 3 weeks (after weaning) Sequencing	=	=	=	ND	ND	ND	Serum: = [IgG] Intestin: = [IgA]	ND	ND	Ileum: = Lactic acid bacteria	ND	Ileum: = E.coli
Brousseau 2015	Pedococcus acidilactici	Yorkshire x Landrace Healthy	Probiotic (2.5.10 ⁹ cfu then 3.5.10 ⁹ cfu per day in utero and 6.10 ⁹ cfu per day from birth to weaning) 7 weeks Culture	ND	ND	ND	ND	ND	ND	ND	Ileum: ↓ α -diversity ↓ Evenness Modification of β -diversity	Ileum: ↑ Firmicutes ↓ Actinobacteria Colon: ↑ Actinobacteria	Feces: ↑ Bifidobacterium ↓ Lactobacillus Ileum and Colon: = Bifidobacterium = Lactobacillus	ND	ND
	Saccharomyces cerevisiae			ND	ND	ND	ND	ND	ND	ND	Ileum: ↑ α -diversity ↑ Evenness = β -diversity	Ileum: ↑ Firmicutes Feces: ↑ Actinobacteria	Feces, Ileum and Colon: = Bifidobacterium = Lactobacillus	ND	ND
	Pedococcus acidilactici + Saccharomyces cerevisiae			ND	ND	ND	ND	ND	ND	ND	Ileum: = α -diversity = Evenness Modification of β -diversity	Ileum, colon and Feces: =	Feces, Ileum and Colon: = Bifidobacterium = Lactobacillus	ND	ND
Lan 2016	Bacillus coagulance + Bacillus licheniformis + Bacillus subtilis + Clostridium butyricum	Landrace x Yorkshire Male and Female Healthy	Probiotic (0.1% of diet) 6 weeks Culture	↑ BW ↑ ADG	=	↓	= fecal score	↑ Dry matter, Gross energy and nitrogene digestibility	ND	Blood: = % lymphocytes	ND	ND	Feces: ↑ Lactobacillus	ND	Feces: ↓ E.coli
Choi 2011	Lactobacillus acidophilus + Bacillus subtilis + Saccharomyces cerevisiae + Aspergillus oryzae	Landrace x Yorkshire x Duroc Male and Female Healthy	Probiotic (4.10 ⁸ cfu/g of L. acidophilus, 4.8.10 ⁹ cfu/g of B. subtilis, 10 ⁷ cfu/g of S. cerevisiae, and 4.3.10 ⁷ cfu/g of A. oryzae) 4 weeks (after birth) Culture	↑ ADG	↑ ADFI	↓	ND	↑ Dry matter	ND	ND	ND	ND	Feces: = Lactobacillus	ND	ND

Table S21: Effect of probiotics on the phenotype and gastro-intestinal microbiota of pigs (2/2)

Ref	Intervention	Conditions	Methods	Phenotype						Immunity	Microbiota				
				Weight	Food intake	FCR or FCE	Diarrhoea rate	Digestibility	Villi structure		Diversity	Phylum	Lactic acid-producing bacteria	SCFA-producing bacteria	Pathogenic and/or Zoonotic bacteria
Lv 2015	Lactobacillus acidophilus + Saccharomyces cerevisiae	Landrace x Yorkshire x Duroc Healthy	Probiotic (3.10 ¹¹ cfu/g of L. acidophilus and 3.10 ⁷ cfu/g of S. cerevisiae) 6 weeks (after weaning) Culture	↑ ADG	=	↓	↓	ND	ND	Blood = GPX activity	ND	ND	Feces: ↑ Lactobacillus = Bifidobacterium = Enterococcus	ND	Feces: ↓ E.coli
Wang 2019	Lactobacillus plantarum	Landrace x Yorkshire Healthy	Probiotic (10 ¹⁰ CFU/2mL) 3 weeks (after birth) Sequencing	=	ND	ND	↓	ND	Duodenum: = VH = CD = VH/CD ratio Ileum: = VH = CD = VH/CD ratio Jejunum: = VH = CD = VH/CD ratio	ND	Colon: = α-diversity	Colon: ↑ Firmicutes ↑ Actinobacteria ↓ Bacteroidetes ↓ Fusobacteria	Colon: ↑ Lactobacillus	Colon: ↓ Fusobacterium	Colon: ↓ Escherichia-shigella
Shen 2009	Yeast	Large white x Landrace Healthy	Probiotic (5g/kg) 3 weeks (after weaning) Culture	=	=	=	ND	↑ Gross energy, Dry matter and crude protein digestibility	Jejunum: ↑ VH = CD = VH/CD ratio Ileum and Duodenum: = CD, VH and CD/VH ratio	Plasma: = % lymphocyte CD4+ and CD8+ ↓ [INFγ] in plasma = [IL10] Gut: = [IL10] ↑ [INFγ]	ND	ND	Cecum, Colon and Rectum: = Lactobacillus	ND	Cecum: ↓ E.coli Colon and Rectum: = E.coli
Hosseindoust 2016	Bacteriophage	Landrace x Yorkshire x Duroc Male and Female Healthy	Probiotic (1g/kg of diet) 5 weeks (after birth) Culture	=	=	=	↓	= Digestibility	Jejunum: ↑ VH = CD = VH/CD ratio Duodenum and Ileum: = VH = CD = VH/CD ratio	Serum: = [Ig]	ND	ND	Cecum: = Lactobacillus ↑ Bifidobacterium Ileum: ↑ Lactobacillus = Bifidobacterium	ND	ND
		Landrace x Yorkshire x Duroc Male and Female Salmonella typhimurium, enteritidis and choleraesuis, E.coli and C.perfringens	Probiotic (1g/kg of diet) 5 weeks (after birth) Culture Infection: ND	=	=	↓	↓	= Digestibility	Jejunum: ↑ VH = CD = VH/CD ratio Duodenum and Ileum: = VH = CD = VH/CD ratio	Serum: = [Ig]	ND	ND	Cecum: = Lactobacillus ↑ Bifidobacterium Ileum: ↑ Lactobacillus = Bifidobacterium	ND	ND

Table S22: Effect of probiotics combined with other interventions on the phenotype and gastro-intestinal microbiota of pigs

Ref	Intervention	Conditions	Methods	Phenotype				Immunity	Microbiota			Pathogenic and/or Zoonotic bacteria
				Weight	Food intake	FCR or FCE	Diarrhoea rate		Diversity	Lactic acid-producing bacteria	SCFA-producing bacteria	
Lv 2015	Lactobacillus acidophilus + Saccharomyces cerevisiae + Na-Selenium	Yorkshire x Landrace x Duroc Healthy	Na (0.46mg/kg of diet) Probiotic (3.1011 cfu/g of L. acidophilus and 3.109 cfu/g of S. cerevisiae) 6 week (post weaning) Culture	↑ BW ↑ ADG	=	↓ FCR	↓	Blood: ↑ GPx activity	ND	Feces: ↑ Lactobacillus = Bifidobacterium = Enterococcus	ND	Feces: ↓ E.coli
Lo verso 2020	Cranberry + Carvacrol + Yeast + Vitamins A,D,E and B complex	Yorkshire x Landrace x Duroc Healthy	Cranberry (1g/kg of diet) Carvacrol (0.1 g/kg of diet) Yeast (5g/kg of diet) Vitamins complex (3g/kg of diet) 6 weeks (post weaning) Sequencing	=	=	=	ND	ND	= α diversity = β diversity	Colon: ↓ Lactobacillus amylovorus	Colon: = Faecalibacterium prausnitzii	ND

Table S23: Effect of postbiotics on the phenotype and gastro-intestinal microbiota of pigs

Ref	Intervention	Conditions	Methods	Phenotype					Lactic acid-producing bacteria	SCFA-producing bacteria	Microbiota		
				Weight	Food intake	FCR or FCE	Digestibility	Villi structure			pH	SCFA	Pathogenic and/or Zoonotic bacteria
Biagi 2007	Sodium Butyrate	German Landrace x Pietrain Healthy	Postbiotic (4000 ppm) 4 weeks (post weaning) Culture	=	=	=	ND	Jejunum, Ileum and Cecum: = VH = CD = VH/CD ratio	ND	ND	ND	Jejunum, Ileum and Cecum: = [Acetate], [Propionate], [Butyrate], [Lactate]	ND
Hanczakowska 2013	Propionic acid + Formic acid	Landrace x Large white x Duroc x Pietrain Healthy	Postbiotic (0.5% of diet) 1 weeks (post weaning) Culture	=	ND	=	=	Ileum: = VH ↑ CD = VH/CD ratio	ND	ND	= Stomach, Duodenum, Jejunum, Ileum and Cecum	Ileum: ↑ [Valerate] = [Acetate] = [Propionate] = [Butyrate] Cecum: ↑ [Isobutyrate] = [Acetate] = [Propionate] = [Butyrate]	Ileum: = E.coli = C. perfringens
	Caprylic acid + Propionic acid and Formic acid		Caprylic acid (0.2% of diet) Propionic of formic acid (0.5% of diet) 11 week Culture	↑ BW ↑ BWG	ND	=	↑ Crude fiber digestibility	Ileum: = VH = VH/CD ratio ↑ VW ↑ CD	ND	ND	↑ (stomach)	Cecum: ↑ [butyric] ↑ [valeric]	Ileum: = E.coli = C.perfringens = Candida albicans
	Capric acid + Propionic acid and Formic acid			↑ BW ↑ BWG	ND	=	↑ Crude fiber, protein and fat digestibility	Ileum: ↑ VH = VH/CD ratio ↑ VW ↑ CD	ND	ND	↑ (stomach) ↓ (jejunum)	Cecum: ↑ [butyric]	Ileum: = E.coli = C.perfringens = Candida albicans
	Caprylic + Capric acid + Propionic acid and Formic acid			↑ BW ↑ BWG	ND	=	↑ Crude fat digestibility	Ileum: = VH = VH/CD ratio ↑ VW = CD	ND	ND	↑ (stomach)	Cecum: = [SCFA]	Ileum: = E.coli = C.perfringens = Candida albicans

Table S24: Effect of infection on the phenotype and gastro-intestinal microbiota of pigs

Ref	Infection	Conditions	Methods	Phenotype						Immunity	Microbiota	
				Weight	Food intake	FCR or FCE	Diarrhoea rate	Digestibility	Villi structure		Lactic acid-producing bacteria	Pathogenic and/or Zoonotic bacteria
Hosseindoust 2016	<i>Salmonella typhimurium</i> , <i>enteritidis</i> and <i>cholerasuis</i> + <i>E.coli</i> + <i>C.perfringens</i>	Landrace x Yorkshire x Duroc Male and Female	Infection (ND) 5 weeks (after birth) Culture	↓ ADG	↓ ADFI	=	↑	=	Duodenum, Jejunum and Ileum: = VH = CD = VH/CD ratio	Serum: ↑ [IgA]	Cecum: = Lactobacillus ↓ Bifidobacterium Ileum: ↓ Lactobacillus = Bifidobacterium	ND

Table S25: Effect of prebiotics on the phenotype and gastro-intestinal microbiota of pigs

Ref	Intervention	Conditions	Methods	Phenotype					Immunity	Microbiota						
				Weight	Food intake	FCR or FCE	Diarrhoea rate	Villi structure		Diversity	Phylum	Lactic acid-producing bacteria	SCFA-producing bacteria	pH	SCFA	Pathogenic and/or Zoonotic bacteria
Li 2018	Inulin	Pietran x Landrace Male and Female Healthy	Prebiotic (0.4 to 3 g/animal/day) 7 week (post birth) RTqPCR	↑ BW	ND	ND	ND	Jejunum: ↑ VH = CD = VH/CD Ileum: ↑ VH ↑ CD ↓ VH/CD ratio	Colon: ↓ IL8, TNFα and TLR4 mRNA expression	ND	Colon: = Firmicutes = Bacteroidetes	Colon: = Lactobacillus = Bifidobacterium	Colon: = Clostridium XI Va	ND	Cecum: = Total SCFA Colon: ↓ Total SCFA	Colon: = E.coli
Tian 2019	GOS	Duroc x Landrace x Large white Healthy	Prebiotic (1g/kg of BW) 3 week (post birth) Sequencing	ND	ND	ND	ND	ND	Ileum ↑ IL10 and PBD-A mRNA expression = IL8 mRNA expression	= α-diversity Modification of the β-diversity	Ileum: ↑ Firmicute ↓ Bacteroidetes	Ileum: ↑ Lactobacillus	ND	= (Ileum)	Ileum: ↑ [Butyrate] = [Lactate]	Ileum: ↓ Escherichia ↓ Clostridium sensu stricto
Rattingan 2020	Laminarin	Boars x Landrace x Large white Male and Female Healthy	Prebiotic (300ppm) Protein (21%) 1 week (post weaning) Sequencing	=	=	=	=	ND	ND	= α-diversity = Richness	Colon: = Firmicute = Protéobacteria	ND	Colon: = Roseburia = Bacteroides	ND	Cecum and Colon: = Total SCFA	Colon: = Campylobacter
		Boars x Landrace x Large white Male and Female Reducing crude protein	Prebiotic (300ppm) Protein (18%) 1 week (post weaning) Sequencing	=	↑	=	↓	ND	ND	= α diversity = Richness	Colon: = Firmicute = Protéobacteria	ND	Colon: = Roseburia = Bacteroides	ND	Cecum and Colon: = Total SCFA	Colon: = Campylobacter

Table S26: Effect of fibres on the phenotype and gastro-intestinal microbiota of pigs

Ref	Intervention	Conditions	Methods	Phenotype				Immunity	Microbiota					Pathogenic and/or Zoonotic bacteria
				Weight	Food intake	FCR or FCE			Diversity	Phylum	Lactic acid-producing bacteria	SCFA-producing bacteria	SCFA	
Wu 2020	50% guar gum 50% cellulose	Yorkshire x Landrace Female Pregnante	Prebiotic (3% of feed) 17 week Sequencing	ND	ND	ND		Serum: ↓ [INFγ] ↑ [IL-10]	↑ α diversity Modification of the β diversity	Feces: ↑ Bacteroidetes	Feces: = Enterococcus = Lactococcus	Feces: ↑ Roseburia ↑ Bacteroides = Faecalibacterium = Akkermansia	Feces: ↑ [Butyrate] ↑ [Propionate]	ND
Yan 2016	Amylose	Yorkshire x Landrace x Duroc Female Pregnante	Prebiotic (54,5/100g of diet) 11 week RTqPCR	ND	ND	ND		ND	↑ richness	ND	Feces: = Bifidobacterium	Feces: = Bacteroidetes	ND	ND

Table S27: Effect of amino acids on the phenotype and gastro-intestinal microbiota of pigs

Ref	Intervention	Conditions	Methods	Phenotype				Immunity	Intestinal barrier	Microbiota				
				Weight	Food intake	FCR or FCE				Diversity	Phylum	Lactic acid-producing bacteria	SCFA-producing bacteria	Pathogenic and/or Zoonotic bacteria
Chang 2021	5-Aminolevulinic acid	Landrace x Large white Female Healthy	AA (50 mg/kg of diet) 4 weeks Sequencing	ND	ND	ND		ND	ND	= α diversity Modification of the β diversity	Feces: = phylum abundance	ND	ND	ND
Xu 2014	N acetyl cysteine	Landrace x Duroc Healthy	AA (500 mg/kg of diet) 3 weeks (Post birth) RTqPCR	ND	ND	ND		Colon: ↑ [T-AOC], [GPx] ↓ [MDA] and [NO] Caecum: ↑ [T-AOC], [SOD]	ND	ND	ND	Ileum and Colon: ↑ Lactobacillus Ileum, Cecum and Colon: ↑ Bifidobacterium	ND	Ileum and Cecum: ↓ E.coli
Li 2019	D Aspartate			↓ ADG	=	=		Blood: ↓ [IgM]	Ileum: ↓ TLR4 and NOD1 mRNA expression	= Evenesse, Richnesse and α diversity	Ileum: = Phylum abundance	Ileum = Lactobacillus = Pediococcus	ND	Ileum: = Escherichia shigella ↑ Clostridium sensu stricto 1
	L Aspartate	Landrace x Duroc x Yorkshire Healthy	AA (1% of diet) 5 weeks (Post weaning) Sequencing	=	=	=		Blood: = [IgM]	Ileum: ↓ NOD1 mRNA expression	↑ Shanon and simpson indice	Ileum: ↑ Chloroflexi, ↑ Nitrospirae ↑ Germatimonadetes ↑ Acidobacteria ↑ Chlorobi	Ileum ↓ Lactobacillus ↓ Pediococcus	ND	Ileum: ↓ Escherichia shigella = Clostridium sensu stricto 1
	D and L Aspartate			=	=	=		Blood: ↑ [IgM]	Ileum: ↓ TLR4 and NOD1 mRNA expression	↑ Simpson index	Ileum: ↓ Protéobacteria	Ileum = Lactobacillus = Pediococcus	ND	Ileum: = Clostridium sensu stricto 1 ↓ Escherichia shigella

Table S28: Effect of proteins on the phenotype and gastro-intestinal microbiota of pigs

Ref	Intervention	Conditions	Methods	Phenotype				Diversity	Phylum	Microbiota			Pathogenic and/or Zoonotic bacteria
				Weight	Food intake	FCR or FCE	Diarrhoea rate			Lactic acid-producing bacteria	SCFA-producing bacteria	SCFA	
Rattingan 2020	Protein	Boars x Landrace x Large white Male and Female Healthy	Protein (21%) 1 week (post weaning) Sequencing	=	=	=	=	= α diversity = Richness	Colon: = Firmicute ↑ Protéobacteria	ND	Colon: = Roseburia = Bacteroides	Cecum and Colon: = Total SCFA	Colon: = Campylobacter

Table S29: Effect of antibiotics on the phenotype and gastro-intestinal microbiota of pigs

Intervention	Conditions	Methods	Phenotype					Immunity	Diversity	Phylum	Microbiota		
			Weight	Food intake	FCR or FCE	Diarrhoea rate	Villi structure				Lactic acid-producing bacteria	SCFA-producing bacteria	Pathogenic and/or Zoonotic bacteria
Chlortetracycline	Landrace x Yorkshire x Duroc Male and Female Healthy	Antibiotic (0.10% of diet) 4 weeks (after birth) Culture	↑ ADG	↑ ADFI	↓ FCR	ND	ND	ND	ND	ND	Feces: = Lactobacillus	ND	ND
Chlortetracycline	Landrace x Large white Healthy	Antibiotic (80 mg/kg of diet) 3 weeks (post weaning) Culture	↑ ADG	=	=	ND	Jejunum: ↑ VH = CD ↑ VH/CD ratio Ileum Duodenum: = VH = CD = VH/CD ratio	Plasma: = % lymphocyte CD4+ and CD8+ ↓ [INF γ] = [IL10]	ND	ND	Cecum, Colon, Rectum: = Lactobacillus	ND	Cecum: ↓ E.coli
Chlortetracycline	Yorkshire x Landrace x Duroc Healthy	Antibiotic (1.5g/kg of diet) 6 weeks (post weaning) Sequencing	=	ND	ND	ND	ND	ND	= Richness, evenness and shanon index in Ileum and colon = β diversity	ND	Ileum: ↓ Lactobacillus reuteri Colon: ↓ Lactobacillus amylovorus	ND	ND
Chlortetracycline + Tiamulin	Yorkshire x Landrace Healthy	Antibiotic (100mg/kg of diet) 7 weeks Culture	ND	ND	ND	ND	ND	ND	↓ Evenness index ↓ α diversity Modification of the β diversity	Ileum: ↑ Firmicutes Colon: ↑ Actinobacteria Feces: ↓ Actinobacteria	Feces: ↑ Lactobacillus	ND	ND
Colistin sulphate + Enramycin	Yorkshire x Landrace x Duroc Healthy	Colistin (100 ppm) Enramycin (15ppm) 2 week (post weaning) RTqPCR	=	=	=	=	ND	Jejunum: = inflammation protein expression	ND	ND	Ileum, cecum and colon: ↓ Lactobacillus = Enterococcus = Bifidobacterium	ND	Ileum, cecum: ↓ E.coli
Tylosin phosphate	Topics hybrid x Pietran Healthy	Antibiotic (100mg/kg of diet) 6 weeks (post weaning) Sequencing	↑ BW	ND	↓ FCR	ND	ND	ND	= α diversity	Cecum: ↑ Firmicutes ↓ Tenericutes	ND	Colon: ↑ Coprococcus ↑ Blautia ↑ Ruminococcus Cecum: ↑ Phascolarctobacterium ↓ Prevotella	Cecum: ↓ Campylobacter
Tilmicosin		Antibiotic (400 mg/kg of diet) 3 weeks (post weaning) Culture	↑ BWG	↑ ADFI	=	ND	Jejunum: = VH = CD = VH/CD ratio	Blood: = [IgA] ↑ [IgM]	= shanon diversity index	ND	Feces: = Lactobacillus	ND	ND
Amoxicillin	Landrace x Large white Male and Female Healthy	Antibiotic (600 mg/kg of diet) 3 weeks (post weaning) Culture	↑ BWG	↑ ADFI	=	ND	Jejunum: = VH = CD = VH/CD ratio	Blood: = [IgA] ↑ [IgM]	= shanon diversity index	ND	Feces: = Lactobacillus	ND	ND
Doxycycline		Antibiotic (300 mg/kg of diet) 3 weeks (post weaning) Culture	↑ BWG	↑ ADFI	=	ND	Jejunum: = VH = CD = VH/CD ratio	Blood: = [IgA] ↑ [IgM]	= shanon diversity index	ND	Feces: = Lactobacillus	ND	ND

Table S30: Effect of plants and seaweed on the phenotype and gastro-intestinal microbiota of pigs

Ref	Intervention	Conditions	Methods	Phenotype						Microbiota				
				Weight	Food intake	FCR or FCE	Digestibility	Villi structure	Diversity	Lactic acid-producing bacteria	SCFA-producing bacteria	pH	SCFA	Pathogenic and/or Zoonotic bacteria
Chen 2018	Sangrovit® Macleata cordata	Landrace x Large white x Duroc Male and Female Healthy	Plants (50mg/kg of diet) 3 weeks (post weaning) RTqPCR	↑ ADG	↑	=	ND	Duodenum: ↓ VH = CD = VH/CD ratio Jejunum: = VH ↓ CD ↑ VH/CD ratio Ileum: ↑ VH = CD ↑ VH/CD ratio	ND	Ileum and Cecum: ↑ Lactobacillus	ND	ND	Ileum and Cecum: ↑ [Acetate] ↑ [Propionate] ↑ [Butyrate] ↑ [total SCFA]	Ileum and Cecum: ↓ Salmonella ↓ E.coli
Ivarsson 2012	Chicory forage	Yorkshire Male and Female Healthy	Plants (80g/kg of diet) 3 weeks (post birth) Culture	=	=	=	↑ Non starch polysaccharide, arabinose, xylose, uronic acid and total dietary fiber digestibility	ND	= simpson index	Feces: ↓ Lactobacillus	Feces: ↑ Prevotella ↓ Megasphaera	= (feces)	ND	ND
	Chicory root			=	=	=	↑ arabinose, uronic acid and total dietary fiber digestibility	ND	= simpson index	Feces: = Lactobacillus	Feces: = Prevotella = Megasphaera	↓ (feces)	ND	ND
	Chicory forage + root			=	=	=	↑ Non starch polysaccharide, arabinose, uronic acid and total dietary fiber digestibility	ND	= simpson index	Feces: ↑ Lactobacillus johnsonni	Feces: = Prevotella ↑ Megasphaera	= (feces)	ND	ND

Abbreviations:

BW: Body Weight

BWG: Body Weight Gain

ADG: Average Daily Gain

FI: Feed Intake

ADFI: Average Daily Feed Intake

FCR: Feed Conversion Ratio

FCE: Feed Conversion Efficiency

VH: Villi Height

CD: Crypt Depth

= No change compared with the control group

↑ Increase compared with the control group

↓ Decrease compared with the control group

ND: Not Determined

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