Electronic Supplementary Material (ESI) for RSC Advances.
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Supplementary materials

Supplementary Table S1. Composition of diet for sows during late gestation and lactation (Air-dry basis, %).

Ingredients	Late gestation	Lactation
Corn	63.17	58.81
Soybean meal	16.72	26.50
Wheat bran	14.00	8.71
Soybean oil	2.50	2.50
Calcium hydrophosphate	0.81	1.45
Limestone	1.17	1.05
Salt	0.50	0.50
Lysine	0.24	0.08
Threonine	0.05	-
Tryptophan	0.01	-
Premix*	0.50	0.50
Total	100	100
Nutrient composition[#]		
Dry matter	88.73	88.04
Digestive energy (MJ/kg)	3269	3332
Crude protein	15.12	18.11
Calcium	0.68	0.80
Total phosphorus	0.58	0.68

Available phosphorus	0.29	0.34

*Provided the following per kg of complete diet: vitamin A, 12,000 IU; vitamin E, 24 IU; vitamin K3, 2.0 mg; thiamine, 2.0 mg; riboflavin, 6.0 mg; pyridoxine, 4 mg; vitamin B12, 24 ng; niacin, 30 mg; pantothenic acid, 20 mg; folic acid, 3.6 mg; biotin, 0.4 mg; choline chloride, 0.4 mg; iron, 96 mg; copper, 8.0 mg; zinc, 120 mg; manganese, 40 mg; iodine, 0.56 mg; selenium, 0.4 mg.

[#] Calculated value.

Supplementary Table S2. Composition of MFGM.

Compositions	Value
Protein (%)	70.0
Phospholipid (%)	6.0
Fat (%)	15.0
Lactose (%)	3.0 - 6.0
Moisture (%)	4.5
Ash (%)	3.0
Typical amino acid (g/100 g)	
Alanine	2.6
Ariginine	2.3
Aspartic acid	7.9
Cystine/Cysteine	1.7
Glutamic Acid	10.6
Glycine	1.9
Histidine	1.7
Hydroxyproline	＜0.1
Isoleucine	3.7
Leucine	6.7
Methionine	6.4

Phenylalanine	1.1
Proline	2.7
Serine	3.7
Threonine	3.5
Tryptophan	4.2
Tyrosine	1.2
Valine	2.5

MFGM, Milk fat globule membrane.

Supplementary Table S3. Primer sequences used in RT-qPCR.

Genes	Forward (5'→3')	Reverse (5'→3')
GADPH	ACCCAGAAGACTGTGGATGG	AAGCAGGGATGATGTTCTGG
Mucin 1	GTGCCGACGAAAGAACTG	TGCCAGGTTCGAGTAAGAG
Mucin 2	CTGTGTGGGGCCTGACAA	AGTGCTTGCAGTCGAACTCA
Mucin 4	TTCACTCCAACCATCCTTCCA	CTCGTTCCACTTGTCTGTTCC
Mucin 13	GCTACAGTGGAGTTGGCTGT	GACGAATGCAATCACCAGGC
Mucin 20	AGGCAGTTACAACATCCACAGAAG	CTGTAGACCATGGCCGAGAAC
ZO-1	GCCATCCACTCCTGCCTAT	CGGGACCTGCTCATAACTTC
Occludin	CAGCAGCAGTGGTAACTTGG	CAGCAGCAGTGGTAACTTGG
Claudin-1	AAGGACAAAACCGTGTGGGA	CTCTCCCCACATTCGAGATGATT
Claudin-2	GCTGGCGAACGAGTTCTTAC	AGATGGCGCTAGATGTCACC
Claudin-3	GCCAAAGCCAAGATCCTCTA	GTAGTCCTTGCGGTCGTAGG

Claudin-4	TCAGCCCTGACTTTGCGTG	ACCTGTCTGTCCACACCAC
TNF-α	TGGGAGTAGACAAGGTACAACCC	CATCTTCTCAAAATTCGAGTGACAA
INF-γ	GCGGCTGACTGAACTCAGATTGTAG	AGTGCTGTCTGGCCTGCTGTTA
IL-1β	CTCGCAGCAGCACATCAACAAG	GGAAGGTCCACGGGAAAGACAC
IL-6	ACCACGGCCTTCCCTACTT	CACAACTCTTTTCTCATTTCCAC
IL-8	CCTCATTCCTGTGCTGGTCA	TGCAAGTTGAGGCAAGAAGAC
IL-10	TCTGAGAACAGCTGCATCCAC	CGCCCATCTGGTCCTTCGTT
IL-22	CCCAGATCTGGGTACCATGGTCCCG	GCCTTTAATACGACATTGGGACAGT
TLR-2	AAGATGTCGTTCAAGGAGGTGCG	ATCCTCTGAGATTTGACGCTTTG
TLR-4	GGTGTGAAATTGAGACAATTGAAAAC	GTTTCCTGTCAGTACCAAGGTTGA
GPR41	TCTTCACCACCGTCTATCTCAC	CACAAGTCCTGCCACCCTC
GPR43	CTGCCTGGGATCGTCTGTG	CATACCCTCGGCCTTCTGG
GPR119	TATAGGCAGAAGGAGGTA	AGAGAAGGAGGAGGAATG
GPR120	GAATTCGCCACCATGGGAATGTCCCTTGAGTGC	TCTAGACTAGCTGGAAATAACAGACAGA

GADPH, glyceraldehyde-3-phosphate dehydrogenase; GPR, G protein-coupled receptor.

Supplementary Table S4. The effects of MFGM supplementation during late gestation on milk composition of the sows.

Items (%)	CON	MFGM	*P* value
Colostrum (%)			
Cream	2.88 ± 0.30	3.19 ± 0.31	0.491
Lactoprotein	10.23 ± 0.81	10.61 ± 0.73	0.734
Lactose	1.34 ± 0.13	1.43 ± 0.15	0.648
Mature milk (d 7) (%)			
Cream	5.65 ± 0.31	5.86 ± 0.23	0.589
Lactoprotein	5.00 ± 0.04	4.89 ± 0.08	0.221
Lactose	6.19 ± 0.09	6.00 ± 0.10	0.161

MFGM, Milk fat globule membrane; CON, CON group fed basal diet; MFGM, MFGM group fed basal diet plus MFGM.

Supplementary Table S5. The effects of MFGM supplementation during late gestation on alpha-diversity of fecal microbiota of the sows and the piglets.

Items	CON	MFGM	*P* value
Sows			
Sobs	1125.20 ± 24.08	1133.00 ± 42.87	0.732
Ace	1259.90 ± 35.37	1259.90 ± 39.01	0.998
Shannon	4.98 ± 0.09	4.91 ± 0.24	0.527
Simpson	0.019 ± 0.003	0.02 ± 0.01	0.256
Chao	1281.40 ± 48.75	1277.2 ± 45.67	0.891
Piglets (d 7)			
Sobs	754.80 ± 98.81	484.00 ± 34.63	<0.001
Ace	827.27 ± 108.11	599.22 ± 39.93	<0.001
Shannon	3.63 ± 0.54	3.48 ± 0.40	0.230
Simpson	0.12 ± 0.09	0.07 ± 0.03	0.453

Chao	877.59 ± 109.3	387.4 ± 30.19	<0.001
Piglets (d 21)			
Sobs	416.60 ± 29.90	498.40 ± 41.82	0.007
Ace	549.40 ± 64.64	641.21 ± 29.91	0.020
Shannon	3.46 ± 0.33	4.10 ± 0.23	0.007
Simpson	0.09 ± 0.03	0.04 ± 0.01	0.009
Chao	533.98 ± 47.71	642.56 ± 32.30	0.003

MFGM, Milk fat globule membrane; CON, CON group fed basal diet; MFGM, MFGM group fed basal diet plus MFGM.