

New insights into porcine milk *N*-glycome and the potential relation with offspring gut microbiome

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Diet compositions for both Yorkshire and Meishan sows (as fed basis).

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Correlations between PNO20 and gut bacteria.

Table S1. Diet compositions for both Yorkshire and Meishan sows (as fed basis)

Ingredients	Content (%)	Ingredients	Content
Corn	70	Digestible energy (Mcal/kg)	3.12
Soybean meal	20	Crude protein (%)	17.5
Fish meal	2	Crude fibre (%)	2.05
Wheat bran	4	Ether extract (%)	3.07
Vitamin and mineral mixture ¹	4	Digestible Lys (%)	0.88
Total	100	Digestible Met+Cys (%)	0.67
		Total calcium (%)	0.77

¹ Premix supplied the following per kg complete diet: vitamin A, 10,000 IU; vitamin D3, 1,100 IU; vitamin E, 30 mg; vitamin K3, 1.4 mg; vitamin B2, 3 mg; vitamin B12, 0.02 mg; niacin, 20 mg; choline chloride, 310 mg; Zn, 100 mg; Fe, 150 mg; Cu, 140 mg; Mn, 500 mg; I, 0.12 mg; Se, 0.27 mg.

Table S2. The total content of carbohydrates in the milk of Yorkshire and Meishan SOWS

Breed	Yorkshire					Meishan				
Lactation days	1	3	7	14	21	1	3	7	14	21
Lactose (g/L) ¹	33	36	37.3	40.2	39.7	31.8	42	50.1	50.1	48.5
Total carbohydrate (g/L) ²	35.2	38.4	39.8	42.8	42.4	33.9	44.8	53.4	53.4	51.7

¹ These data has been implemented in an earlier paper by Bian et al. (2016).

² Estimated values based on a 15:1 ratio of lactose to other carbohydrates.

Table S3. Relative abundance of the milk *N*-glycans at lactation days 1, 3, 7, 14, and 21 of Yorkshire (YK) and Meishan (MS) sows¹

Items	YK1	MS1	YK3	MS3	YK7	MS7	YK14	MS14	YK21	MS21
PNO1	2.3	2.6	3.1	3.3	3.6	4.1	2.9	2.6	2.5	3.7
PNO2	0.2	0.2	0.2	0.2	0.4	0.6	0.2	0.2	0.3	0.2
PNO4	3.9	5.9	4.5	5.3	4	4.1	2.4	2.9	2.1	2.9
PNO5	4.1	4.6	2.9	3.2	2	2.6	1.2	1.6	1	1.9
PNO6	4	4.1	2.6	2.8	1.8	2.2	1.6	1.7	1.4	2.2
PNO9	0.3	0.4	0.4	0.4	0.9	0.6	0.8	0.5	0.6	0.5
PNO11	19	22	16	13	10	8.4	10	8.8	9.9	8.6
PNO3	4.9	4.4	9.2	8.7	14	14	18	14	19	22
PNO7	6.8	6	6.3	6	6.5	7.6	5.9	6.6	5.7	7.5
PNO8	7	5.6	7.2	7.3	7	8.9	8.3	9.1	7.8	9.2
PNO13	0.5	0.5	0.5	0.7	0.5	0.8	0.5	0.6	0.4	0.7
PNO14	37	32	25	18	16	8.3	8.8	9.4	7.7	8.9
PNO12	0.8	1	0.9	1	1.1	0.9	0.8	0.6	0.5	0.5
PNO15	0.2	0.2	0.3	0.8	0.8	1.6	0.6	0.3	0.6	0.3
PNO17	0.9	1.2	2.3	3.2	3	3.1	4.2	4.6	3.7	3.5
PNO18	1.7	1.6	5.3	5.7	8.2	7.3	10	9.7	12	7.8
PNO10	1.5	2.5	3.6	5.7	2.4	5.9	3.9	5.8	4	5.6
PNO21	0.1	0.1	0.5	0.4	1.5	1	1.8	0.9	1.7	0.6
PNO16	0.9	0.8	1.9	2.9	3.2	4.2	3.3	4.4	4	3.7
PNO19	2.5	2.8	5.4	7.9	7.8	8.8	8.5	10	9.3	6.8
PNO20	1.1	0.9	1.8	2	2.6	1.8	2.9	2.7	3	1.8
PNO22	0.4	0.5	1	1.6	1.7	2.9	2.2	2.8	2.6	1.4

¹ Mean values of relative abundances are presented, *n* = 6 sows per group at a given time point. PNO, porcine milk *N*-glycan oligosaccharide.

Table S4. Relative abundance of the dominant OTUs from postnatal day 1 to 14 in the feces of piglets¹

	Yy1	Ym1	Mm1	My1	Yy3	Ym3	Mm3	My3	Yy7	Ym7	Mm7	My7	Yy14	Ym14	Mm14	My14
OTU2208(<i>Escherichia-Shigella</i>)	22	5.7	4.69	11.4	5.29	5.41	8.32	1.16	4.81	1.75	1.07	3.64	0.435	0.276	0.309	0.046
OTU985(<i>Clostridium perfringens</i> NCTC 8239)	13.1	18.4	18.3	12.9	3.35	6.66	4.68	4.92	0.487	3.08	1.32	0.904	1.4	0.413	0.171	0.107
OTU760(<i>Escherichia-Shigella</i>)	10.2	1.19	0.895	2.05	4.01	3.22	2.64	0.603	0.393	0.732	0.862	3	0.207	0.088	0.074	0.014
OTU2387(<i>Clostridium</i>)	7.03	9.84	11.7	8.2	2.25	4.8	3.11	3.56	0.355	2.1	0.982	0.62	0.853	0.22	0.126	0.065
OTU2693(<i>Peptostreptococcaeae</i>)	4.56	2.53	1.88	1.8	3.89	0.303	0.874	0.912	0.042	0.118	0.06	0.208	0	0.003	0.008	0
OTU3002(<i>Rhodococcus</i>)	3.93	0.062	0.215	0.546	0.012	0.047	0.083	0.025	0	0.012	0.003	0.003	0	0	0	0
OTU2767(<i>Escherichia-Shigella</i>)	2.38	0.608	0.362	0.957	1.19	1.89	1.81	0.25	0.391	0.326	0.256	0.957	0.129	0.046	0.049	0.016
OTU2484(<i>Fusobacterium mortiferum</i>)	2.01	5.68	11.4	7.04	0.704	0.413	0.876	1.08	0.261	1.23	0.496	0.142	2.09	0.95	0.876	1.31
OTU1926(<i>Lachnospiraceae bacterium</i>)	1.94	3.52	0.172	0.059	8.12	0.721	1.7	1.43	0.055	0.258	1.01	0.538	0.005	0.018	0.009	0.008
OTU2493(<i>Clostridiales</i>)	1.93	2.93	3.03	2.04	0.732	1.64	1.24	1.26	0.087	0.777	0.31	0.164	0.161	0.061	0.023	0.014
OTU260(<i>Escherichia-Shigella</i>)	1.92	0.76	0.58	1.22	0.716	0.88	1.28	0.195	0.922	0.221	0.193	0.621	0.036	0.027	0.038	0.002
OTU748(<i>Clostridiales</i>)	1.61	2.92	2.87	1.8	0.633	1.67	1.01	1.25	0.06	0.626	0.266	0.127	0.187	0.073	0.013	0.031
OTU2374(<i>Fusobacterium mortiferum</i>)	1.37	4.11	6.18	3.62	1.37	4.38	1.12	1.33	1.07	0.813	1.42	2.34	0.675	0.655	0.514	0.61
OTU879(<i>Lachnospiraceae</i>)	1.01	1.62	1.97	1.08	0.495	1.25	0.833	1.02	0.052	0.606	0.203	0.103	0.103	0.069	0.001	0.014
OTU382(<i>Clostridiales</i>)	0.948	1.07	1.57	1.14	0.326	0.809	0.494	0.558	0.038	0.359	0.194	0.123	0.203	0.045	0.02	0.017
OTU410(<i>Bacteroides vulgatus</i> ATCC 8482)	0.831	0.133	0.009	0	4.91	12.2	7.7	9.78	3.52	7.63	16.6	9.71	1.51	5.08	5.75	1.74
OTU838(<i>Enterococcus hirae</i> ATCC 9790)	0.822	0.305	0.588	3.81	0.596	0.205	0.543	0.201	0.012	0.054	0.049	0.074	0	0.027	0.024	0
OTU2923(<i>Ruminococcus gnavus</i>)	0.502	1.29	0.1	0.099	1.13	1.11	1.11	0.799	0.035	0.562	0.25	1.01	0.005	0.02	0.017	0
OTU26(<i>Fusobacterium</i>)	0.457	0	0.016	3.74	0.004	0.069	0.007	1.48	0	0	0.001	0	0.497	0.281	0.555	0.199

OTU322(<i>Streptococcus</i>)	0.281	0.589	1.53	2.63	0.4	0.049	0.307	0.321	0.012	0.068	0	0.081	0.001	0	0.001	0.002
OTU595(<i>Clostridium baratii</i>)	0.256	0.182	0.234	3.38	0.027	0.008	0.049	0.039	0	0.001	0	0	0	0	0	0
OTU1528(<i>Clostridium</i>)	0.142	0.297	0.344	0.167	1.58	1.41	0.615	0.652	0.056	0.232	0.232	0.427	0.007	0.037	0.008	0.014
OTU1615(<i>Clostridium</i>)	0.141	0.111	0.812	0.027	9.14	13.3	5.93	6.24	0.397	2.57	2.67	4.23	0	0.004	0.029	0
OTU1124(<i>Bacteroides</i>)	0.116	0.095	0.001	0	2.89	3.03	0.664	1.53	0.818	1.15	1.97	3.59	2.46	0.26	0.043	0.056
OTU606(<i>Streptococcus</i>)	0.082	1.28	1.11	1.72	0.775	0.322	0.984	0.053	0.38	0.026	0.109	0.3	0.35	0.1	0.039	0.045
OTU1689(<i>Bacteroides fragilis</i> NCTC 9343)	0.015	6.34	2.32	0.008	1.17	4.71	10.1	3.06	5.88	4.26	2.25	0.087	0.058	0.473	0.239	0.092
OTU967(<i>Fusobacterium</i> <i>varium</i>)	0.014	0.091	0.006	0	2.4	0.205	0.476	0.017	3.98	0.06	1.46	0.275	0.008	0.205	0.086	0.022
OTU2554(<i>Lactobacillus</i> <i>delbrueckii</i> subsp. <i>bulgaricus</i> 2038)	0.009	0.02	0.015	0.001	1.78	0.051	2.03	0.002	0.519	2.97	4.16	0.252	0	0.041	0.03	0.012
OTU1273(<i>Fusobacteriales</i>)	0.008	0	1.61	0.007	0.017	0.002	1.09	5.68	0.131	0.014	0.731	0.733	0.086	5.34	8.66	1.61
OTU742(<i>Bacteroides</i> <i>plebeius</i>)	0.005	0	0	0	4.11	0.034	0	0	0.001	0.01	0.047	0	0.015	0	0.006	0.466
OTU230(<i>Lactobacillus</i> <i>vaginalis</i>)	0.005	0	0	0	0.7	0.157	0	0.707	0.932	0.504	3.54	0.33	4.95	1.8	1.45	0.735
OTU2197(<i>Lactobacillus</i>)	0.004	0.259	0.011	0.004	0.762	0.071	0.292	6.02	0.366	0.095	0.518	0.102	0.07	0.029	0.049	0.002
OTU706(<i>Lactobacillus</i> <i>amylovorus</i>)	0.003	0.002	0.005	0	1.01	0.048	3.78	0.039	14.2	29.6	10.4	8.41	12.3	11.9	14.6	9.27
OTU2643(<i>Fusobacteriales</i>)	0.002	0.013	0.904	0.007	0.004	0.002	0.28	1.48	0.018	0.001	0.148	0.131	0.017	1.55	2.3	0.392
OTU2271(<i>Ruminococcaceae</i>)	0.002	0	0	0	0.018	0	0	0.018	1.08	0.165	0.77	0.963	1.43	0.963	2.04	0.661
OTU2913(<i>Fusobacteriales</i>)	0.001	0.001	0.199	0.001	0.213	0.017	0.379	1.99	0.07	0.003	0.14	0.134	0.023	2.1	3.81	0.487
OTU2074(<i>Prevotellaceae</i>)	0.001	0	0	0	0	0	0	0	0	0.018	0.013	0.346	0.474	0.119	0.563	9.68
OTU1863(<i>Clostridium</i> <i>lactatifermentans</i>)	0.001	0	0.01	0.005	0.293	2.18	2.11	0.743	0.691	2.64	0.69	0.607	0.051	0.623	0.118	0.182
OTU919(<i>Bacteroides</i> <i>massiliensis</i>)	0.001	0	0	0	0.004	0.002	0.009	3.6	0	0.001	0.239	4.62	0.019	0.297	0.527	0.183
OTU1444(<i>Ruminococcus</i>)	0.001	0	0.054	0.002	0.258	0.002	0.054	0.041	1.49	0.527	0.413	0.346	2.93	2.17	0.723	0.296

OTU1482(<i>Alistipes</i>)	0	0	0	0	0.001	0.003	0.001	0.002	3.17	1.26	0.486	5.81	0.429	5.98	4.98	3.16
OTU1733(<i>Bacteroides fluxus</i>)	0	0.005	0	0	0.174	0.052	0.16	0.043	0.462	0.403	2.6	6.42	0.662	0.451	0.455	0.212
OTU2703(<i>Rikenellaceae</i>)	0	0	0	0	0	0	0	0	0	0.001	0.005	0	3.24	0.021	2.57	6.46
OTU375(<i>Erysipelotrichaceae</i>)	0	0	0	0	0	0	0	0	0	0	0	0	1.92	0.028	0.329	8.22
OTU2205(<i>Lachnospiraceae</i>)	0	0.137	0.007	0.001	0.875	0.37	1.02	2.58	5.74	0.607	2.4	2.54	0	1.16	0.108	0.08
OTU110(<i>Prevotella</i> sp. DJF LS16)	0	0	0	0	0	0	0	0	0.005	0	0.012	0	3.02	1.3	1.01	3.31
OTU1428(<i>Roseburia</i>)	0	0	0.001	0	0.004	0	0.002	0	0.009	0	0	0.017	0.052	4.14	0.077	0.047
OTU588(<i>Ruminococcaceae</i>)	0	0	0	0	0	0	0	0.001	0.955	0.159	0.187	0.004	2.58	1.05	2.44	0.505
OTU2569(<i>Bacteroides fragilis</i>)	0	0.033	0.009	0	0.003	0.014	0.017	0.087	0.621	1.91	0.412	1.76	0.002	0.458	0.072	0.044
OTU130(<i>Lactobacillus</i>)	0	0	0	0	0.097	0	0.384	0.004	1	1.82	0.707	0.539	0.592	0.98	1.09	0.671
OTU819(<i>Lachnospiraceae</i>)	0	0	0	0.005	0.002	0	0	0	0.23	0.001	0	0	2.12	1.21	0.361	1.07
OTU1114(<i>Bacteroidales</i>)	0	0	0	0	0	0	0	0	0.617	0.128	0.86	0.046	4.3	0.086	1.23	1.11
OTU46(<i>Prevotella</i>)	0	0	0	0.001	0.102	0	0	0	3.38	0.006	0.028	1.33	0.241	0.098	0.068	0.282
OTU1380(<i>Bacteroides uniformis</i>)	0	0.002	0	0	0.11	0.065	0.208	0.076	2.72	0.335	0.2	0.767	0.231	0.663	0.346	0.057
OTU1884(<i>Bacteroides thetaiotaomicron</i> VPI-5482)	0	0.011	0.003	0	0.616	0.088	0.082	0.01	3.52	0.171	0.098	0.375	0.043	0.382	0.097	0.122

¹ Mean values of relative abundances are presented, $n = 6$ piglets per group at a given time point. OTU, operational taxonomic unit; Yy, Yorkshire piglets fostered by their biological mother; Ym, Meishan piglets fostered by Yorkshire sows; Mm, Meishan piglets fostered by their biological mother; My, Yorkshire piglets fostered by Meishan sows.

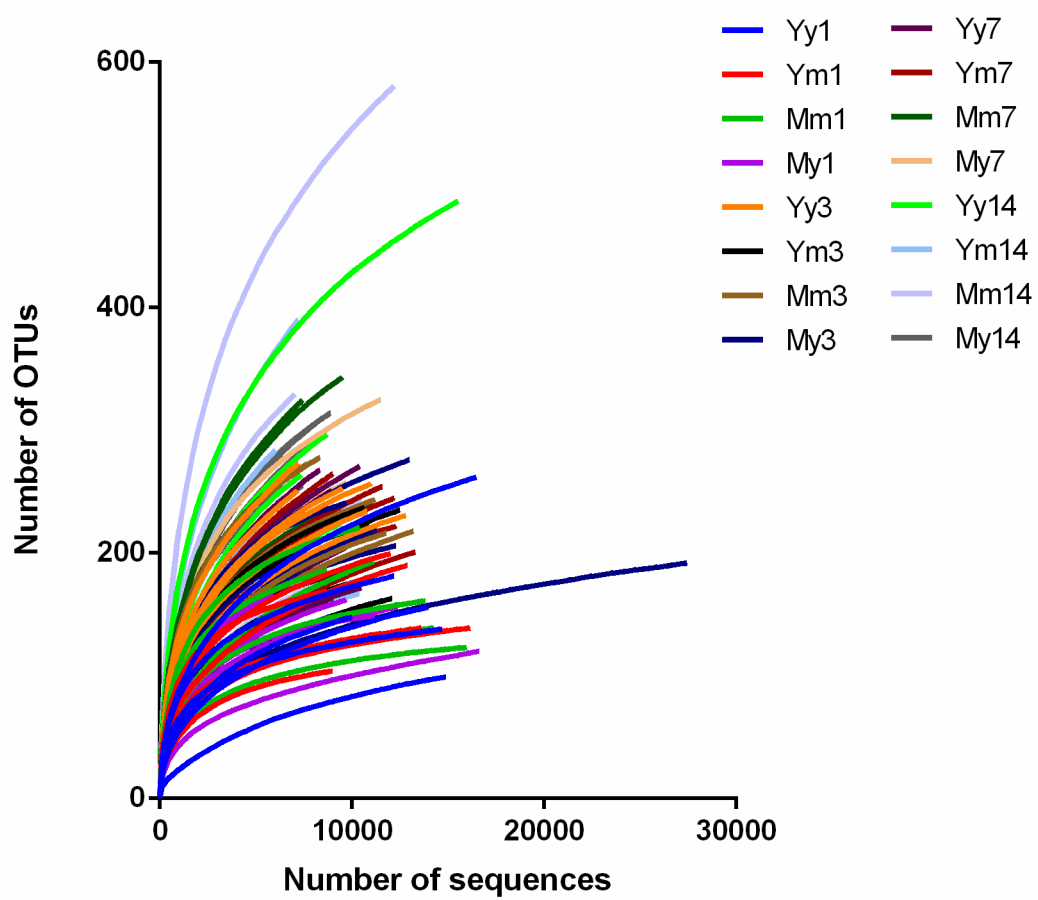


Figure S1. Rarefaction curve of all the samples used.

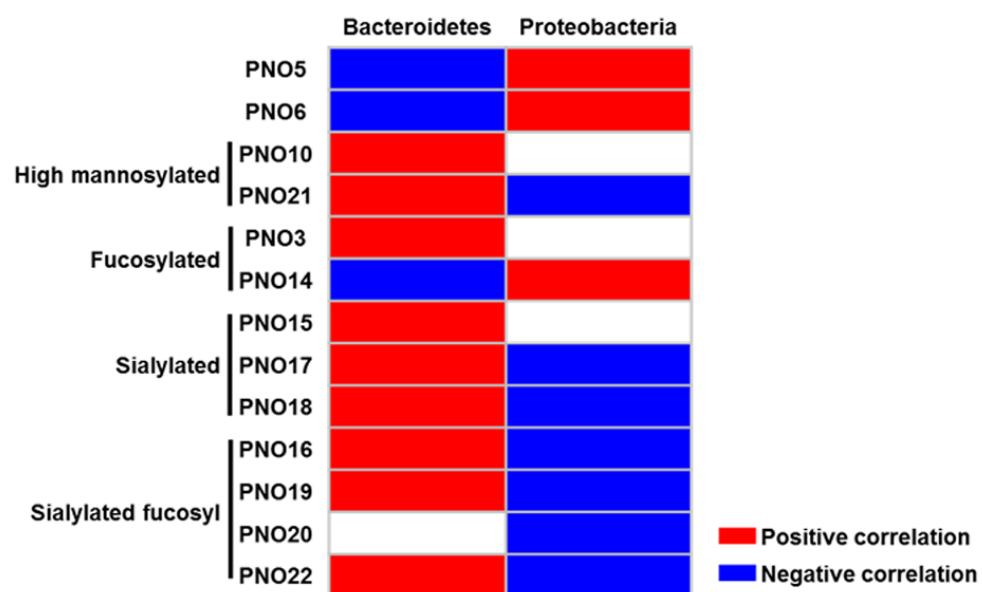


Figure S2. Correlations between sow milk N-glycans with bacteria at phylum levels.

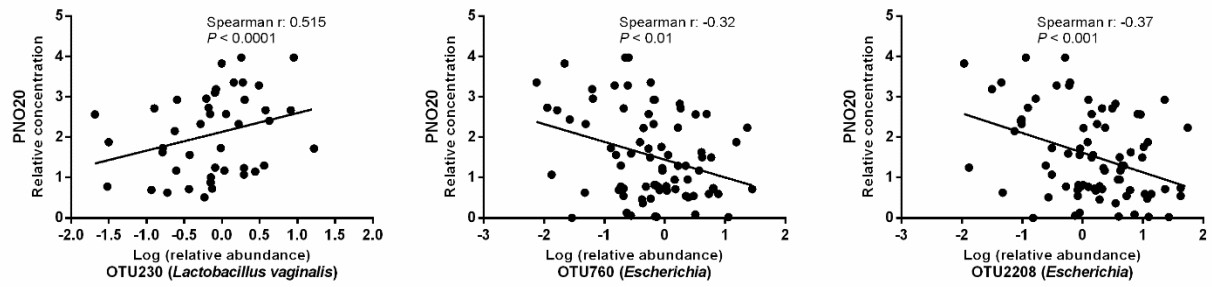


Figure S3. Correlations between PNO20 and gut bacteria.