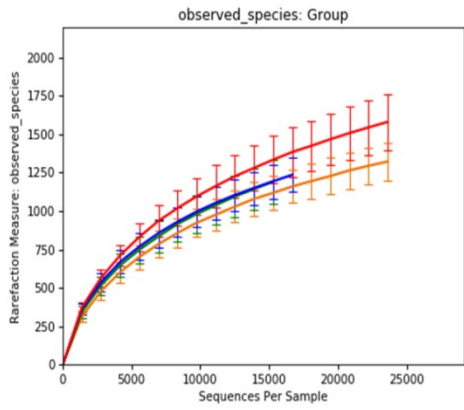
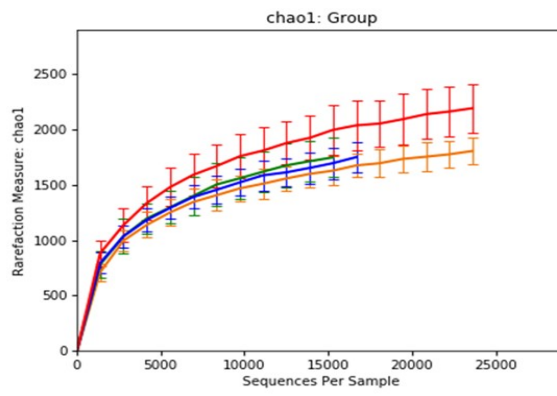


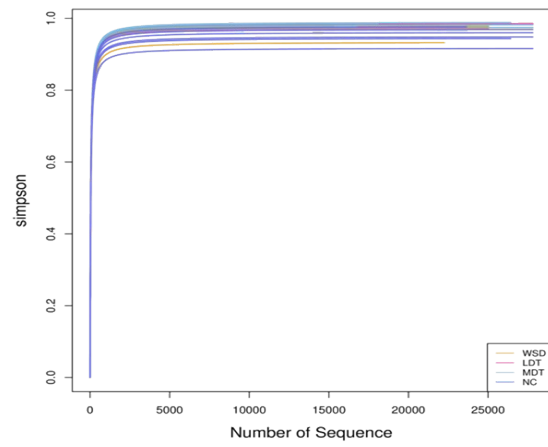
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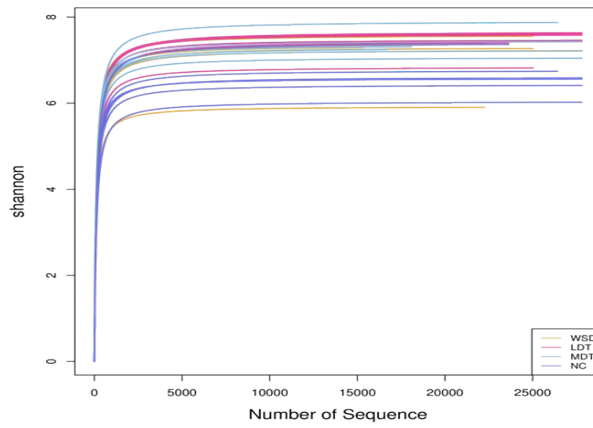
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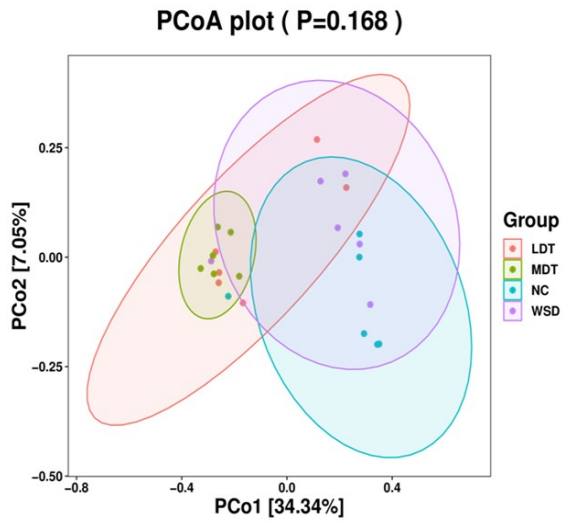
c



d



e



f

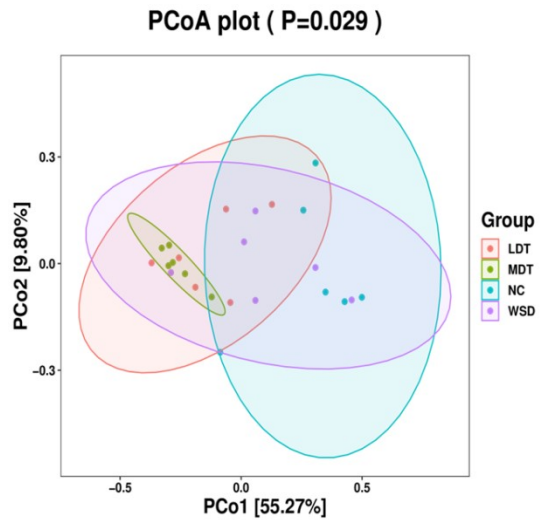


Figure S1: Diversity and richness of bacterial taxa after 28 days of formononetin treatment in groups WSD,NC,MDT,LDT DIO mice model male and female **(a)** Indicates refraction measures OTU **(b)** Chao 1 measure **(c)** Simpson index of each group **(d)** Shanon index of each group **(e-f)** PCoA plot based on unweight and weight plots respectively.

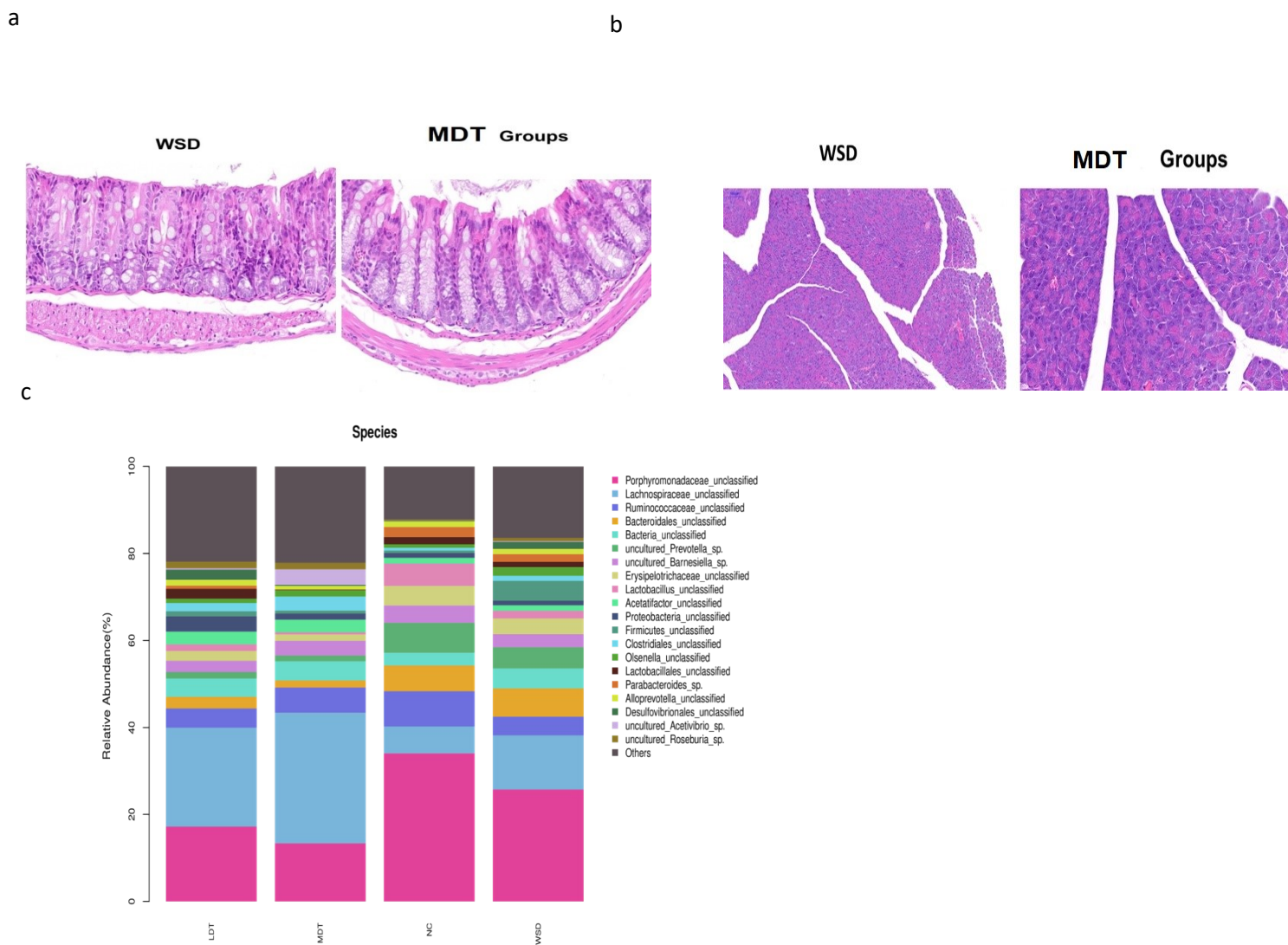


Figure S2: H&E staining of caecum and pancreatic tissues **(a)** Illustrative H&E sections of the caecum tissues in male and female mice. WSD control group indicate colon atrophy, inflammation and goblet cell reduction, MDT indicating increase goblet cell number and reduced epithelia damage, **(b)** Pancreatic tissue MDT significantly improved acinic cells and enhanced growth of Langerhans cells and reduced the damage while WSD feed pancreas displayed atrophy of acini of exocrine pancreas and degeneration of Islet of Langerhans **(c)** Relative abundance of gut microbiota at specie level bar chart showing bacterial community abundance between WSD,NC,MDT and LDT.

Table S1: Composition of the Western style diet

Formula	g/kg
Casein	236.0
DL-Methionine	3.54
Sucrose	182.62
Corn Starch	160.
Maltodextrin	120.0
Vegetable Shortening, hydrogenated (Primex)	100.0
Beef Tallow	100.0
Cellulose	40.0
Calcium Phosphate, dibasic	4.72
Vitamin Mix, Teklad (40060)	11.8
Mineral mix AIN-93G-MX (94046)	41.3
Ethoxyquin, antioxidant	0.02

Table S2: miRNA Primers used for the real-time PCR

miRNA	Primers
Mmu-miR 200a-F	GCGTCCTAACACTGTCTGGT
Mmu-miR- 122-F	GGCTGTGGAGTGTGACAATG
Mmu-miR- 29b-F	GCCGTTAGCACCATTGAAATC
Mmu-miR- 146a -F	GCCGCCCTGTGAAATTCAGTT
Mmu-miR- 200C-F	TAATACTTGCCGGCTAATGGTAATGATGA
Mmu-miR-21-F	GCCCGCTAGCTTATCAGACTGATG
Mmu-miR-7b-F	GCCGCTGAGGTAGGTTGTGT
Mmu-miR-7d -F	GCCGCAGAGGTAGTAGGTTGC
Mmu-miR-7e-F	TGCCGGTGAGGTAGGAGG
Mmu-miR666-3P-F	GGACGGTAGCAAGCAAAGAGTGTG
mmu-miR-let-7a--F	GCCGCTGAGGTAGTAGGTTGT
Mmu-miR-182-F	TTTGGCAATGGTAGAACTCA
Mmu-miR-181A-6P-F	AACATTCAACGCTGTCGGTGAGT

Table S3: mRNA primers used for qPCR

Gene	Primer
Occludin	Forward 5'-AGTACATGGCTGCTGATG -3' Reverse 5'-CCCACCATCCTCTTGATGTGT -3'
IL-6	Forward 5'- GTTGCCTTCTGGGACTGATGT-3' Reverse 5'-TCTGTTGTGGGTGGTATCCTCTG -3'
GAPDH	Forward 5'-CACCCACTCCTCCACCTTTGA-3' Reverse 5'-TCTCTCTCCTCTTGTGCTCTTGC -3'
IL-22	5'-CACTTATCAACTGTTGACAC-3' 5'-GTTTTCTAGCTTCTTCTC-GC-3'
MUC-2	Forward 5'-CACTGCGATGCCAACGACA -3' Reverse 5'-GCCACTAACTGCTTGTTACCTGTA -3'
TNF α -F	Forward 5'-GCTCAGAGCTTTCAACAAC-3' Reverse 5'-AAGGTCTGAAGGTAGGAAGG-3'