Materials and Methods

Table S1. Primer Information

Reference	Primer	Primer sequence（5'-3'）	Product length（bp）	Tm（℃）
XM_021099593.1	Sus scrofa-BCL2-S	AGGATTGTGGCCTTCTTTGAGT	215.00	60.00
	Sus scrofa-BCL2-A	AGAGACAGCCAGGAGAAATCAAA		
NM_001206359.1	Sus scrofa-gapdh-S	GACATCAAGAAGGTGGTGAAGCA	177.00	60.00
	Sus scrofa-gapdh-A	GTCGTACCAGGAAATGAGCTTGA		
XM_003127290.5	Sus scrofa-BAX-S	AATGGGGGGAGAGACACCTG	263.00	60.00
	Sus scrofa-BAX-A	GGGCCTTGAGCACCAGTTTA		
NM_001244539.1	Sus scrofa-CLAUDIN-1-S	GGAAGATTTACTCCTACGCTGGTG	141.00	60.00
	Sus scrofa-CLAUDIN-1-A	AAGTGGTGTTCAGATTCAGCAAGG		
NM_001163647.2	Sus scrofa-OCCLUDIN-S	TCCACCCATCACTTCAGATCAAC	189.00	60.00
	Sus scrofa-OCCLUDIN-A	CTATTGTATTCATCAGCAGCAGCC		
XM_021098856.1	Sus scrofa-ZO1-S	GTGCCTAAAGCTGTTCCTGTGAG	228.00	60.00
	Sus scrofa-ZO1-A	TAAAGGTGGGAGGATGCTGTTGT		
NM_214131.1	Sus scrofa-CASP3-S	GGAAGCAAATCAATGGACTCTGG	271.00	60.00
	Sus scrofa-CASP3-A	TGCTCCTTTTGCTATGGTCTTCT		
XM_013998997.2	Sus scrofa-casp9-S	GTGGACATTGGTTCTGGAGGATT	137.00	60.00
	Sus scrofa-casp9-A	TCATGGCAGAAGTTCACGTTGTT		
NM_001291925.1	Sus scrofa-PCNA-S	CTGCAAGTGGAGAACTCGGAA	163.00	60.00
	Sus scrofa-PCNA-A	GTAGGAGAGAGTGGAGTGGCT		
XM_021073740.1	Sus scrofa-KI67-S	CCGTCCCAAGGTCACTGAAGA	252.00	60.00
	Sus scrofa-KI67-A	AGACCCTGCATCGAGGACAAA		
NM_007393.3	Mus musculus-β-actin-S	GTGACGTTGACATCCGTAAAGA	287.00	60.00
	Mus musculus-β-actin-A	GTAACAGTCCGCCTAGAAGCAC		
NM_174985.1	Mus musculus-TGR5-S	CTCATCGTCATCGCCAACC	224.00	60.00
	Mus musculus-TGR5-A	GCAAGCAGGGAAAGGAAACAA		
NM_001163504.1	Mus musculus-FXR-S	ACGGCAGACCAACAGACCCT	242.00	60.00
	Mus musculus-FXR-A	TCCACTGCGGACCCTTTGA		
NM_001278601.1	Mus musculus-TNFα-S	CCCTCACACTCACAAACCACC	93.00	60.00

	Mus musculus-TNFα-A	CTTTGAGATCCATGCCGTTG		
NM_007527.3	Mus musculus-Bax-S	TTGCTACAGGGTTTCATCCAGG	275.00	60.00
	Mus musculus-Bax-A	GCAAAGTAGAAGAGGGCAACCA		
NM_009741.5	Mus musculus-Bcl2-S	GTTTGATTTCTCCTGGCTGTCTC	92.00	60.00
	Mus musculus-Bcl2-A	ACTTGTGGCCCAGGTATGCA		
NM_016674.4	Mus musculus-claudin1-S	ATGTGGATGGCTGTCATTGGG	215.00	60.00
	Mus musculus-claudin1-A	GGACAGGAGCAGGAAAGTAGGA		
NM_001360536.1	Mus musculus-occludin-S	ATAATGGGAGTGAACCCGACG	239.00	60.00
	Mus musculus-occludin-A	CGATCCATCTTTCTTCGGGTTT		
NM_009386.2	Mus musculus-ZO1-S	GGGAAAACCCGAAACTGATG	103.00	60.00
	Mus musculus-ZO1-A	GCTGTACTGTGAGGGCAACG		

Western Blotting

The cells were washed 2-3 times with PBS and then treated with an appropriate volume of RIPA lysis buffer (containing PMSF and phosphatase inhibitors) for 3-5 minutes. The cells were scraped off with a cell scraper and transferred to a 1.5 mL centrifuge tube. The cells were lysed on ice for 30 minutes, followed by centrifugation at 12,000 rpm for 10 minutes at 4°C. The protein concentration was determined using a BCA protein assay kit, following the instructions provided with the kit. The protein solution was mixed with 5× Loading Buffer at a 4:1 ratio, denatured at 95°C for 5 minutes, and stored at -20°C. Subsequently, SDS-PAGE and transfer were performed, and the transferred membrane was blocked at room temperature for 30 minutes. After blocking, the primary antibody (Bcl2 [R23309], BAX [R22708], β-actin [T200068-8F10]) was added and incubated overnight at 4°C with shaking. The membrane was washed three times with TBST for 5 minutes each time. The secondary antibody (sheep anti-rabbit [511203] and goat anti-mouse [511103]) was diluted 1:5000 in TBST and added to the incubation chamber, followed

by incubation at room temperature for 30 minutes. The membrane was then washed three times with TBST for 5 minutes each time. ECL A and B solutions were mixed in a 1:1 ratio and used for chemiluminescent detection. The membrane was placed in a chemiluminescent imager, and the chemiluminescent signal was captured. The original image was saved in TIFF format. The antibodies were purchased from Zenbio (Chengdu, China).

Figures

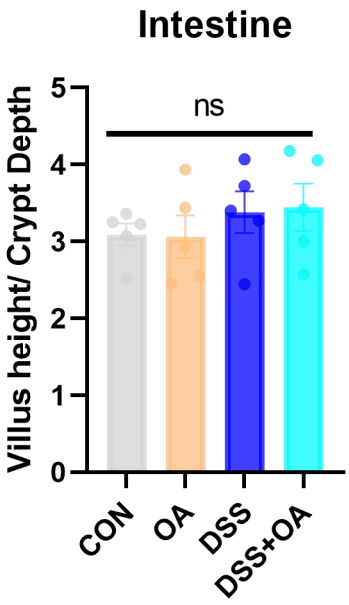

Figure S1. The effect of oleanolic acid (OA) on the ratio of villus height to crypt depth.

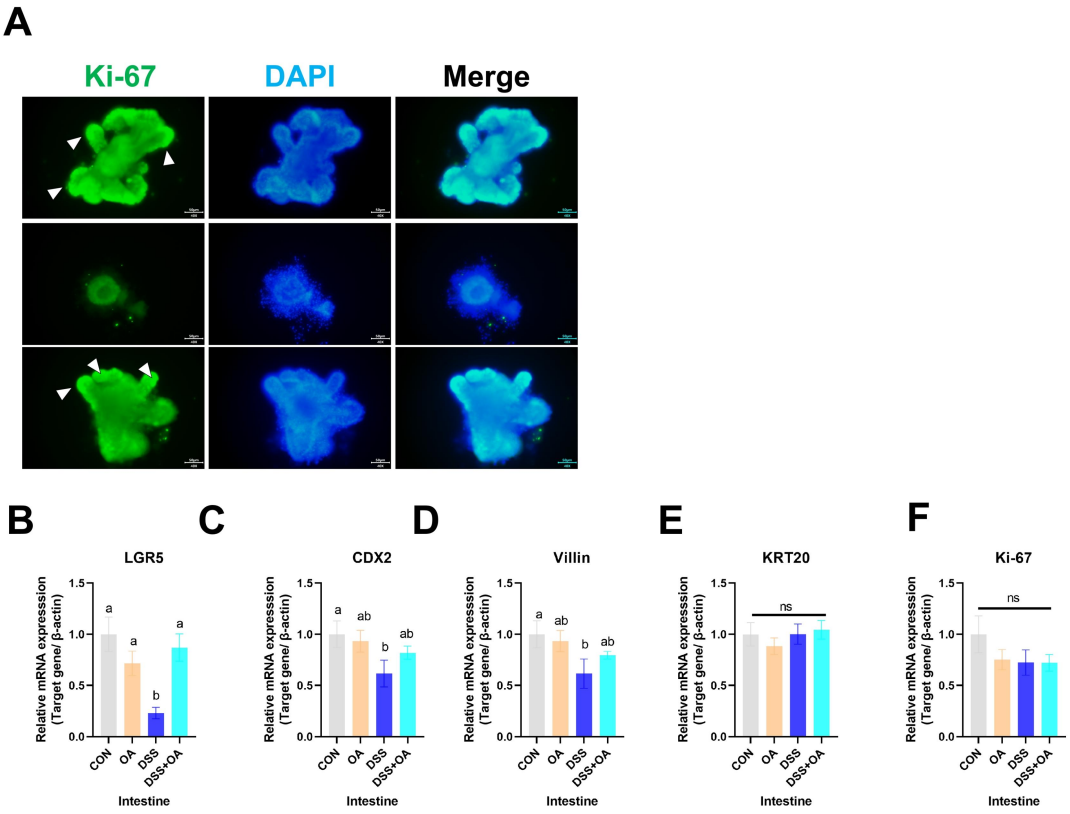

Figure S2. The effect of oleanolic acid (OA) on the organoid formation and expression of functional cell marker genes in the intestine of mice with enteritis. Lgr5: leucine-rich repeat- containing G protein-coupled receptor 5, CDX2:Caudal Type Homeobox 2， KRT-20:Keratin 20.

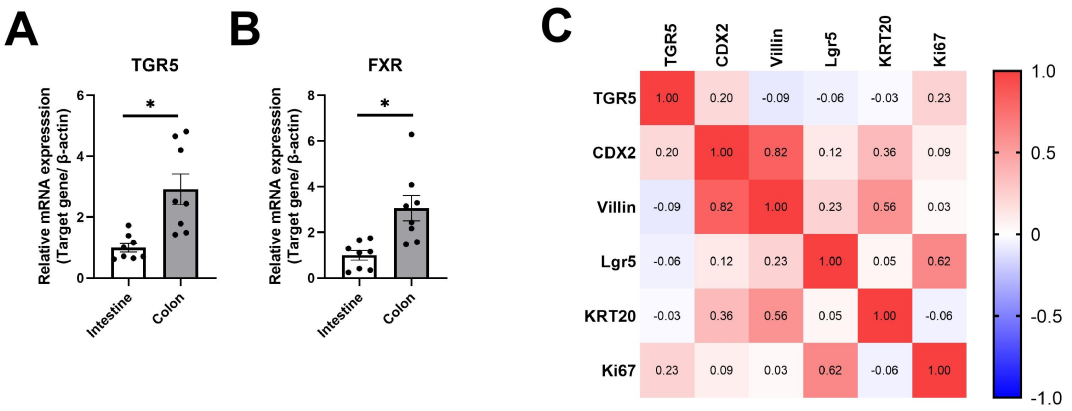

Figure S3. Expression levels of bile acid receptors in the small intestine and colon and their correlation with the expression of functional cell marker genes. (A-B) Gene expression levels of TGR5 and FXR. (C) Pearson correlation analysis of TGR5 with Lgr5, villin, and other marker gene expression levels.

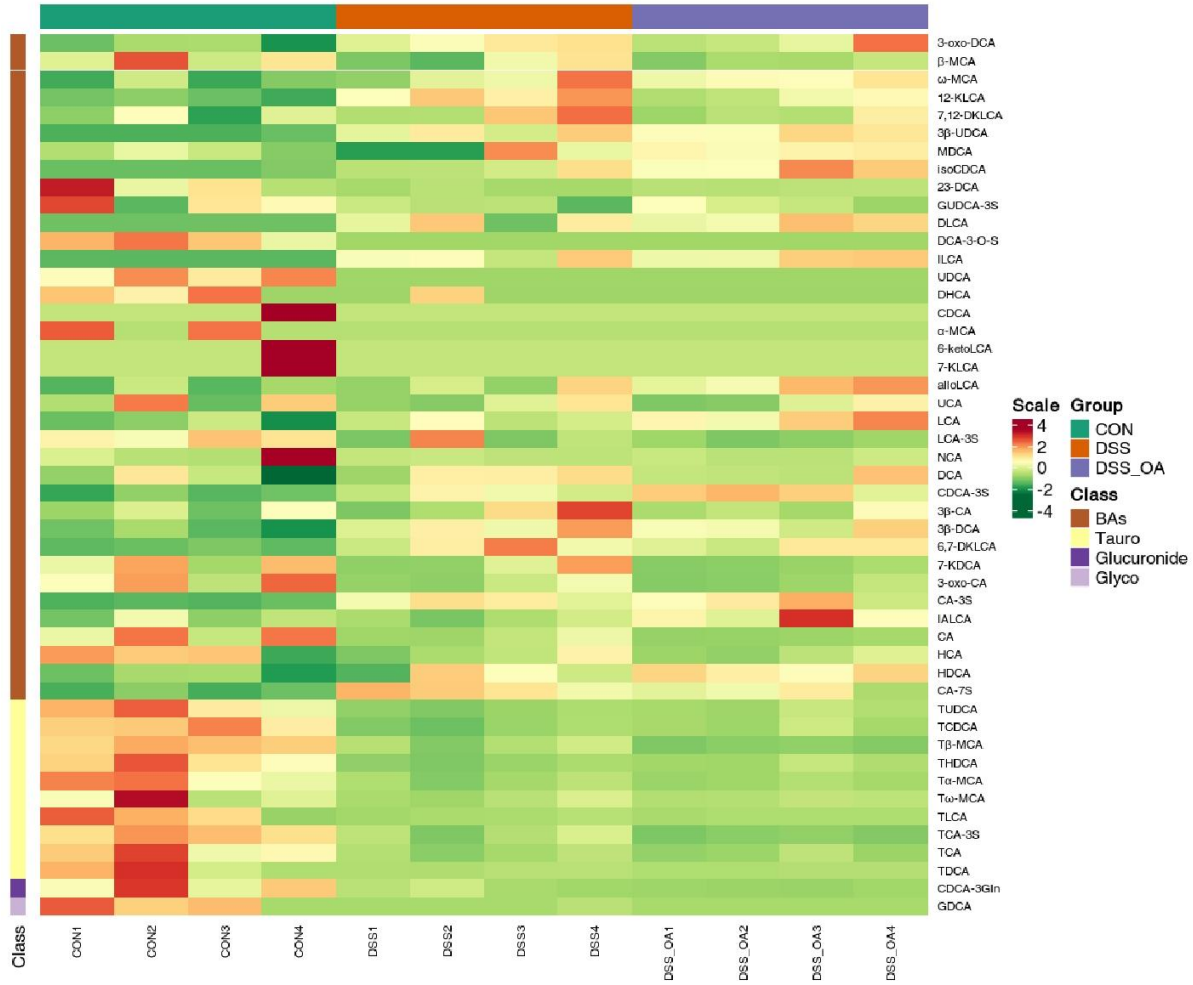

Figure S4: Heatmap illustrating the levels of bile acids in the intestinal contents across different groups.

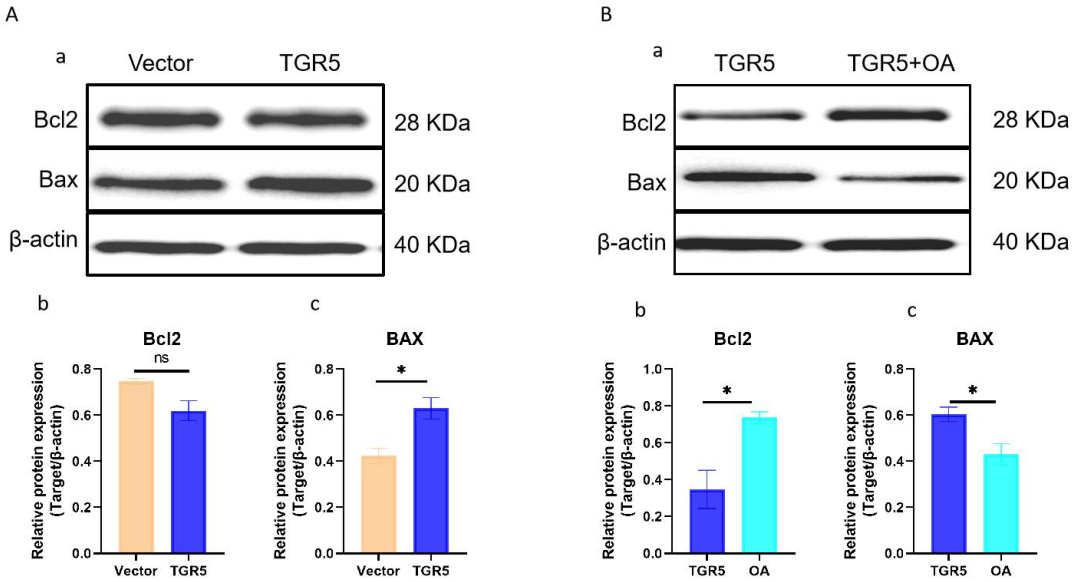

Figure S5. The effect of TGR5 overexpression and OA treatment on the expression abundance of key apoptotic proteins in IPEC-J2 cells. (A) Overexpression of TGR5 upregulates the expression of BAX, but has no significant effect on the protein expression of Bcl2. (B) OA treatment significantly upregulated the protein expression of Bcl2 and downregulated the protein expression of BAX in cells overexpressing TGR5.

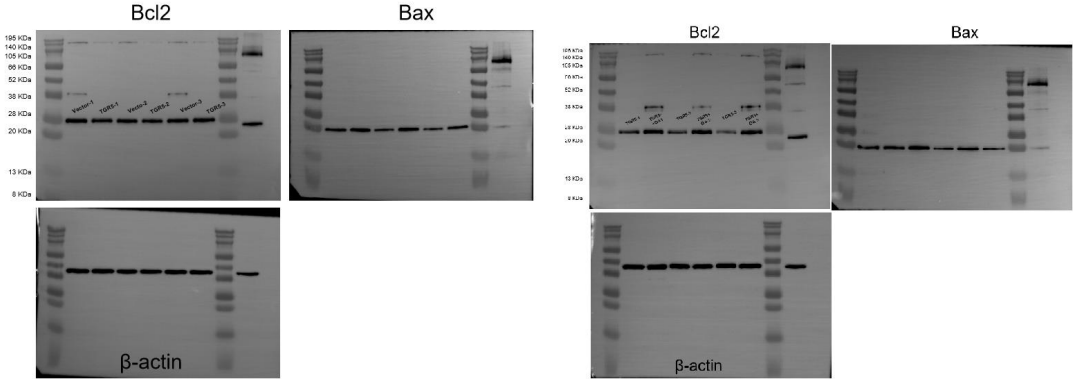

Figure S6. The original picture of protein expression detected by Western blot.