Supplementary Table 1: Diet Formulation

Ingredients	Control Diet (AIN-93M)	TC Diet (10%)	FOS Diet (10%)
	(g/kg diet)	(g/kg diet)	(g/kg diet)
TC[1] or FOS	0.0	100.0	100.0
Carbohydrates			
Cornstarch (g)	465.7	383.6	365.7
Maltodextrin (g)	155.0	155.0	155.0
Sucrose (g)	100.0	100.0	100.0
TC (g)	0.0	82.1	
Protein			
Casein (g)	140.0	133.5	140.0
TC (g)	0.0	6.5	
Fat			
Soybean oil (g)	40.0	39.4	40.0
TC (g)	0.0	0.59	
Fiber			
Cellulose(g)	50.0	48.1	50.0
TC (g)	0.0	1.92	
Vitamin mix	10.0	10.0	10.0
Mineral			
Mineral mix[2]	13.4	13.4	13.4
Calcium Carbonate (40.04% Ca)	12.5	12.3	12.5
Sodium Phosphate, monobasic (25.81 % P)	5.6	5.5	5.6
Potassium Phosphate, monobasic (22.76% P)	2.4	2.4	2.4
Sucrose	1.1	1.3	1.1
Choline Bitartrate	2.5	2.5	2.5
L-cysteine	1.8	1.8	1.8

[1]TC (tart cherry) analysis performed by NP Analytical Laboratories (St Louis, MO).[2] Calcium and phosphorus deficient mineral mix (TD 98057 Envigo Laboratories) was used so that calcium and phosphorus could be adjusted for the TC diet.

Supplementary Table 2: Primer Sequence List for qRT-PCRs

Symbol	Name	Sequence
Bmp2	Bone morphogenetic protein 2	QF 5'- GGACATCCGCTCCACAAA -3' QR 5'- GGCGCTTCCGCTGTTT-3'
Bsp	Bone sialoprotein	QF 5'- ACACCCCAAGCACAGACTTTTG -3' QR 5'- TCCTCGTCGCTTTCCTTCACT -3'
Ccr7	C-C Motif Chemokine Receptor 7	QF 5'- GGTGGCTCTCCTTGTCATTTTC -3' QR 5'- GTGGTATTCTCGCCGATGTAGTC -3'
Col1α1	Type I collagen called the pro-α 1	QF 5'- CGTCTGGTTTGGAGAGAGCAT -3' QR 5'- GGTCAGCTGGATAGCGACATC -3'
Cx43	Connexin 43	QF 5'- ACAGCGGTTGAGTCAGCTTG-3' QR 5'- GAGAGATGGGGAAGGACTTGT-3'
Cxc12	C-X-C Motif Chemokine Ligand 12	QF 5'- CAAGCATCTGAAAATCCTCAACAC -3' QR 5'- TCTTCAGCCGTGCAACAATC -3'
Cxcl10	C-X-C Motif Chemokine Ligand 10	QF 5'- AGTGCTGCCGTCATTTTCTG -3' QR 5'- ATTCTCACTGGCCCGTCAT-3'
Cxcr4	C-X-C Motif Chemokine Receptor 4	QF 5'- TCAGTGGCTGACCTCCTCTT -3' QR 5'- CTTGGCCTTTGACTGTTGGT-3'
Dmp-1	Dentin matrix acidic phospho protein 1	QF 5'- CTGTCATTCTCCTTGTGTTCCT -3' QR 5'- CAAATCACCCGTCCTCTCTTC -3'
Gapdh	Glucose 6 phosphate dehydrogenase	QF 5'- GAACGCAAAGCTGAAGTGAGACT -3' QR 5'- TCATTACGCTTGCACTGTTGGT - 3'
Gpr41	G protein-coupled receptor 41	QF 5'-TCCTGGCATCGGCTCACT -3' QR 5'- TGTAGGTTGCATTTCCCCAGTA -3'
Gpr43	G protein-coupled receptor 43	QF 5'- TTCCCATGGCAGTCACCAT -3' QR 5'- GGGCTGCGTGAGCATGAT -3'
Gpr109a	G protein-coupled receptor 109a	QF 5'- TCGAAAGAAAACATTGGGTGAA -3' QR 5'- CCCCGTGAGCTCCACACT-3'
Hprt1	Hypoxanthine-guanine phosphoribosyl transferase	QF 5'- GCCTAAGATGAGCGCAAGTTG -3' QR 5'- TACTAGGCAGATGGCCACAGG - 3'
Il6	Interleukin 6	QF 5'- GAGGATACCACTCCCAACAGACC -3' QR 5'- AAGTGCATCATCGTTGTTCATACA -3'
Il10	Interleukin 10	QF 5'- GGTTGCCAAGCCTTATCGGA -3' QR 5'- ACCTGCTCCACTGCCTTGCT -3'
Il17	Interleukin 17	QF 5'- ATCCCTCAAAGCTCAGCGTGTC -3' QR 5'- GGGTCTTCATTGCGGTGGAGAG-3'
Il22	Interleukin 22	QF 5'- TGCCTTTCCTGACCAAACTCA -3' QR 5'- CTGGTCGTCACCGCTGATG -3'
Il23	Interleukin 23	QF 5'- CGCCAAGGTCTGGCTTTTTAT -3' QR 5'- CAGGCTCCCCTTTGAAGATG -3'
Mepe	Matrix extracellular phospho glycoprotein	QF 5'- CCCCAAGAGCAGCAAAGGTA -3' QR 5'- CTCCGCTGTGACATCCCTTTA -3'
Ocn (Bglap2)	Osteocalcin (Bone gamma-carboxyglutamate protein 2	QF 5'- TGAGCTTAACCCTGCTTGTGACGA -3' QR 5'- AGGGCAGCACAGGTCCTAAATAGT -3'
Opg	Osteoprotegerin	QF 5'- TCCCGAGGACCACAATGAAC -3' QR 5'- TGGGTTGTCCATTCAATGATGT -3'
Opn	Osteopontin	QF 5'- ACTCCAATCGTCCCTACAGTCG -3' QR 5'- TGAGGTCCTCATCTGTGGCAT -3'
Osx	Osterix	QF 5'- GAAGTTCACCTGCCTGCTCTGT -3' QR 5'- CGTGGGTGCGCTGATGT -3'
Phex	Phosphate regulating endopeptidase X linked	QF 5'- GGCATGACTGCTGTAAGATCAGAT -3' QR 5'- AGCTCCATTGACATAAGGCACT -3'

Rankl	Receptor activator of nuclear factor kappa-B ligand	QF 5'- TCTGCAGCATCGCTCTGTTC -3' QR 5'- AGCAGTGAGTGCTGTCTTCTGATATT- 3'
Runx2	Runt-related transcription factor 2	QF 5'- CGACAGTCCCAACTTCCTGT-3' QR 5'- CGGTAACCACAGTCCCATCT -3'
Sost	Sclerostin	QF 5'- ACCGGGCGGAGAATGG -3' QR 5'- GCTGTACTCGGACACATCTTTGG -3'
Tgfβ	Transforming growth factor beta	QF 5'- CCCTATATTTGGAGCCTGGA -3' QR 5'- CTTGCGACCCACGTAGTAGA -3'
Tnfα	Tumor necrosis factor alpha	QF 5'- CTGAGGTCAATCTGCCCAAGTAC -3' QR 5'- CTTCACAGAGCAATGACTCCAAAG-3'
Vcam1	Vascular Cell Adhesion Molecule 1	QF 5'- TGAACCCAAACAGAGGCAGAGT -3' QR 5'- GGTATCCCATCACTTGAGCAGG -3'
Wnt10b	Wingless-type MMTV integration site family, member 10b	QF 5'- ATGCGGATCCACAACAACAG-3' QR 5'- TTCCATGGCATTTGCACTTC- 3'

Supplementary Table 3: Additional Trabecular and Cortical Bone Microarchitectural Parameters of the Lumbar Vertebra and Tibia

	Con		TC		FOS		*P-values*		
	- CD25	**+ CD25**	**- CD25**	**+ CD25**	**- CD25**	**+ CD25**	**CD25**	**Diet**	**CD25*Diet**
Vertebra Trabecular Bone									
TbN ($1/mm^2$)	4.18 ± 0.07	4.29 ± 0.10	4.20 ± 0.08	4.46 ± 0.01	5.00 ± 0.07$^{\#\$}$	4.97 ± 0.11$^{\#\$}$	0.1238	**<0.0001**	0.2547
TbTh (µm)	51.58 ± 0.79	51.55 ± 1.04	49.36 ± 0.57$^{\#}$	49.95 ± 0.89$^{\#}$	55.08 ± 0.37$^{\#\$}$	54.88 ± 0.91$^{\#\$}$	0.8579	**<0.0001**	0.8764
TbSp (µm)	238.00 ± 4.35	230.38 ± 6.45	232.86 ± 4.47	222.88 ± 5.30	196.13 ± 3.44$^{\#\$}$	198.63 ± 5.68$^{\#\$}$	0.2317	**<0.0001**	0.2317
ConnDens ($1/mm^3$)	160.48 ± 7.66	164.89 ± 7.40	158.07 ± 5.37	187.15 ± 7.30	240.54 ± 9.97$^{\#\$}$	241.51 ± 14.92$^{\#\$}$	0.1026	**<0.0001**	0.1414
SMI	1.28 ± 0.07	1.36 ± 0.06	1.46 ± 0.02$^{\#}$	1.46 ± 0.07$^{\#}$	0.73 ± 0.04$^{\#\$}$	0.70 ± 0.09$^{\#\$}$	0.8116	**<0.0001**	0.5710
Tibia Trabecular Bone									
TbN ($1/mm^2$)	3.84 ± 0.08	3.79 ± 0.13	3.76 ± 0.10	3.64 ± 0.09	4.39 ± 0.10$^{\#\$}$	4.51 ± 0.08$^{\#\$}$	0.8119	**<0.0001**	0.4473
TbTh (µm)	47.22 ± 0.68	45.19 ± 0.89	45.74 ± 1.31	45.40 ± 1.10	47.69 ± 0.64$^{\$}$	48.18 ± 0.65$^{\$}$	0.3937	**0.0330**	0.3581
TbSp (µm)	255.43 ± 5.00	259.94 ± 9.18	261.88 ± 7.07	270.14 ± 6.88	219.78 ± 5.54$^{\#\$}$	212.53 ± 3.98$^{\#\$}$	0.7301	**<0.0001**	0.4665
ConnDens ($1/mm^3$)	81.73 ± 4.69	78.67 ± 7.40	93.10 ± 9.34	81.66 ± 6.02	145.96 ± 12.34$^{\#\$}$	154.87 ± 7.22$^{\#\$}$	0.5925	**<0.0001**	0.4719
SMI	2.14 ± 0.10	2.17 ± 0.06	1.99 ± 0.09$^{\#}$	1.97 ± 0.04$^{\#}$	1.83 ± 0.08$^{\#\$}$	1.80 ± 0.04$^{\#\$}$	0.8420	**0.0001**	0.9173
Tibia Cortical Bone									
MedullaryArea (μm^2)	28.1 ± 0.60	27.90 ± 0.80	27.7 ± 0.60	27.60 ± 1.10	30.9 ± 0.70$^{\#\$}$	29.10 ± 0.70$^{\#\$}$	0.3417	**0.0076**	0.4884
Porosity (%)	3.88 ± 0.06	3.93 ± 0.11	3.93 ± 0.04	3.77 ± 0.12	4.1 ± 0.10	4.07 ± 0.13	0.2124	0.0809	0.7615

Control diet = Con; Tart cherry diet = TC; Fructooligosaccharide diet = FOS; Isotype control antibody = - CD25; CD25 antibody = +CD25.
Data presented as mean ± SE. n=8 mice/group. When only main effects of diet were detected, # indicates differences between TC or FOS diets vs. Con diet (*P<0.05)*.$ indicated differences between TC vs. FOS diet groups (P<0.05).

Supplementary Table 4: T- Lymphocyte Absolute Counts in Ileum and Bone Marrow

	Con		TC		FOS		*P-values*		
	- CD25	**+ CD25**	**- CD25**	**+ CD25**	**- CD25**	**+ CD25**	**CD25**	**Diet**	**CD25*Diet**
Ileum T-Lymphocytes									
$CD3^+CD4^+$ (1 $x10^3$)	15.43 ± 3.42	27.00 ± 6.12	18.90 ± 3.32	18.17 ± 2.56	10.77 ± 1.27	14.84 ± 2.82	0.0743	0.1048	0.4038
Treg ($CD4^+CD25^+Foxp3^+$)	431 ±102.31^{b}	55 ±12^{c}	821 ± 129^{a}	23 ± 7.01^{d}	457 ± 53^{ab}	26 ± 4.01^{cd}	**<0.0001**	0.8014	**0.0030**
Th-17 ($CD4^+IL\text{-}17^+$)	163 ± 40^{b}	223 ± 59^{ab}	168 ± 48^{b}	87 ± 19.34^{b}	126 ± 28^{b}	358 ± 44.98^{a}	0.0998	0.0848	**0.0131**
Bone Marrow T-Lymphocytes									
$CD3^+CD4^+$(1 x 10^3)	4.47 ± 0.85	3.40 ± 0.94	5.52 ± 1.16	3.79 ± 0.41	14.15 ± 1.10$^{\#\$}$	10.64 ± 0.92$^{\#\$}$	**0.0391**	**<0.0001**	0.7621
Treg ($CD4^+CD25^+Foxp3^+$)	886 ± 165	6.75 ± 3.74	788 ± 202	3.5 ± 1.43	2566 ± 121$^{\#\$}$	11.83 ± 2.18$^{\#\$}$	**<0.0001**	**<0.0001**	0.2407
Th-17 ($CD4^+IL\text{-}17^+$)	60 ± 14	61 ± 20	54 ±11.61	57 ± 15	147 ± 26$^{\#\$}$	163 ± 19.66$^{\#\$}$	0.9469	**<0.0001**	0.6876

Control diet = Con; Tart cherry diet = TC; Fructooligosaccharide diet = FOS; Isotype control antibody = - CD25; CD25 antibody = +CD25.
Data presented as mean ± SE. n=8/group. Superscript letters note significant interactions (CD25*Diet) and groups that share the same superscript letter are not significantly different from each other. When only main effects of diet were detected, # indicates differences between TC or FOS diets vs. Con diet (*P<0.05)*. $ indicates differences between the TC vs. FOS diet groups (*P<0.05)*.

Supplementary Table 5: Bone Gene Expression Data

	Con		FOS		*P-values*		
	- CD25	**+ CD25**	**- CD25**	**+ CD25**	**CD25**	**Diet**	**CD25*Diet**
Osteoblastogenesis							
Runx 2	1.00 ± 0.14	1.38 ± 0.15	1.39 ± 0.17	1.12 ± 0.21	0.8852	0.5806	0.1806
Osteoblast Markers							
Bsp	1.00 ± 0.23	1.10 ± 0.15	1.78 ± 0.31	0.93 ± 0.16	0.2121	0.4246	0.0923
Bglap2	1.00 ± 0.18	1.59 ± 0.22	2.15 ± 0.38	1.87 ± 0.48	0.8661	0.0848	0.3625
Opn	1.00 ± 0.19	0.85 ± 0.15	1.52 ± 0.23	0.93 ± 0.18	0.1563	0.2700	0.3641
Rank: Rankl:Opg Axis							
RankL	1.00 ± 0.16	0.91 ± 0.1	0.90 ± 0.22	0.81 ± 0.12	0.7798	0.1754	0.8669
Opg	1.00 ± 0.11	0.74 ± 0.17	1.01 ± 0.27	0.73 ± 0.12	0.3621	0.8459	0.3917
RankL:Opg	1.00 ± 0.27	1.48 ± 0.37	0.72 ± 0.06	1.63 ± 0.15	0.0820	0.2180	0.4943

Control diet = Con; Fructooligosaccharide diet = FOS; Isotype control antibody = - CD25; CD25 antibody = +CD25. Data presented as mean ± SE. n=6/group

Supplementary Figure 1.

Representative 3-D images generated from microCT scans of the (A) lumbar vertebral body and (B) midshaft of the tibia. Control diet = Con; Tart cherry diet = TC; Fructo-oligosaccharide diet = FOS; Isotype control antibody = -CD25; CD25 antibody = +CD25.