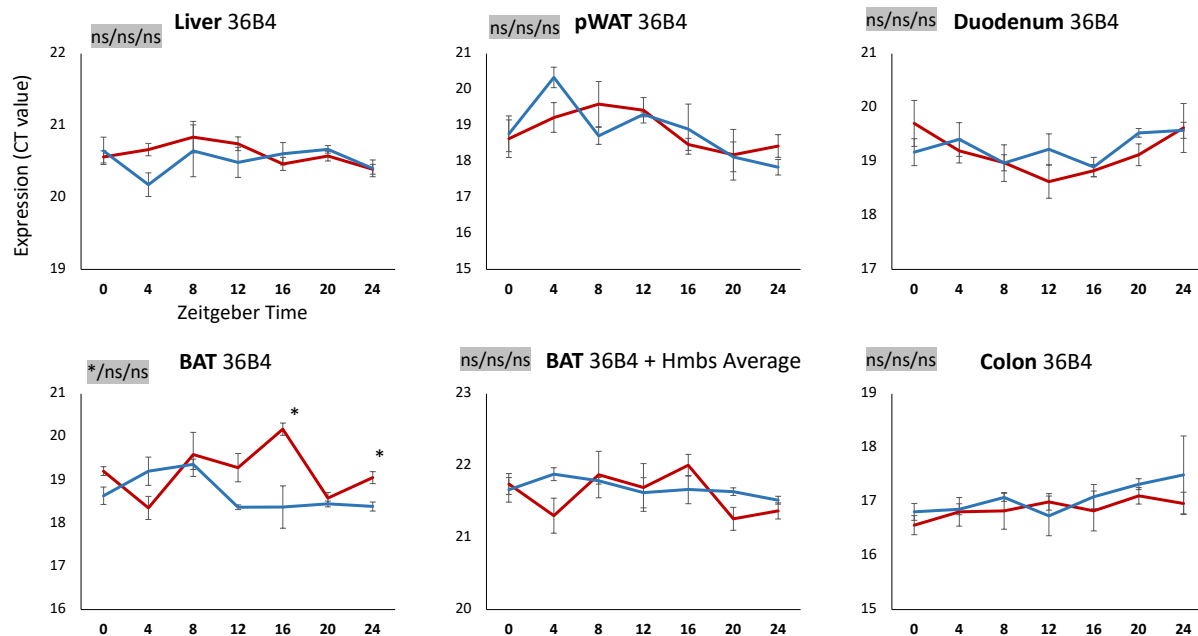


# Supplementary Figure S1

■ **AL Fed** ANOVA  
■ **Fasted** Feeding/Time/Interaction

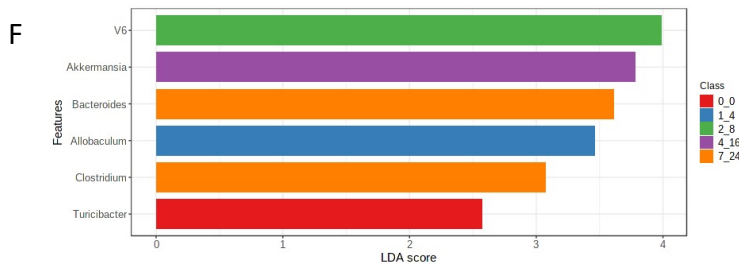
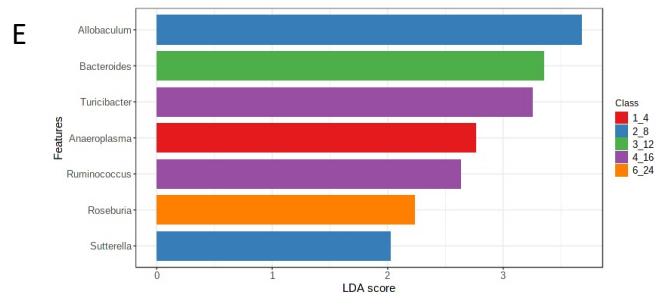
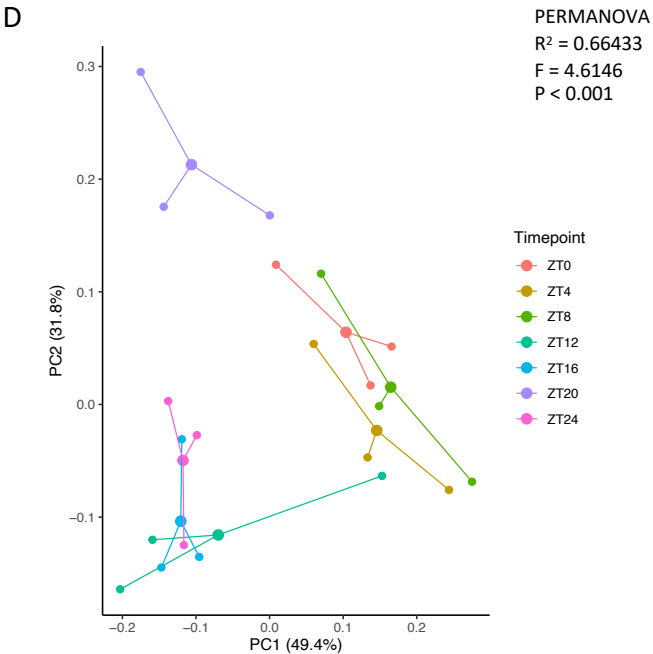
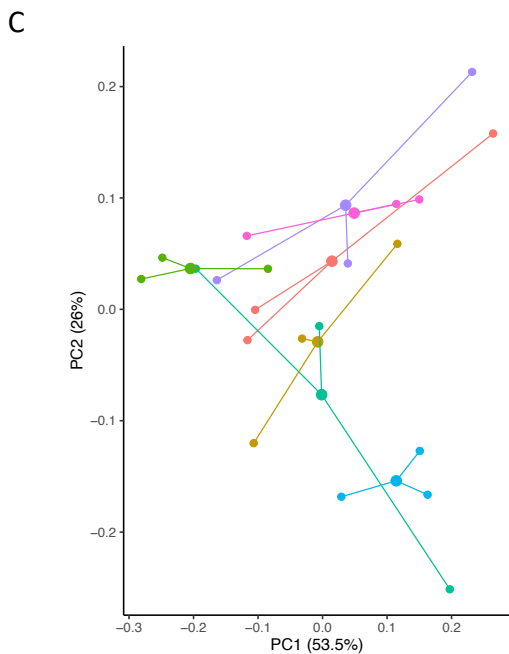
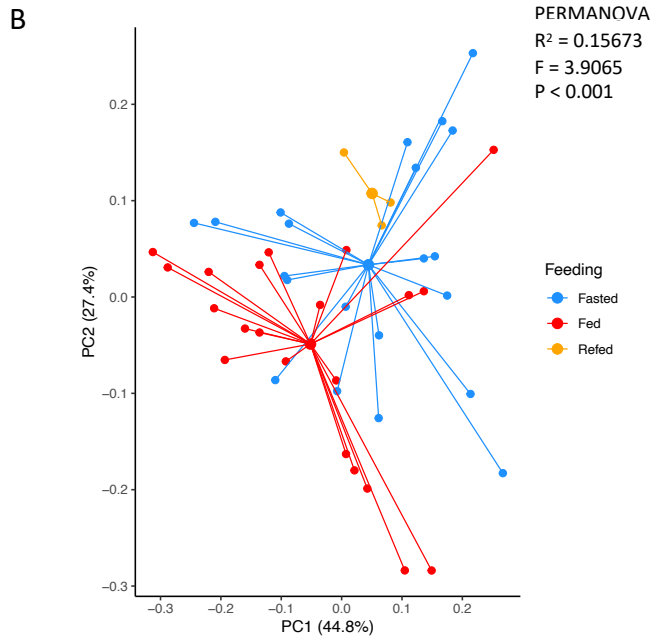
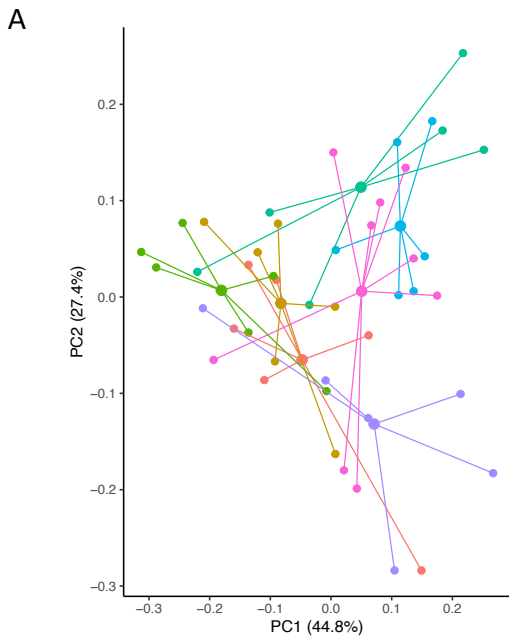
**A**



**B**

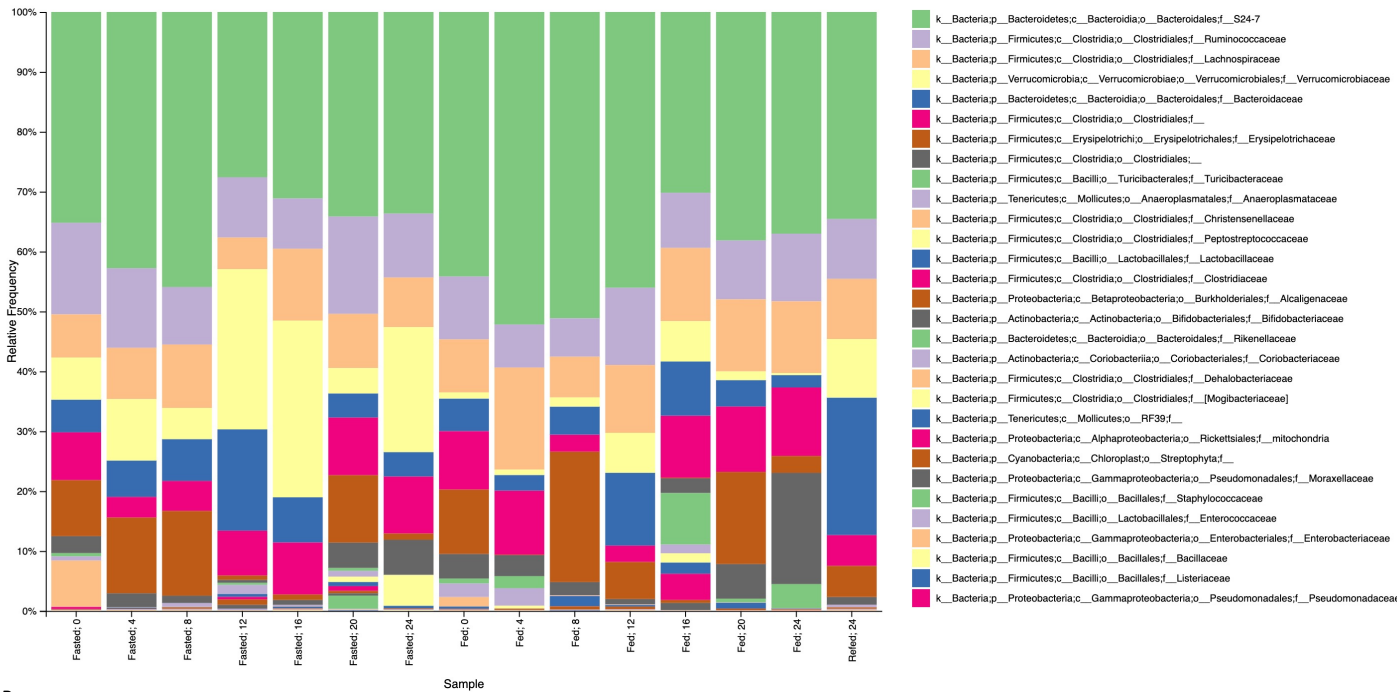
CIRCADIAN		ANOVA		
Tissue	Gene	Feeding	Time	Interaction
Liver	Bmal1	p=.05	***	***
Liver	Clock	ns	**	ns
Liver	Dbp	ns	**	***
Liver	Per1	ns	p=.06	*
Liver	Per2	ns	*	**
Liver	Per3	ns	***	***
Liver	Cry1	ns	**	**
Liver	Cry2	ns	***	ns
Liver	Rev-eba	**	ns	ns
Liver	Rev-erbβ	ns	*	**
Liver	Rora	ns	**	***
Liver	Rory	*	**	***
PWAT	Bmal1	*	*	***
PWAT	Clock	ns	ns	ns
PWAT	Dbp	ns	*	***
PWAT	Per1	ns	ns	*
PWAT	Per2	ns	**	*
PWAT	Per3	ns	***	**
PWAT	Cry1	ns	ns	**
PWAT	Cry2	ns	***	ns
PWAT	Rev-eba	ns	ns	*
PWAT	Rev-erbβ	ns	**	*
PWAT	Rora	ns	ns	ns
BAT	Bmal1	**	*	***
BAT	Clock	ns	p=.05	ns
BAT	Dbp	ns	**	***
BAT	Per1	ns	p=.065	**
BAT	Per2	***	ns	**
BAT	Per3	ns	p=.06	**
BAT	Cry1	*	ns	**
BAT	Cry2	ns	*	ns
BAT	Rev-eba	ns	p=.06	*
BAT	Rev-erbβ	ns	*	**
BAT	Rora	ns	ns	**
Duodenum	Bmal1	ns	***	ns
Duodenum	Clock	*	ns	ns
Duodenum	Dbp	ns	***	ns
Duodenum	Per1	ns	***	ns
Duodenum	Per2	p=.07	ns	ns
Duodenum	Per3	ns	***	ns
Duodenum	Cry1	ns	***	ns
Duodenum	Cry2	ns	**	ns
Duodenum	Rev-eba	ns	ns	ns
Duodenum	Rev-erbβ	ns	***	ns
Duodenum	Rora	ns	***	p=.06
Colon	Bmal1	ns	***	ns
Colon	Clock	ns	ns	ns
Colon	Dbp	ns	***	ns
Colon	Per1	ns	*	n**
Colon	Per2	*	***	ns
Colon	Per3	ns	***	*
Colon	Cry1	ns	**	ns
Colon	Cry2	ns	ns	ns
Colon	Rev-eba	ns	***	ns
Colon	Rev-erbβ	ns	***	ns
Colon	Rora	ns	ns	*
Liver	Cyp7a1	*	***	*
Liver	SREBP1c	ns	ns	***
Liver	Nampt	ns	**	**
Liver	Fgf21	ns	ns	**
Liver	Acc1	ns	ns	***
PWAT	PPARγ	ns	**	ns
BAT	Angptl4	*	***	***
Duodenum	HMGCS2	**	ns	*

# Supplementary Figure S2

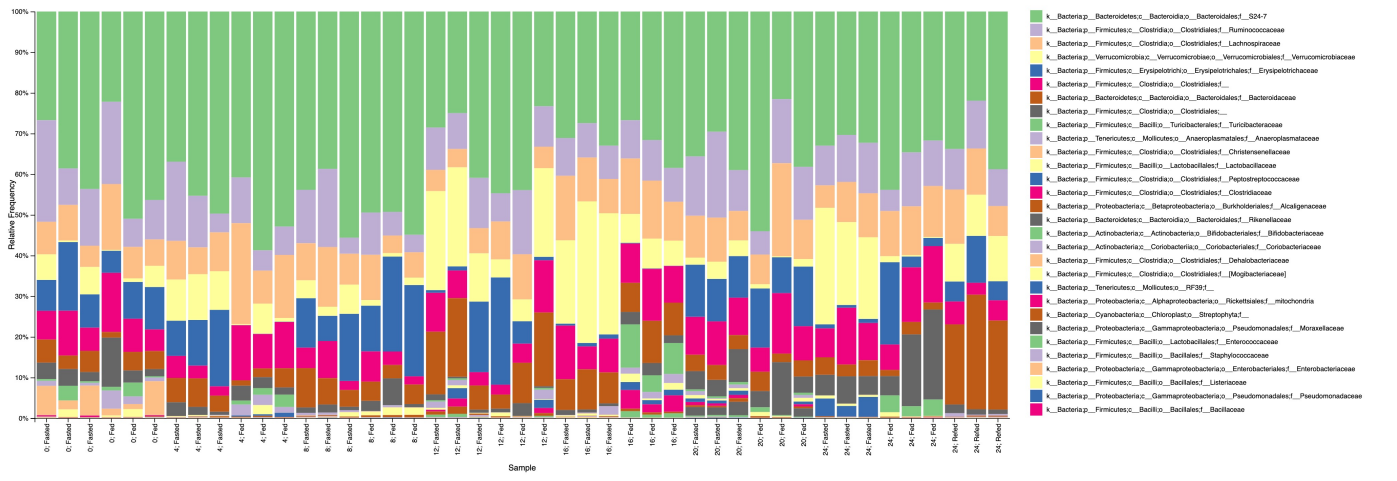


# Supplementary Figure S3

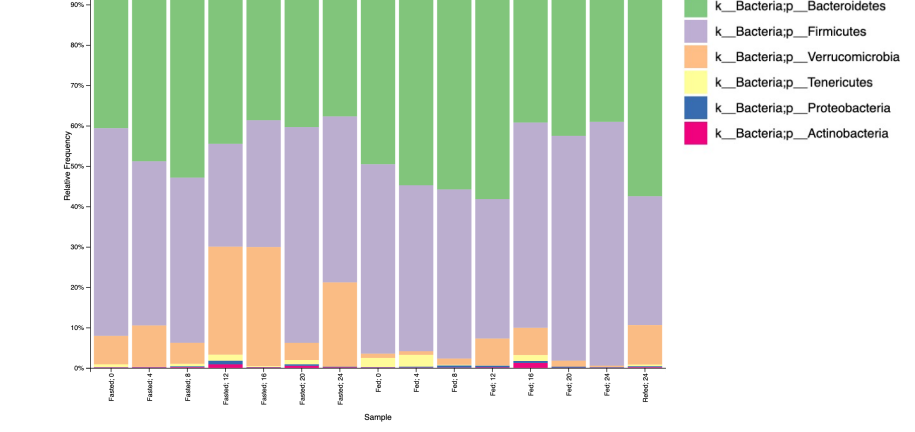
A



B



C



Supplementary Table S1

<b>CIRCADIAN</b>		
<b>Target</b>	<b>Forward</b>	<b>Reverse</b>
Bmal1	CCTAATTCTCAGGGCAGCAGAT	TCCAGTCTTGGCATCAATGAGT
Clock	GAGGTCGTCCTTCAGCAGTC	TGTGACATGCCTTGTGGAAT
Cry1	GACTCACTCACTCAAGCAAG	TCCTCCCACACGCTTTCGTATC
Cry2	ATGTGTTCCCAAGGCTGTTT	CCTCCTTGGCCATCTTCATA
Dbp	AATGACCTTTGAACCTGATCCCGCT	GCTCCAGTACTTCTCATCCTTCTGT
Per1	TGGCTCAAGTGGCAATGAGTC	GGCTCGAGCTGACTGTTCACT
Per2	CCATCCACAAGAAGATCCTAC	GCTCCACGGGTTGATGAAGC
Per3	GTGACAGCAGAGTCCCATGA	CACTGCCATCTCGAGTTCAA
Rev-erba	ACGACCCTGGACTCCAATAA	CCATTGGAGCTGTCAGTGTAGA
Rev-erbb	ACAGAAATAGTTACCTGTGCAACT	GACTTGCTCATAGGACACACCA
Ror-a	CCCCTACTGTTCCCTTCACCA	CCAGGTGGGATTTGGATATG
Ror-g	ACTACGGGGTTATCACCTGTGAG	GTGCAGGAGTAGGCCACATTAC
<b>OTHER</b>		
<b>Target</b>	<b>Forward</b>	<b>Reverse</b>
36B4	CAGATGCAGCAGATCCGCA	CGCATCATGGTGTTCCTTGCC
Hmbs	AAGGGTTTTCCCGTTTGC	TCCCTGAAGGATGTGCCTA
Cyp7a1	AGCAACTAAACAACCTGCCAGTACTA	GTCCGGATATTCAAGGATGCA
SREBP1c	GGAGCCATGGATTGCACATT	GGCCCGGGAAGTCACTGT
Nampt	TCGGTTCTGGTGGCGCTTTGCTAC	AAGTTCCCCGCTGGTGTCTATGT
Fgf21	CGGCCCTGTAAAGGCTCT	CGGCCCTGTAAAGGCTCT
Acc1	GTTCTGTTGGACAACGCCTTCAC	GGAGTCACAGAAGCAGCCCATT
PPARg	CTGCTCAAGTATGGTGTCCATGA	TGAGATGAGGACTCCATCTTTATTCA
Angptl4	GGCTCAGAACAGCAAGATCC	CCTCTTCCCCTCGAAGTCT
HMGCS2	CAATGTCACCACAGACCACCAG	CAATGTCACCACAGACCACCAG

# Supplementary Table S2

Phylum	Rhythmic
k_Bacteria;p_Bacteroidetes	Yes
k_Bacteria;p_Firmicutes	Yes
k_Bacteria;p_Proteobacteria	Fed only
k_Bacteria;p_Actinobacteria	Yes
k_Bacteria;p_Verrucomicrobia	Fed only
k_Bacteria;p_Tenericutes	Fast only
k_Bacteria;p_Cyanobacteria	insufficient counts
<b>Family</b>	
k_Bacteria;p_Bacteroidetes;c_Bacteroidia;o_Bacteroidales;f_S24-7	Yes
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Ruminococcaceae	No
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_	Fast only
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Lachnospiraceae	No
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_	Yes
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Clostridiaceae	insufficient counts
k_Bacteria;p_Firmicutes;c_Erysipelotrichi;o_Erysipelotrichales;f_Erysipelotrichaceae	No
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Dehalobacteriaceae	No
k_Bacteria;p_Firmicutes;c_Bacilli;o_Turicibacterales;f_Turicibacteraceae	insufficient counts
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Christensenellaceae	insufficient counts
k_Bacteria;p_Proteobacteria;c_Betaproteobacteria;o_Burkholderiales;f_Alcaligenaceae	Yes
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Peptostreptococcaceae	insufficient counts
k_Bacteria;p_Actinobacteria;c_Coriobacteriia;o_Coriobacteriales;f_Coriobacteriaceae	Fast only
k_Bacteria;p_Verrucomicrobia;c_Verrucomicrobiae;o_Verrucomicrobiales;f_Verrucomicrobiaceae	Fed only
k_Bacteria;p_Tenericutes;c_Mollicutes;o_Anaeroplasmatales;f_Anaeroplasmataceae	Fast only
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_[Mogibacteriaceae]	No
k_Bacteria;p_Tenericutes;c_Mollicutes;o_RF39;f_	insufficient counts
k_Bacteria;p_Firmicutes;c_Bacilli;o_Lactobacillales;f_Lactobacillaceae	No
k_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Rickettsiales;f_mitochondria	insufficient counts
k_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Pseudomonadales;f_Moraxellaceae	insufficient counts
k_Bacteria;p_Cyanobacteria;c_Chloroplast;o_Streptophyta;f_	insufficient counts
k_Bacteria;p_Bacteroidetes;c_Bacteroidia;o_Bacteroidales;f_Bacteroidaceae	Yes
k_Bacteria;p_Firmicutes;c_Bacilli;o_Bacillales;f_Listeriaceae	insufficient counts
k_Bacteria;p_Firmicutes;c_Bacilli;o_Bacillales;f_Staphylococcaceae	insufficient counts
k_Bacteria;p_Firmicutes;c_Bacilli;o_Lactobacillales;f_Enterococcaceae	insufficient counts
k_Bacteria;p_Bacteroidetes;c_Bacteroidia;o_Bacteroidales;f_Rikenellaceae	insufficient counts
k_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Enterobacteriales;f_Enterobacteriaceae	insufficient counts
k_Bacteria;p_Actinobacteria;c_Actinobacteria;o_Bifidobacteriales;f_Bifidobacteriaceae	insufficient counts
<b>Genus</b>	
k_Bacteria;p_Bacteroidetes;c_Bacteroidia;o_Bacteroidales;f_S24-7;g_	Yes
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Ruminococcaceae;g_Oscillospira	No
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Ruminococcaceae;g_Ruminococcus	Yes
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_;g_	Fast only
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Lachnospiraceae;g_Coprococcus	Yes
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Lachnospiraceae;g_	Yes
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Lachnospiraceae;f_	Fed only
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Ruminococcaceae;g_	Yes
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_;	Yes
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Ruminococcaceae;f_	No
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Clostridiaceae;f_	insufficient counts
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Lachnospiraceae;g_Roseburia	insufficient counts
k_Bacteria;p_Firmicutes;c_Erysipelotrichi;o_Erysipelotrichales;f_Erysipelotrichaceae;g_Clostridium	Fed only
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Dehalobacteriaceae;g_Dehalobacterium	No
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Lachnospiraceae;g_[Ruminococcus]	Fed only
k_Bacteria;p_Firmicutes;c_Bacilli;o_Turicibacterales;f_Turicibacteraceae;g_Turicibacter	insufficient counts
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Christensenellaceae;g_	insufficient counts
k_Bacteria;p_Proteobacteria;c_Betaproteobacteria;o_Burkholderiales;f_Alcaligenaceae;g_Sutterella	Fed only
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Peptostreptococcaceae;g_	insufficient counts
k_Bacteria;p_Actinobacteria;c_Coriobacteriia;o_Coriobacteriales;f_Coriobacteriaceae;g_Adlercreutzia	Fast only
k_Bacteria;p_Verrucomicrobia;c_Verrucomicrobiae;o_Verrucomicrobiales;f_Verrucomicrobiaceae;g_Akkermansia	Fed only
k_Bacteria;p_Firmicutes;c_Erysipelotrichi;o_Erysipelotrichales;f_Erysipelotrichaceae;g_Allobaculum	No
k_Bacteria;p_Tenericutes;c_Mollicutes;o_Anaeroplasmatales;f_Anaeroplasmataceae;g_Anaeroplasma	insufficient counts
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_[Mogibacteriaceae];g_	No

Supplementary Table S2 continued

k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Lachnospiraceae;g_Dorea	Yes
k_Bacteria;p_Firmicutes;c_Erysipelotrichi;o_Erysipelotrichales;f_Erysipelotrichaceae;g_	insufficient counts
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Ruminococcaceae;g_Butyricoccus	No
k_Bacteria;p_Tenericutes;c_Mollicutes;o_RF39;f_;g_	insufficient counts
k_Bacteria;p_Firmicutes;c_Bacilli;o_Lactobacillales;f_Lactobacillaceae;g_Lactobacillus	No
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Lachnospiraceae;g_Blautia	Fast only
k_Bacteria;p_Actinobacteria;c_Coriobacteriia;o_Coriobacteriales;f_Coriobacteriaceae;g_	insufficient counts
k_Bacteria;p_Proteobacteria;c_Alphaproteobacteria;o_Rickettsiales;f_mitochondria;_	insufficient counts
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Ruminococcaceae;g_Clostridium	insufficient counts
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Lachnospiraceae;g_Clostridium	insufficient counts
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Clostridiaceae;g_Clostridium	insufficient counts
k_Bacteria;p_Firmicutes;c_Erysipelotrichi;o_Erysipelotrichales;f_Erysipelotrichaceae;g_Coprobacillus	insufficient counts
k_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Pseudomonadales;f_Moraxellaceae;g_Acinetobacter	insufficient counts
k_Bacteria;p_Cyanobacteria;c_Chloroplast;o_Streptophyta;f_;g_	insufficient counts
k_Bacteria;p_Bacteroidetes;c_Bacteroidia;o_Bacteroidales;f_Bacteroidaceae;g_Bacteroides	Yes
k_Bacteria;p_Firmicutes;c_Bacilli;o_Bacillales;f_Listeriaceae;g_Listeria	insufficient counts
k_Bacteria;p_Firmicutes;c_Bacilli;o_Bacillales;f_Staphylococcaceae;g_Staphylococcus	insufficient counts
k_Bacteria;p_Firmicutes;c_Bacilli;o_Lactobacillales;f_Enterococcaceae;g_Enterococcus	insufficient counts
k_Bacteria;p_Bacteroidetes;c_Bacteroidia;o_Bacteroidales;f_Rikenellaceae;g_	insufficient counts
k_Bacteria;p_Proteobacteria;c_Gammaproteobacteria;o_Enterobacteriales;f_Enterobacteriaceae;_	insufficient counts
k_Bacteria;p_Firmicutes;c_Clostridia;o_Clostridiales;f_Lachnospiraceae;g_Anaerostipes	No
k_Bacteria;p_Actinobacteria;c_Actinobacteria;o_Bifidobacteriales;f_Bifidobacteriaceae;g_Bifidobacterium	insufficient counts

### Figure S1

(A) Housekeeping gene expression. Upper left asterisks indicate results of 2-way repeated measures ANOVA: feeding/time/interaction. All are arrhythmic in the fed and fasted condition.

(B) Results of 2-way repeated measures ANOVA for feeding, time, and their interaction in all gene expression rhythms. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

### Figure S2

(A, B) Family level PCoA plots of Bray-Curtis dissimilarities. PERMANOVA was used to determine whether timepoint and feeding had significant effects on microbiome composition.

(A) The effect of time on microbiome composition. Data points are labelled according to feeding group (F = Fed, X = Fast, R = Refed) and coloured by timepoint (see legend).

(B) The effect of feeding condition on microbiome composition. Data points are labelled with timepoint and coloured according to feeding group (see legend).

(C) The effect of time in AL-fed animals.

(D) The effect of time in 24h-fasted animals.

(E) Families whose abundances significantly differed at in the fed condition at particular timepoints ( $p < 0.05$ ) with LDA scores  $>2$ .

(F) Families whose abundances significantly differed at in the fasted condition at particular timepoints ( $p < 0.05$ ) with LDA scores  $>2$ .

### Figure S3

(A) Relative abundances of bacterial families by group.

(B) Relative abundances of bacterial families in individual mice. Mice of the same feeding condition and timepoint were cohoused.

(C) Relative abundances of bacterial phyla by group.

### Table S1

qPCR primers

### Table S2

Rhythmicity of microbial phyla, families and genera determined from CircaCompare analysis of rarefied read counts.