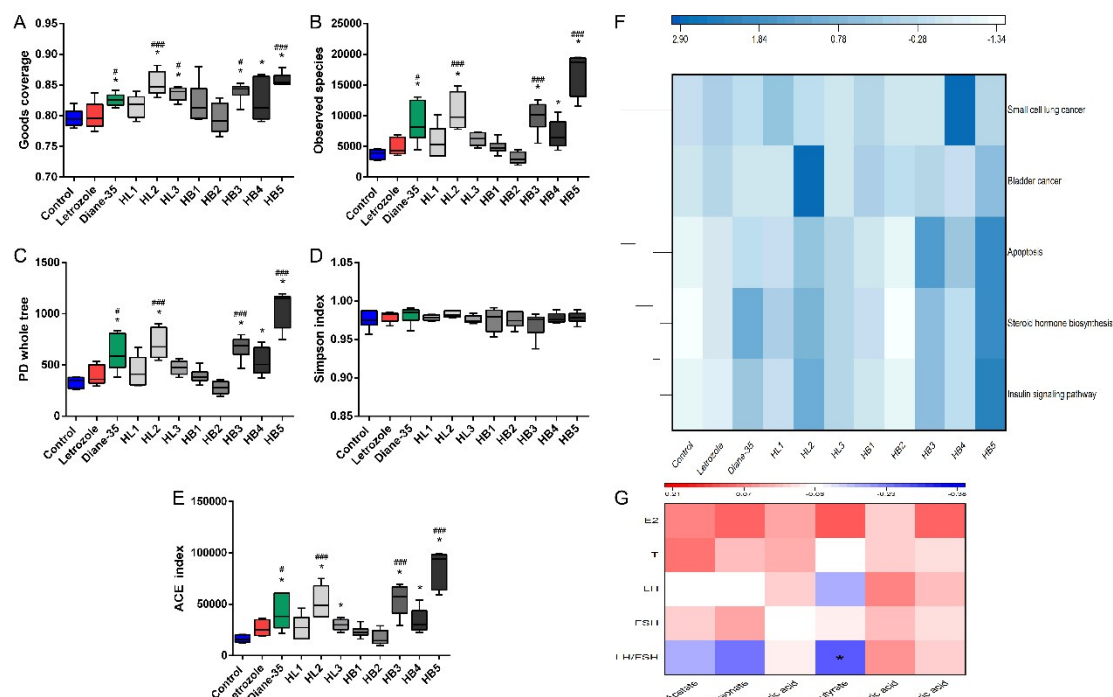
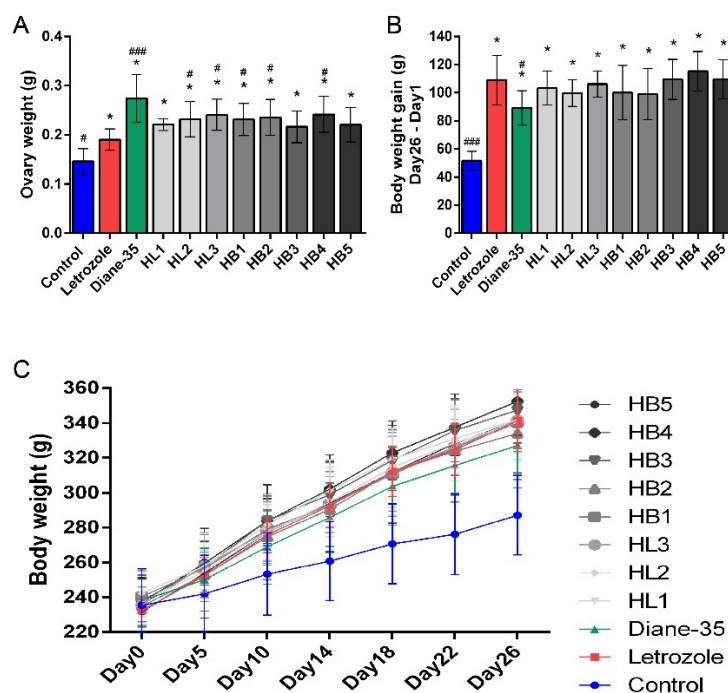




Supplementary Figure1. (A) Goods coverage index. (B) Observed species index. (C) PD whole tree index. (D) Simpson index. (E) ACE index. (F) Heat map of the differential KEGG pathways. (G) Correlation between sex hormones and SCFAs. Data are expressed as medians with interquartile ranges. * $p<0.05$ versus the control group, # $p<0.05$, ### $p<0.001$ versus the letrozole group using LSD test. The R value between the butyrate level and LH/FSH ratio was -0.28 ($p=0.023$).



Supplementary Figure2. (A) Ovary weight of rats. (B) Body weight gain at Day 26. (C) Trends of the body weight changes during the animal experiment. Data are represented as mean $\pm$ SD. * $p<0.05$ versus the control group, # $p<0.05$, ### $p<0.001$ versus the letrozole group using LSD test.

Supplementary Table1. Result of one-way ANOSIM test between experimental groups in PCoA analysis.

Group	Letrozole	HB3	HB4
Diane-35	R=0.37 $p=0.02$	R=0.47 $p=0.01$	R=0.26 $p=0.03$
HL2		R=0.26 $p=0.04$	

Only significant values ($p < 0.05$) were shown.

Supplementary Table2. Correlation between three alpha diversity indices and testosterone (T), LH levels.

Group	R	p
T & Chao 1	0.222	0.073
T & observed species	0.194	0.118
T & PD whole tree	0.189	0.128
LH & Chao 1	-0.075	0.551
LH & observed species	-0.054	0.669
LH & PD whole tree	-0.063	0.615

Supplementary Table3. Body weight of rats during the animal experiment.

Group	Day0	Day5	Day10	Day14	Day18	Day22	Day26
Control	235.5±20.8	242.0±22.2	253.3±23.5 [#]	260.8±22.7 [#]	270.7±22.9 [#]	276.2±23.1 ^{###}	276.2±23.1 [#]
Letrozole	232.3±6.3	252.5±10.6	275.8±10.2 [*]	292.7±12.6 [*]	312.2±14.3 [*]	324.7±14.8 [*]	324.7±14.8 [*]
Diane-35	238.0±15.0	250.2±18.1	269.0±21.4 [*]	285.8±20.1 [*]	303.7±22.4 [*]	315.7±21.1 [*]	303.2±31.3
HL1	237.3±12.9	255.1±12.0	277.3±15.8 [*]	294.7±19.9 [*]	314.5±22.8 [*]	328.5±21.7 [*]	309.7±28.9 [*]
HL2	242.3±13.5	258.0±13.5	281.5±12.8 [*]	301.5±17.4 [*]	319.3±17.4 [*]	331.2±17.2 [*]	340.5±27.1 [*]
HL3	235.6±19.6	258.2±18.8	277.8±17.1 [*]	293.2±16.0 [*]	312.0±20.3 [*]	326.3±15.8 [*]	333.5±22.0 [*]
HB1	240.3±16.1	256.7±19.2	279.0±20.4 [*]	293.2±24.0 [*]	310.7±24.1 [*]	326.0±27.3 [*]	345.8±21.9 [*]
HB2	235.0±11.0	252.8±13.0	274.7±15.0 [*]	290.5±21.6 [*]	312.0±22.6 [*]	323.8±24.2 [*]	334.3±10.4 [*]
HB3	238.0±14.4	257.3±15.1	284.0±14.2 [*]	299.0±15.7 [*]	318.7±17.5 [*]	335.8±18.2 [*]	345.7±17.4 [*]
HB4	237.2±13.7	259.7±12.5	283.8±12.9 [*]	302.2±15.8 [*]	323.0±15.8 [*]	337.3±16.4 [*]	338.5±32.0 [*]
HB5	231.7±19.8	253.8±25.7	277.3±27.3 [*]	294.0±27.6 [*]	311.8±29.4 [*]	328.3±28.3 [*]	332.8±26.0 [*]

Data are expressed as mean ± SD. ^{*} $p < 0.05$ versus the control group, [#] $p < 0.05$, ^{###} $p < 0.001$ versus the letrozole group using LSD test.