**Supplementary Information**

**Supplementary Table. 1** Nutrientscomposition of both ND and HTD. ND, normal diet; HTD, high tryptophan diet

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| **Nutrients**  | **Content** |
| **Metabolizable energy** |  |
| Protein  | 23.07% |
| Carbohydrate | 65.08% |
| Fat | 11.85% |
| **Vitamin** |  |
| Vitamin A  | 7800.00 IU**/**kg |
| Vitamin D | 1200.00 IU/kg |
| Vitamin E | 67.00 mg/kg |
| Vitamin K | 5.00 mg /kg |
| Vitamin B1 | 10.00 mg/kg |
| Vitamin B2 | 15.00 mg/kg |
| Vitamin B6 | 10.00 mg/kg |
| Vitamin B12 | 0.02 mg/kg |
| Nicotinic acid | 55.00 mg/kg |
| Pantothenic acid | 22.00 mg/kg |
| Biotin | 0.20 mg/kg |
| Folic acid | 6.60 mg/kg |
| **Mineral substance** |  |
| Sodium (Na) | 3.10 g/kg |
| Magnesium (Mg) | 2.90 g/kg |
| Kalium (K) | 7.40 g/kg |
| Cuprum (Cu) | 11.40 mg/kg |
| Iron (Fe) | 113.70 mg/kg |
| Manganese (Mn) | 80.00 mg/kg |
| Zinc (Zn) | 31.60 mg/kg |
| Selenium (Se) | 0.20 mg/kg |
| Iodine (I) | 0.70 mg/kg |

**Supplementary Table. 2** Aminoacids present in ND and HTD (g/kg). The ND and HTD are the same composition in nutrients except the tryptophan content. ND, normal diet; HTD, high tryptophan diet

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| --- | --- | --- |
| **Aminoacids**  | **ND** | **HTD** |
| Methionine+Cystine  | 5.80 | 5.80 |
| Lysine | 8.90 | 8.90 |
| Arginine  | 9.90 | 9.90 |
| Leucine  | 14.80 | 14.80 |
| Isoleucine  | 7.40 | 7.40 |
| Threonine | 6.60 | 6.60 |
| Valine  | 8.90 | 8.90 |
| Histidine | 4.90 | 4.90 |
| Phenylalanine+Tyrosine | 14.60 | 14.60 |
| **Tryptophan**  | **2.10** | **4.00** |

**Supplementary Fig. 1** The levels of 5-HT and 5-HIAA in midbrain were significantly increased in the Ab treatment group compared with the control group in DBA/1 mice. n=6 in each group. Statistical analysis was performed by the independent samples t-test. \*\* *p* < 0.01, \*\*\* *p* < 0.001. Data represents as mean ± SD. 5-HT, 5-hydroxytryptamine; 5-HIAA, 5-hydroxyindoleacetic acid; Ab, antibiotics

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**Supplementary Fig. 2** Ab treatment caused a change in the gut microbiota composition compared with their control in DBA/1 mice, and with a high frequency of *Proteobacteria* and low frequency of *Firmicutes* and *Bacteroidetes* in the Ab treatment mice. The horizontal bar charts depict the taxonomic differences between the two groups at the phylum level. n=10 in each group. Statistical analysis was performed by the Wilcoxon rank-sum test. \* *p* ＜ 0.05, \*\* *p* ＜ 0.01, \*\*\* *p* ＜ 0.001. Ab, antibiotics



**Supplementary Fig. 3** HTD+Ab treatment did not significantly increase the 5-HT level in the brain of DBA/1 mice compared with the HTD group. n=6 in each group. Statistical analysis was performed by the independent samples t-test. \*\*\* *p* < 0.001. Data represents as mean ± SD. 5-HT, 5-hydroxytryptamine; HTD, high tryptophan diet; HTD+Ab, high tryptophan diet with antibiotics



**Supplementary Fig. 4** HTD+Pb treatment did not significantly change the metabolism of TRP and 5-HT in plasma and brain of DBA/1 mice. n=6 in each group. Statistical analysis was performed by the independent samples t-test. Data represents as mean ± SD. TRP, tryptophan; 5-HT, 5-hydroxytryptamine; HTD, high tryptophan diet; HTD+Pb, high tryptophan diet with probiotics

