**Supplementary Table 1.** Dietary composition of different semi-synthethic experimental diets following the AIN-93G recommendations, consumed by the different groups of rats in experiments 1 and 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| The composition of the diet (g/kg) | 0.1P | 0.2P | 0.3P | 0.6P | 1.2P |
| Egg white1\* | 225 | 225 | 225 | 225 | 225 |
| Cornstarch | 314.4 | 310 | 305.6 | 300 | 273 |
| Sucrose  | 307.5 | 307.5 | 307.5 | 307.5 | 307.5 |
| Corn oil | 50 | 50 | 50 | 50 | 50 |
| Cellulose\* | 55 | 55 | 55 | 55 | 55 |
| Mineral mix2\* | 35 | 35 | 35 | 35 | 35 |
| Vitamin mix3\* | 10 | 10 | 10 | 10 | 10 |
| Potassium phosphate4\* | 3.1 | 7.5 | 11.9 | 18.2 | 44.5 |
| Calculated phosphorus content of the diets |
|  Phosphorus (%) | 0.1 | 0.2 | 0.3 | 0.6 | 1.2 |
|  Phosphorus (mg/kcal) | 0.263 | 0.526 | 0.789 | 1.579 | 3.158 |

0.1P: 0.1% phosphorus, 0.2P: 0.2% phosphorus, 0.3P: 0.3% phosphorus, 0.6P: 0.6% phosphorus, 1.2P: 1.2% phosphorus

1The diets contained 20% protein coming exclusively from egg white

2“Phosphorus-free” mineral mix (AIN-93G mineral mix phosphorus-free, used as 35 g/kg of diet)

3Vitamin mix (AIN-93VX vitamin mix, used as 10 g/kg of diet)

4Potassium phosphate KH2PO4, molecular weight 136 g/mol of which phosphorus 31 g/mol

\*Obtained from Dyets Inc., Bethlehem, Pennsylvania, USA

**Supplementary Table 2.** Experiment 1-Weekly body weight statistics. Time points where significance were demonstrated over 6-week experimental period.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0.1S | 0.1E | 0.2S | 0.2E | 0.3S | 0.3E |  |
|  | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | *P*-value |
| Baseline | 288.46 | 26.52 | 289.96 | 23.45 | 289.71 | 22.26 | 292.14 | 18.39 | 290.82 | 19.41 | 291.04 | 19.51 | 1.000 |
| Week 1 | 329.64 a | 30.11 | 329.50 a | 20.87 | 341.90 ab | 24.67 | 344.24 ab | 21.59 | 358.88 b | 19.83 | 346.10 ab | 18.49 | 0.119 |
| Week 2 | 362.62 a | 36.32 | 360.18 a | 21.86 | 380.57 ab | 27.77 | 374.56 ab | 24.38 | 396.22 b | 15.15 | 378.11 ab | 23.62 | 0.085 |
| Week 3 | 387.72 a | 41.77 | 384.61 a | 25.48 | 408.42 ab | 30.88 | 398.03 ab | 25.69 | 430.65 b | 23.24 | 409.01 ab | 29.86 | 0.044 |
| Week 4 | 412.48 a | 45.16 | 405.90 a | 30.84 | 433.65 ab | 33.06 | 414.36 ab | 28.73 | 454.75 b | 24.88 | 431.38 ab | 33.07 | 0.056 |
| Week 5 | 432.41 a | 49.48 | 421.25 a | 35.51 | 451.63 ab | 34.43 | 432.29 ab | 31.61 | 474.20 b | 26.80 | 449.14 ab | 36.07 | 0.076 |
| Week 6 | 452.48 a | 51.80 | 439.12 a | 40.41 | 464.15 ab | 37.58 | 450.07 ab | 35.37 | 494.51 b | 32.23 | 464.02 ab | 40.01 | 0.132 |

P, phosphorus; E, exercise

Group 0.1S: 0.1% P and sedentary; Group 0.1A: 0.1% P and exercise; Group 0.2S: 0.2% P and sedentary; Group 0.2A: 0.2% P and exercise; Group 0.3S: 0.3% P and sedentary; Group 0.3A: 0.3% P and exercise.

Data are expressed as the mean ± SD of all values. A one-way ANOVA for each week was performed using Fisher Pairwise comparison. Goups with different subscribts are significtly different (P-value<0.05).

**Supplementary Table 3.** Experiment 1- Weekly percent body fat statistics. Time points where significance were demonstrated over 6-week experimental period.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0.1S | 0.1E | 0.2S | 0.2E | 0.3S | 0.3E |  |
|  | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | *P*-value |
| Baseline | 18.53 | 5.01 | 18.49 | 4.37 | 16.68 | 2.76 | 16.59 | 2.96 | 19.59 | 4.32 | 19.15 | 3.06 | 0.517 |
| Week 1 | 18.63 | 5.48 | 18.48 | 5.50 | 17.33 | 2.50 | 16.64 | 3.70 | 20.92 | 4.64 | 19.27 | 3.86 | 0.472 |
| Week 2 | 19.67 ab | 5.97 | 19.50 ab | 5.80 | 18.53 ab | 2.98 | 16.14 a | 4.05 | 21.83 b | 4.59 | 19.94 ab | 4.72 | 0.316 |
| Week 3 | 19.13 ab | 6.61 | 18.37 ab | 6.07 | 17.61 a | 4.24 | 16.39 a | 4.08 | 23.79 b | 6.41 | 20.58 ab | 5.71 | 0.148 |
| Week 4 | 20.50 ab | 6.67 | 19.32 ab | 6.58 | 18.98 ab | 4.41 | 16.44 a | 4.30 | 24.68 b | 7.67 | 21.39 ab | 5.78 | 0.162 |
| Week 5 | 20.89 ab | 6.65 | 19.42 a | 6.44 | 19.28 ab | 4.40 | 16.80 a | 4.54 | 25.53 b | 7.78 | 22.28 ab | 6.05 | 0.128 |
| Week 6 | 21.98 ab | 7.40 | 19.88 ab | 7.17 | 19.70 ab | 5.33 | 17.47 a | 5.49 | 26.69 b | 9.51 | 22.83 ab | 6.77 | 0.174 |

P, phosphorus; E, exercise

Group 0.1S: 0.1% P and sedentary; Group 0.1A: 0.1% P and exercise; Group 0.2S: 0.2% P and sedentary; Group 0.2A: 0.2% P and exercise; Group 0.3S: 0.3% P and sedentary; Group 0.3A: 0.3% P and exercise.

Data are expressed as the mean ± SD of all values. A one-way ANOVA for each week was performed using Fisher Pairwise comparison. Goups with different subscribts are significtly different (P-value<0.05).

**Supplementary Table 4.** Experiment 1-Weekly percent LBM statistics. Time points where significance were demonstrated over 6-week experimental period.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0.1S | 0.1E | 0.2S | 0.2E | 0.3S | 0.3E |  |
|  | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | *P*-value |
| Baseline | 71.32 | 4.68 | 70.92 | 4.01 | 72.85 | 2.76 | 73.00 | 2.65 | 70.28 | 3.89 | 70.54 | 2.69 | 0.506 |
| Week 1 | 71.30 | 5.00 | 71.13 | 5.20 | 72.09 | 2.45 | 72.99 | 3.38 | 69.04 | 4.27 | 70.39 | 3.59 | 0.497 |
| Week 2 | 70.12 ab | 5.52 | 70.01 ab | 5.53 | 70.96 ab | 2.65 | 73.22 a | 3.65 | 67.96 b | 4.15 | 69.29 ab | 4.40 | 0.294 |
| Week 3 | 70.63 ab | 6.21 | 70.90 a | 5.63 | 71.41 a | 3.98 | 72.69 a | 3.65 | 65.59 b | 5.94 | 68.60 ab | 5.37 | 0.120 |
| Week 4 | 69.13 ab | 6.25 | 69.68 ab | 6.16 | 69.98 ab | 3.94 | 72.44 a | 4.02 | 64.70 b | 7.14 | 66.98 ab | 5.30 | 0.130 |
| Week 5 | 66.56 ab | 6.65 | 69.76 a | 6.39 | 69.56 ab | 4.66 | 72.00 a | 4.38 | 63.59 b | 7.81 | 66.77 ab | 5.87 | 0.131 |
| Week 6 | 67.68 ab | 6.98 | 69.26 a | 6.61 | 69.11 ab | 5.16 | 71.36 a | 4.91 | 62.64 b | 8.77 | 66.11 ab | 6.18 | 0.154 |

P, phosphorus; E, exercise

Group 0.1S: 0.1% P and sedentary; Group 0.1A: 0.1% P and exercise; Group 0.2S: 0.2% P and sedentary; Group 0.2A: 0.2% P and exercise; Group 0.3S: 0.3% P and sedentary; Group 0.3A: 0.3% P and exercise.

Data are expressed as the mean ± SD of all values. A one-way ANOVA for each week was performed using Fisher Pairwise comparison. Goups with different subscribts are significtly different (P-value<0.05).

**Supplementary Table 5.** Experiment 2- Weekly body weight statistics. Time points where significance were demonstrated over 6-week experimental period.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0.3S | 0.3E | 0.6S | 0.6E | 1.2S | 1.2E |  |
|  | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | *P*-value |
| Baseline | 351.15 | 37.61 | 352.01 | 24.01 | 351.57  | 19.05 | 351.53  | 16.35 | 351.01  | 16.44 | 351.31 | 13.33 | 1.000 |
| Week 1 | 405.78 a | 31.66 | 392.31 ab | 13.99 | 398.39 ab | 23.08 | 396.64 ab | 13.57 | 398.31 ab | 18.13 | 382.08 b | 13.75 | 0.309 |
| Week 2 | 438.28 a | 39.49 | 413.87 ab | 17.22 | 427.52 ab | 26.32 | 418.04 ab | 14.85 | 422.05 ab | 29.85 | 408.51 b | 19.27 | 0.271 |
| Week 3 | 464.92 a | 42.59 | 426.19 b | 19.79 | 445.89 ab | 33.74 | 436.51 ab | 13.33 | 447.04 ab | 27.80 | 423.70 b | 24.67 | 0.063 |
| Week 4 | 487.19 a | 46.16 | 441.72 b | 20.37 | 460.40 ab | 38.09 | 451.34 b | 17.18 | 459.26 ab | 37.13 | 437.32 b | 30.19 | 0.062 |
| Week 5 | 500.65 a | 51.00 | 453.08 b | 18.44 | 476.03 ab | 39.41 | 463.58 b | 18.21 | 468.93 ab | 31.12 | 444.26 b | 30.08 | 0.030 |
| Week 6 | 514.61 a | 52.41 | 462.85 b | 19.07 | 487.16 ab | 39.17 | 472.43 b | 16.44 | 479.22 b | 31.89 | 454.57 b | 31.12 | 0.018 |

P, phosphorus; E, exercise

Group 0.3S: 0.3% P and sedentary; Group 0.3A: 0.3% P and exercise; Group 0.6S: 0.6% P and sedentary; Group 0.6A: 0.6% P and exercise; Group 1.2S: 1.2% P and sedentary; Group 1.2A: 1.2% P and exercise.

Data are expressed as the mean ± SD of all values. A one-way ANOVA for each week was performed using Fisher Pairwise comparison. Goups with different subscribts are significtly different (P-value<0.05).

**Supplementary Table 6.** Experiment 2- Weekly percent body fat statistics. Time points where significance were demonstrated over 6-week experimental period.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0.3S | 0.3E | 0.6S | 0.6E | 1.2S | 1.2E |  |
|  | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | *P*-value |
| Baseline | 20.06 | 4.80 | 19.14 | 3.84 | 17.98 | 1.52 | 18.62 | 3.09 | 20.18 | 2.82 | 18.71 | 3.67 | 0.770 |
| Week 1 | 20.58 | 4.94 | 19.58 | 3.05 | 18.14 | 1.55 | 19.21 | 2.73 | 19.88 | 2.30 | 18.45 | 3.95 | 0.688 |
| Week 2 | 21.25 | 5.47 | 19.19 | 3.99 | 19.02 | 2.13 | 18.91 | 2.79 | 19.94 | 2.15 | 17.86 | 4.36 | 0.580 |
| Week 3 | 21.82 a | 5.64 | 19.11 ab | 3.61 | 19.30 ab | 2.40 | 19.30 ab | 3.11 | 21.27 a | 1.73 | 17.55 b | 4.11 | 0.222 |
| Week 4 | 22.13 | 6.05 | 19.53 | 3.64 | 20.44 | 2.11 | 20.23 | 3.25 | 21.71 | 2.38 | 18.31 | 4.41 | 0.398 |
| Week 5 | 22.91 a | 5.93 | 19.67 ab | 3.99 | 20.87 ab | 2.07 | 20.63 ab | 3.42 | 21.72 ab | 1.84 | 18.36 b | 4.31 | 0.264 |
| Week 6 | 22.66 a | 6.43 | 19.08 ab | 4.27 | 20.42 ab | 2.09 | 19.79 ab | 3.19 | 21.32 ab | 2.00 | 17.83 b | 3.88 | 0.215 |

P, phosphorus; E, exercise

Group 0.3S: 0.3% P and sedentary; Group 0.3A: 0.3% P and exercise; Group 0.6S: 0.6% P and sedentary; Group 0.6A: 0.6% P and exercise; Group 1.2S: 1.2% P and sedentary; Group 1.2A: 1.2% P and exercise.

Data are expressed as the mean ± SD of all values. A one-way ANOVA for each week was performed using Fisher Pairwise comparison. Goups with different subscribts are significtly different (P-value<0.05).

**Supplementary Table 7.** Experiment 2- Weekly percent LBM statistics. Time points where significance were demonstrated over 6-week experimental period.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0.3S | 0.3E | 0.6S | 0.6E | 1.2S | 1.2E |  |
|  | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD | *P*-value |
| Baseline | 69.37 | 4.03 | 70.48 | 3.42 | 71.66 | 1.03 | 70.95 | 2.98 | 69.54 | 2.58 | 71.02 | 3.49 | 0.644 |
| Week 1 | 69.40 | 4.66 | 70.19 | 2.77 | 71.39 | 1.26 | 70.27 | 2.49 | 69.74 | 2.01 | 71.07 | 3.79 | 0.772 |
| Week 2 | 68.70 | 5.31 | 70.31 | 3.83 | 70.39 | 1.35 | 70.66 | 2.39 | 69.59 | 2.01 | 71.63 | 4.23 | 0.661 |
| Week 3 | 67.85 a | 5.50 | 70.17 ab | 3.54 | 69.78 ab | 2.11 | 69.95 ab | 2.75 | 67.90 ab | 1.60 | 71.47 b | 4.27 | 0.300 |
| Week 4 | 67.20 | 5.95 | 69.65 | 3.50 | 68.44 | 1.75 | 68.85 | 2.96 | 66.82 | 1.66 | 70.48 | 4.36 | 0.342 |
| Week 5 | 66.75 a | 5.57 | 69.67 ab | 3.79 | 68.28 ab | 1.77 | 68.52 ab | 3.15 | 67.40 ab | 1.71 | 70.65 b | 4.26 | 0.306 |
| Week 6 | 66.42 a | 6.12 | 69.59 ab | 3.99 | 68.25 ab | 1.60 | 68.68 ab | 2.87 | 67.29 ab | 1.74 | 70.68 b | 3.87 | 0.251 |

P, phosphorus; E, exercise

Group 0.3S: 0.3% P and sedentary; Group 0.3A: 0.3% P and exercise; Group 0.6S: 0.6% P and sedentary; Group 0.6A: 0.6% P and exercise; Group 1.2S: 1.2% P and sedentary; Group 1.2A: 1.2% P and exercise.

Data are expressed as the mean ± SD of all values. A one-way ANOVA for each week was performed using Fisher Pairwise comparison. Goups with different subscribts are significtly different (P-value<0.05).