**Supplementary Figures**



**Figure I.** The incubation system includes an air pump, an airflow meter, a moisture control container, an incubation container, and an acid trap flask.

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| **Figure II.** Daily ammonia-nitrogen emission (g) and ambient temperature (℃) from 15 days of dairy manure incubation.CT: UN:FN = 1:1; 2U1F: UN:FN = 2:1; CT+L: CT + Lignite; 2U1F+L: 2U1F + Lignite.CT used a manure with UN:FN = 1:1; 2U1F used a manure with UN:FN = 2:1; CT+L used a manure with UN:FN = 1:1 + 250 g lignite application; 2UIF+L used a manure with UN:FN = 2:1 + 250 g lignite application; UN:FN = urinary nitrogen: faecal nitrogen. |

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| A graph of a number of different types of incubation  Description automatically generated | **A graph of a number of numbers and a line graph  Description automatically generated** |
| **CT, Equation:** *Y = -0.0009 X2 + 0.0464 X - 0.0018*, R2 = 0.99, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.0048**2U1F, Equation:** *Y = -0.0017 X2 + 0.0726 X - 0.0046*, R2 = 0.99, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.0068 | **CT+L, Equation:** *Y = 0.0002 X2 + 0.0015 X + 0.0017,* R2 = 0.99, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.0012**2U1F+L, Equation:** *Y= 0.0003 X2 + 0.0032 X + 0.0010,* R2 = 0.99, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.0012 |

**Figure III.** Cumulative ammonia-nitrogen (g) from 15 days of dairy manure incubation.

CT: UN:FN = 1:1; 2U1F: UN:FN = 2:1; CT+L: CT + Lignite; 2U1F+L: 2U1F + Lignite.

CT used a manure with UN:FN = 1:1; 2U1F used a manure with UN:FN = 2:1; CT+L used a manure with UN:FN = 1:1 + 250 g lignite application; 2UIF+L used a manure with UN:FN = 2:1 + 250 g lignite application; UN:FN = urinary nitrogen: faecal nitrogen.

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| **A graph of a number of different types of numbers  Description automatically generated with medium confidence** | A graph of a number of black dots  Description automatically generated |
| **CT, Equation:** *Y = 6.87 X0.18*, R² = 0.85, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.34**2U1F, Equation:** *Y = 5.87 X0.28*, R² = 0.91, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.50. | **CT+L, Equation:** *Y = 22.51 X-0.01*, R² = 0.07, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.19**2U1F+L, Equation:** *Y = 21.94 X0.01*, R² = 0.08, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.17. |

**Figure IV.** Manure δ15N (‰) from 15 days of dairy manure incubation.

CT: UN:FN = 1:1; 2U1F: UN:FN = 2:1; CT+L: CT + Lignite; 2U1F+L: 2U1F + Lignite.

CT used a manure with UN:FN = 1:1; 2U1F used a manure with UN:FN = 2:1; CT+L used a manure with UN:FN = 1:1 + 250 g lignite application; 2UIF+L used a manure with UN:FN = 2:1 + 250 g lignite application; UN:FN = urinary nitrogen: faecal nitrogen.

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| **A graph of a number of objects  Description automatically generated** | A graph of the number of incubation days  Description automatically generated |
| **CT, Equation:** *Y = 4.19 X-0.14*, R² = 0.81, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.11**2U1F, Equation:** *Y = 5.07 X-0.20*, R² = 0.73, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.21 | **CT+L, Equation:** *Y = 11.13 X-0.13*, R² = 0.81, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.28**2U1F+L, Equation:** *Y = 16.95 X-0.24*, R² = 0.84, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.68 |

**Figure V.** Manure nitrogen to phosphorus ratio (g/g) from 15 days of dairy manure incubation.

CT: UN:FN = 1:1; 2U1F: UN:FN = 2:1; CT+L: CT + Lignite; 2U1F+L: 2U1F + Lignite.

CT used a manure with UN:FN = 1:1; 2U1F used a manure with UN:FN = 2:1; CT+L used a manure with UN:FN = 1:1 + 250 g lignite application; 2UIF+L used a manure with UN:FN = 2:1 + 250 g lignite application; UN:FN = urinary nitrogen: faecal nitrogen.

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| **A graph of different types of incubation  Description automatically generated** | A graph of different types of incubation  Description automatically generated |
| **CT, Equation:** *Y = 1.13 X-0.14*, R² = 0.78, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.04**2U1F, Equation:** *Y = 0.90 X-0.23*, R² = 0.79, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.03. | **CT+L, Equation:** *Y = 2.36 X-0.03*, R² = 0.28, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.03**2U1F+L, Equation:** *Y = 1.93 X-0.09*, R² = 0.70, *P* ≤ 0.001, Standard error of mean (S.E.M) = 0.04. |

**Figure** **VI.** Manure nitrogen to potassium ratio (g/g) from 15 days of dairy manure incubation.

CT: UN:FN = 1:1; 2U1F: UN:FN = 2:1; CT+L: CT + Lignite; 2U1F+L: 2U1F + Lignite.

CT used a manure with UN:FN = 1:1; 2U1F used a manure with UN:FN = 2:1; CT+L used a manure with UN:FN = 1:1 + 250 g lignite application; 2UIF+L used a manure with UN:FN = 2:1 + 250 g lignite application; UN:FN = urinary nitrogen: faecal nitrogen.