Supplementary Table 1 – Primers used from the literature with annealing temperature used in this study indicated.

Species/Gene	Sequence	Paper	Annealing Temperature
tetM	Forward: ACAGAAAGCTTATTATATAAC Reverse: TGGCGTGTCTATGATGTTCAC	Aminov et al., 2001	52°C
sul2	Forward: ATCTGCCAAACTCGTCGTTA Reverse: CAATGTGATCCATGATGTCG	Wang et al., 2014 Haenelt et al., 2023	60°C
16S	Forward: AAACTCAAAKGAATTGACGG Reverse: CTCACRRCACGAGCTGAC	Bacchetti De Gregoris et al., 2011	60°C
***Bacillus cereus* (*gyrB*)**	Forward: CTGTAGCGAATCGTACGTATC Reverse: TACTGCTCCAGCCACATTAC	Wang et al., 1997	50°C
***Campylobacter jejuni* (*mapA*)**	Forward: GGTTTTGAAGCAAAGATTAAAGG Reverse: AAGCAATACCAGTGTCTAAAGTGC	Inglis and Kalischuk, 2004	58°C
Clostridium perfringens* (*recA)	Forward: CTGGTAAAACAACAGTGGCTTT Reverse: AGCTTGTTCTCCTGTATCTGGT	Williams and Ghanem, 2022	51°C
***Escherichia coli* (*yaiO*)**	Forward: TGATTTCCGTGCGTCTGAATG Reverse: ATGCTGCCGTAGCGTGTTTC	Molina et al., 2015	53°C
***Salmonella enterica* (*inva*)**	Forward: ACAGTGCTCGTTTACGACCTGAAT Reverse: AGACGACTGGTACTGATCGATAAT	Chiu and Ou, 1996 Csordas et al., 2004	58°C

Supplementary Table 2: Dunn's test adjusted p-values for Chao1 alpha diversity comparisons

Comparisons Experiment 1: Pig Slurry	**Adjusted p-value**	**Comparisons Experiment 2: Chicken Manure**	**Adjusted p-value**
Chickcrumbs – Chickcrumbs Frass	0.019	Chickcrumbs - Chickcrumbs Frass	0.260
Chickcrumbs – Larvae Chickcrumbs	0.252	Chickcrumbs - Chickcrumbs Larvae	0.889
Chickcrumbs Frass – Larvae Chickcrumbs	0.235	Chickcrumbs Frass - Chickcrumbs Larvae	0.338
Chickcrumbs – Larvae Slurry	0.002	Chickcrumbs - Manure	<0.001
Chickcrumbs Frass – Larvae Slurry	0.429	Chickcrumbs Frass - Manure	0.004
Larvae Chickcrumbs – Larvae Slurry	0.049	Chickcrumbs Larvae - Manure	<0.001
Chickcrumbs - Slurry	<0.001	Chickcrumbs - Manure Frass	<0.001
Chickcrumbs Frass - Slurry	0.001	Chickcrumbs Frass - Manure Frass	0.012
Larvae Chickcrumbs - Slurry	<0.001	Chickcrumbs Larvae - Manure Frass	<0.001
Larvae Slurry - Slurry	0.014	Manure - Manure Frass	0.767
Chickcrumbs – Slurry Frass	<0.001	Chickcrumbs - Manure Larvae	<0.001
Chickcrumbs Frass – Slurry Frass	0.032	Chickcrumbs Frass - Manure Larvae	0.009
Larvae Chickcrumbs – Slurry Frass	0.001	Chickcrumbs Larvae - Manure Larvae	<0.001
Larvae Slurry – Slurry Frass	0.183	Manure - Manure Larvae	0.847
Slurry – Slurry Frass	0.276	Manure Frass - Manure Larvae	0.892
Chickcrumbs – Slurry Only	<0.001	Chickcrumbs - Manure Only	<0.001
Chickcrumbs Frass – Slurry Only	0.043	Chickcrumbs Frass - Manure Only	0.001
Larvae Chickcrumbs – Slurry Only	0.001	Chickcrumbs Larvae - Manure Only	<0.001
Larvae Slurry – Slurry Only	0.214	Manure - Manure Only	0.698
Slurry – Slurry Only	0.239	Manure Frass - Manure Only	0.444
Slurry Frass – Slurry Only	0.892	Manure Larvae - Manure Only	0.515
Chickcrumbs – Starter Larvae	0.211	Chickcrumbs - Starter Larvae	0.112
Chickcrumbs Frass – Starter Larvae	0.281	Chickcrumbs Frass - Starter Larvae	0.742
Larvae Chickcrumbs – Starter Larvae	0.870	Chickcrumbs Larvae - Starter Larvae	0.156
Larvae Slurry – Starter Larvae	0.076	Manure - Starter Larvae	0.014
Slurry – Starter Larvae	<0.001	Manure Frass - Starter Larvae	0.039
Slurry Frass – Starter Larvae	0.001	Manure Larvae - Starter Larvae	0.029
Slurry Only – Starter Larvae	0.002	Manure Only - Starter Larvae	0.003

Supplementary Table 3: Kruskal-Wallis output for comparisons of larvae or substrates for heavy metal and nutrients for pig slurry assay. For significant results, *post-hoc* Dunn's Tests were performed.

	Larvae	Substrates	
			Significant *Post-hoc* Analyses (Dunn's Test)
Conductivity	KW=5.422; df=2; p=0.066	KW=10.233; df=4; p=0.037	
Total Kjeldahl Nitrogen	KW=5.689; df=2; p=0.058	KW=9.6; df=4; p=0.05	Chickcrumbs Frass and Slurry (p=0.030).
Nitrate Nitrogen	KW=0.107; df=2; p=0.948		
Ammonium Nitrogen	KW=5.422; df=2; p=0.066	KW=10.967; df=4; p=0.027	Chickcrumbs and Chickcrumbs Frass (p=0.014)
Total Phosphorus	KW=4.267; df=2; p=0.118	KW=12.7; df=4; p=0.013	Chickcrumbs Frass and S (p=0.019)
Total Potassium	KW=5.067; df=2; p=0.079	KW=12.3; df=4; p=0.015	Chickcrumbs and Slurry Frass (p=0.046)
Total Magnesium	KW=3.467; df=2; p=0.177	KW=12.567; df=4; p=0.014	Chickcrumbs and Slurry Only (p=0.031) and Slurry and Slurry Only (p=0.047)
Total Copper	KW=2.222; df=2; p=0.329	KW=12.433; df=4; p=0.014	Chickcrumbs and Slurry Only (p=0.047)
Total Zinc	KW=2.222; df=2; p=0.329	KW=12.367; df=4; p=0.015	Slurry and Slurry Only (p=0.041)
Total Sulphur	KW=2.489; df=2; p=0.288	KW=10.8; df=4; p=0.029	Chickcrumbs Frass and Slurry (p=0.046)
Total Calcium	KW=5.6; df=2; p=0.061	KW=12.967; df=4; p=0.011	Slurry and Slurry Only (p=0.014)
Total Lead			
Total Cadmium	KW=2.222; df=2; p=0.329		
Total Mercury			
Total Nickel		KW=12.233; df=4; p=0.016	N.S.
Total Chromium			
Total Sodium	KW=5.956; df=2; p=0.051	KW=12.167; df=4; p=0.016	Slurry and Slurry Frass (p=0.046) and Slurry and Slurry Only (p=0.044).
pH	KW=5.6; df=2; p=0.061	KW=12.9; df=4; p=0.012	Chickcrumbs and Slurry Frass (p=0.026) and Chickcrumbs and Slurry Only (p=0.031)
Total Arsenic			
Total Selenium	KW=2.222; df=2; p=0.329	KW=12.3; df=4; p=0.015	Chickcrumbs and Slurry Frass (p=0.046)

Supplementary Table 4: Kruskal-Wallis output for comparisons of larvae or substrates for heavy metal and nutrients in chicken manure assay. For significant results, *post-hoc* Dunn's Tests were performed.

	Larvae		**Substrates**	
		Significant *Post-hoc* Analyses (Dunn's Test)		Significant *Post-hoc* Analyses (Dunn's Test)
Oven Dry Solids	KW=6.006; df=2; p=0.050	L and LCC (p=0.050)	KW=10.167; df=4; p=0.038	CCF and M (p=0.047)
Total Copper	KW=5.956; df=2; p=0.051		KW=7.968; df=4; p=0.093	
Total Zinc	KW=6.489; df=2; p=0.039	L and LCC (p=0.034)	KW=7.233; df=4; p=0.124	
Total Calcium	KW=7.200; df=2; p=0.027	L and LM (p=0.022)	KW=11.167; df=4; p=0.025	Not significant
Total Lead				
Total Cadmium				
Total Mercury				
Total Nickel			KW=7.268; df=4; p=0.122	
Total Chromium				
Total Arsenic				
Total Selenium	KW=5.956; df=2; p=0.051		KW=4.241; df=4; p=0.374	