

Supplementary information

**Transfer and Transformation of CeO₂ NPs along a Terrestrial Trophic
Food Chain**

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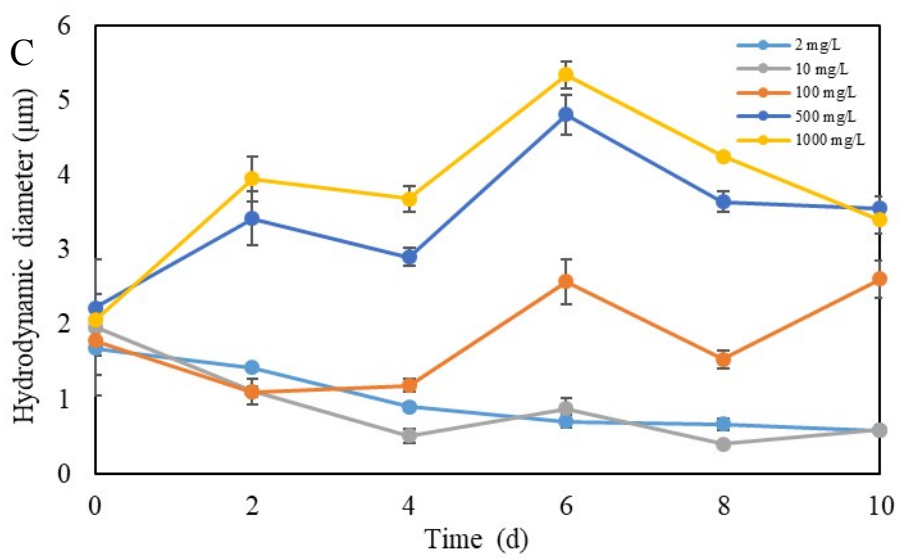
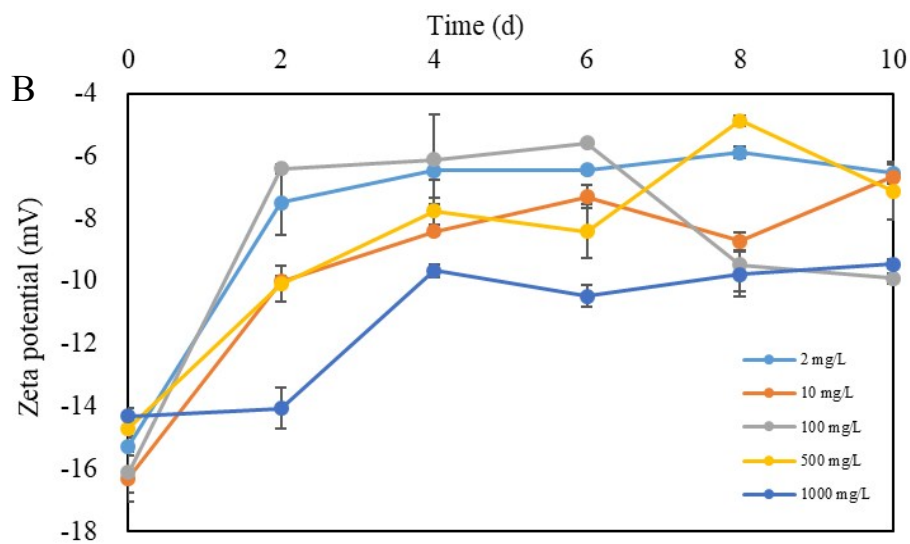
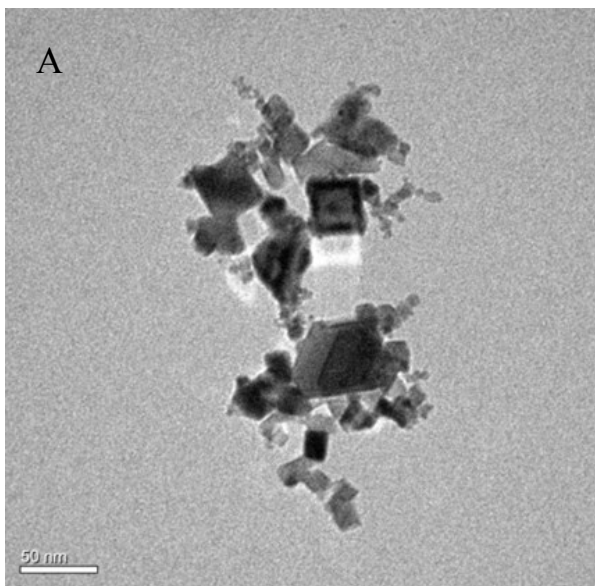


Figure S1. Characterization of CeO₂ NPs. (A): TEM image of pristine CeO₂ NPs. (B) and (C): The zeta potentials and hydrodynamic diameters of CeO₂ NPs (nominal concentrations: 2, 10, 100, 500, and 1000 mg/L) in the nutrient solution after incubation for 0, 2, 4, 6, 8 and 10 days, respectively. The Error bars along with the data denote the standard deviations (n = 3).

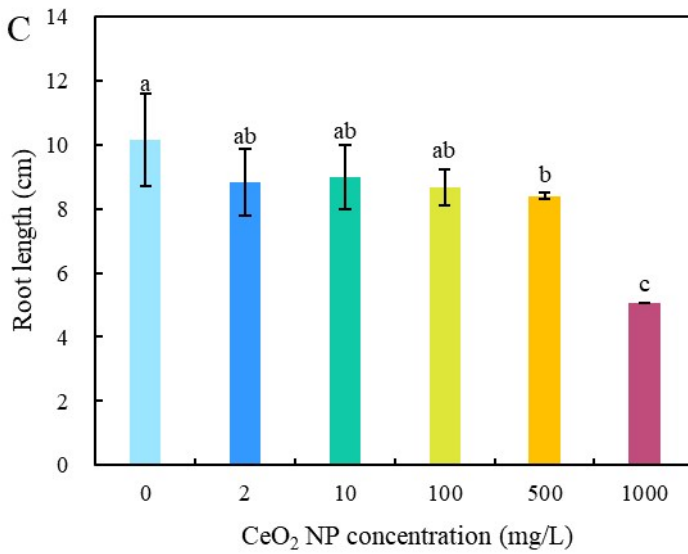
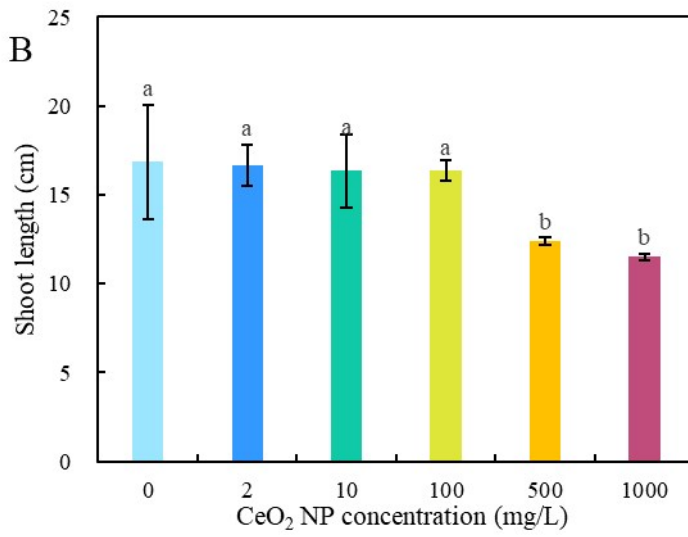
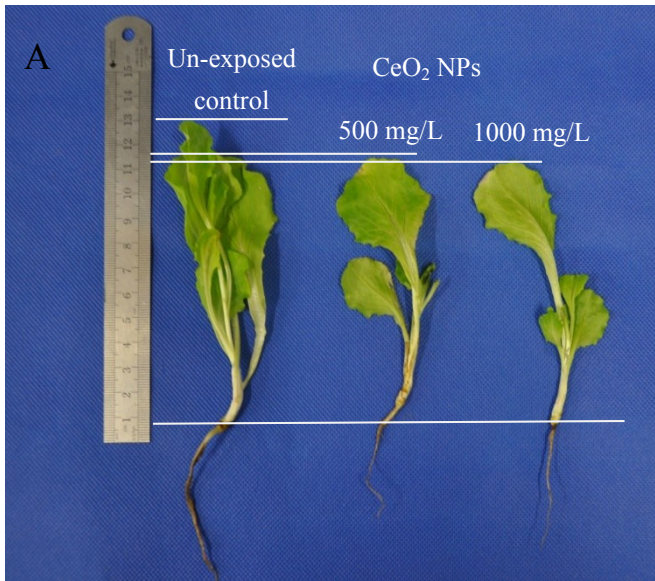


Figure S2. Growth of lettuce under CeO₂ NPs exposure (at nominal concentrations of 0-1000 mg/L,

10 days) via the roots. (A): The image of lettuce growth; (B), (C): Shoot and root length of lettuce, respectively. Different letters (a-c) denoted significant difference (n = 3).

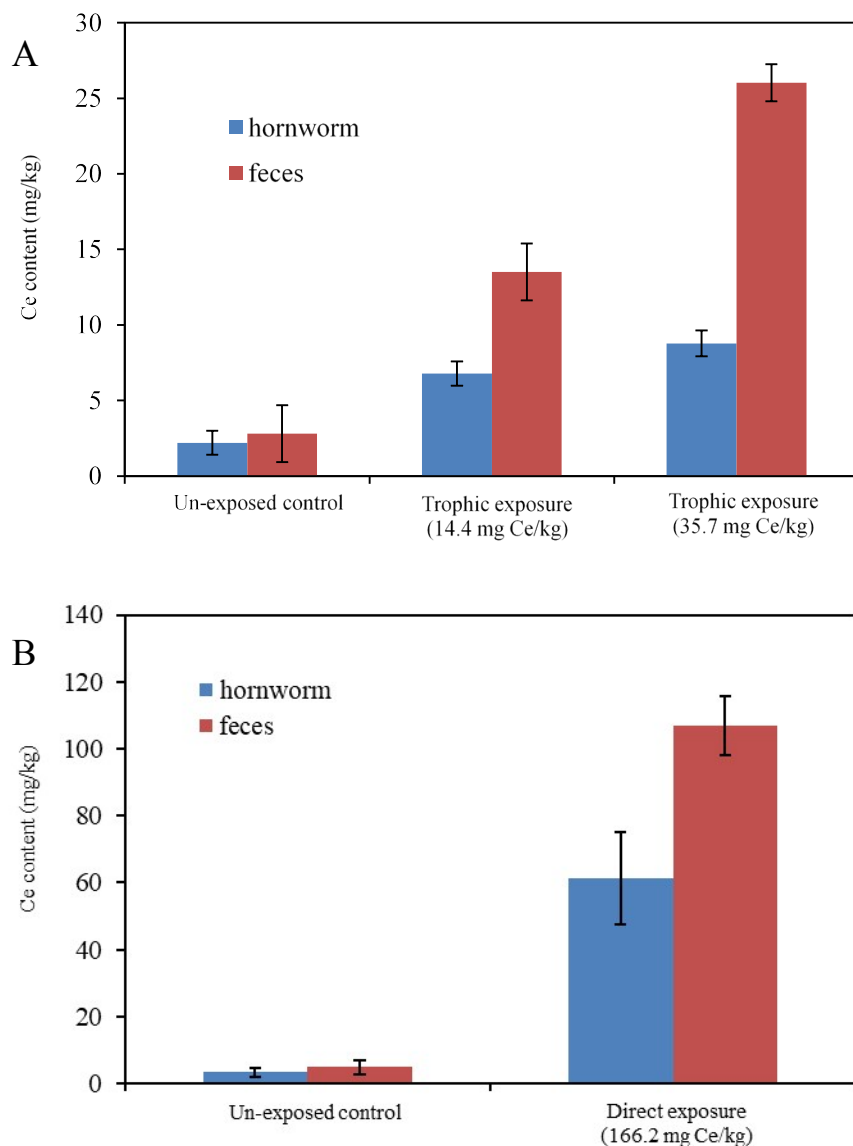


Figure S3. Ce contents in hornworms and feces under different exposures over 7 days. (A): Trophic exposure: hornworms were fed with leaves collected from lettuce under root exposure (14.4 and 35.7 mg Ce/kg dry leaves). (B): Direct exposure: hornworms were fed with leaves of lettuce under foliar exposure (166.2 mg Ce/kg dry leaves).

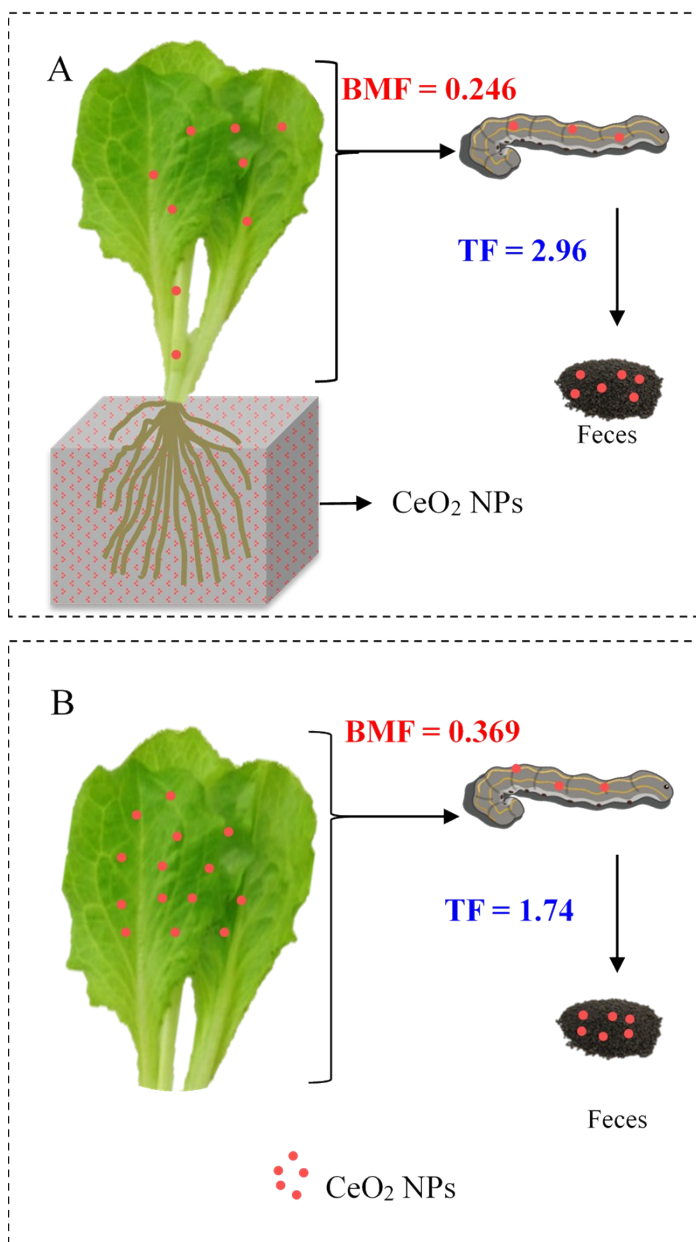


Figure S4. The diagram of hornworms upon trophic and direct exposures. (A): Trophic exposure: hornworms were fed with leaves of lettuce under root exposure (35.7 mg Ce/kg dry leaves). (B): Direct exposure: hornworms consumed leaves of lettuce under foliar exposure (166.2 mg Ce/kg dry leaves). BMF: biomagnification factor; TF: translocation factor.

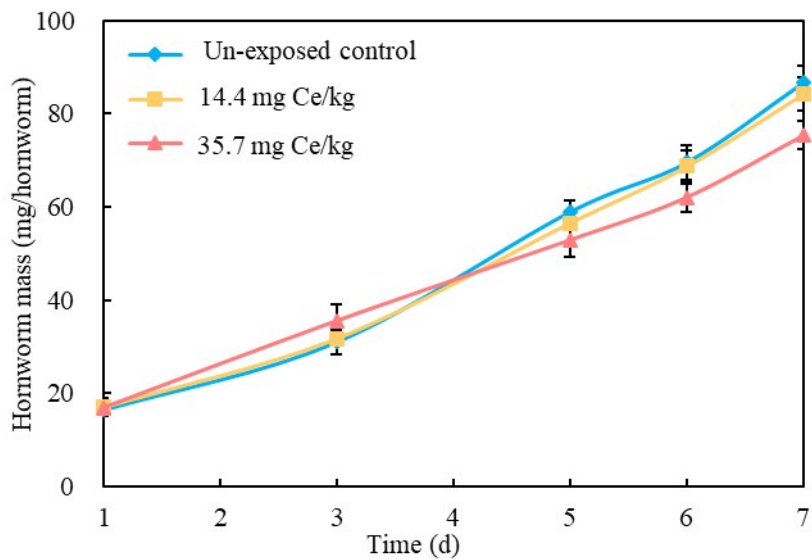


Figure S5. Mass of hornworms after trophic exposure as a function of exposure time. Trophic exposure meant hornworms were fed with leaves of lettuce upon root exposure, and the Ce contents in leaves were 14.4 and 35.7 mg Ce/kg (dry weight), respectively. Error bars indicate standard deviations (n = 5).

Table S1. Ce contents in main organs and feces of chicken under hornworm and leaf dietaries.

Hornworm dietary: chickens were fed with hornworms pre-fed with leaves of lettuce under root exposure (35.7 mg Ce/kg dry leaves). Leaf dietary: chickens were fed with leaves of lettuce under root exposure (35.7 mg Ce/kg dry leaves).

Tissues	Un-exposed control (mg/kg, d.w.)	Hornworm dietary (mg/kg, d.w.)	Leaf dietary (mg/kg, d.w.)
Intestine	0.421±0.090 c	5.28±1.11 b	18.2±3.0 a
Stomach	0.145±0.005 c	3.70±1.21 b	6.96±0.50 a
Brain	0.421±0.184 a	0.633±0.142 a	0.284±0.145 a
Liver	0.0987±0.0373 a	0.0594±0.0138 a	0.0657±0.0010 a
Spleen	0.304±0.158 a	0.213±0.090 a	0.123±0.033 a
Kidney	0.116±0.043 b	0.302±0.061 a	0.208±0.101 ab
Heart	0.152±0.003 a	0.134±0.024 a	0.154±0.003 a
Muscle	0.108±0.010 c	0.254±0.096 b	0.478±0.115 a
Blood	-	-	-
Feces	0.777±0.220 c	13.23±1.51 a	3.63±0.38 b

“-” indicates that Ce content was under the detection limit. d.w.: dry weight.

Table S2. TFs of chicken main organs after hornworm and leaf dietaries. Hornworm dietary: chickens were fed with hornworms (8.78 mg Ce/kg dry hornworms) pre-fed with lettuce leaves (35.7 mg Ce/kg dry leaves) under root exposure; Leaf dietary: chickens were fed with lettuce leaves (35.7 mg Ce/kg dry leaves) after root exposure. TF: translocation factor.

Tissues	Un-exposed control	Hornworm dietary	Leaf dietary
	TF _{organ-leaf}	TF _{organ-hornworm}	TF _{organ-leaf}
Intestine	0.065	0.601	0.510
Stomach	0.023	0.421	0.195
Brain	0.065	0.072	0.008
Liver	0.015	0.007	0.002
Spleen	0.047	0.024	0.003
Kidney	0.018	0.034	0.006
Heart	0.024	0.015	0.004
Muscle	0.017	0.029	0.013