1 **Improving selenium accumulation in broilers using *Escherichia coil***

2 **Nissle 1917 with surface-displayed selenite reductase SerV01**

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23   **Table S1.** Guaranteed values for product composition analysis.

Ingredient (%)	
Crude protein	≥20.0
Crude ash	≤8.0
Crude fiber	≤6.0
Calcium	0.70-1.40
Total phosphorus	≥0.55
Sodium chloride	0.30-0.80
methionine	0.42-0.90
moisture	≤13.50

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25   **Table S2.** Results of gene comparison

	Comparison of LZ-01	
Proteins of Selenite reduction	**Genes**	**Proteins**
Old Yellow Enzymes (OYE)	SAV0956	NADH-dependent flavin oxidoreductase
Glutathione reductase	SAKG03 26900	Sulfite reductase [NADPH] flavoprotein alpha-component
Putative formate dehydrogenase	SAKOR 01018	Dihydrolipoamide dehydrogenase

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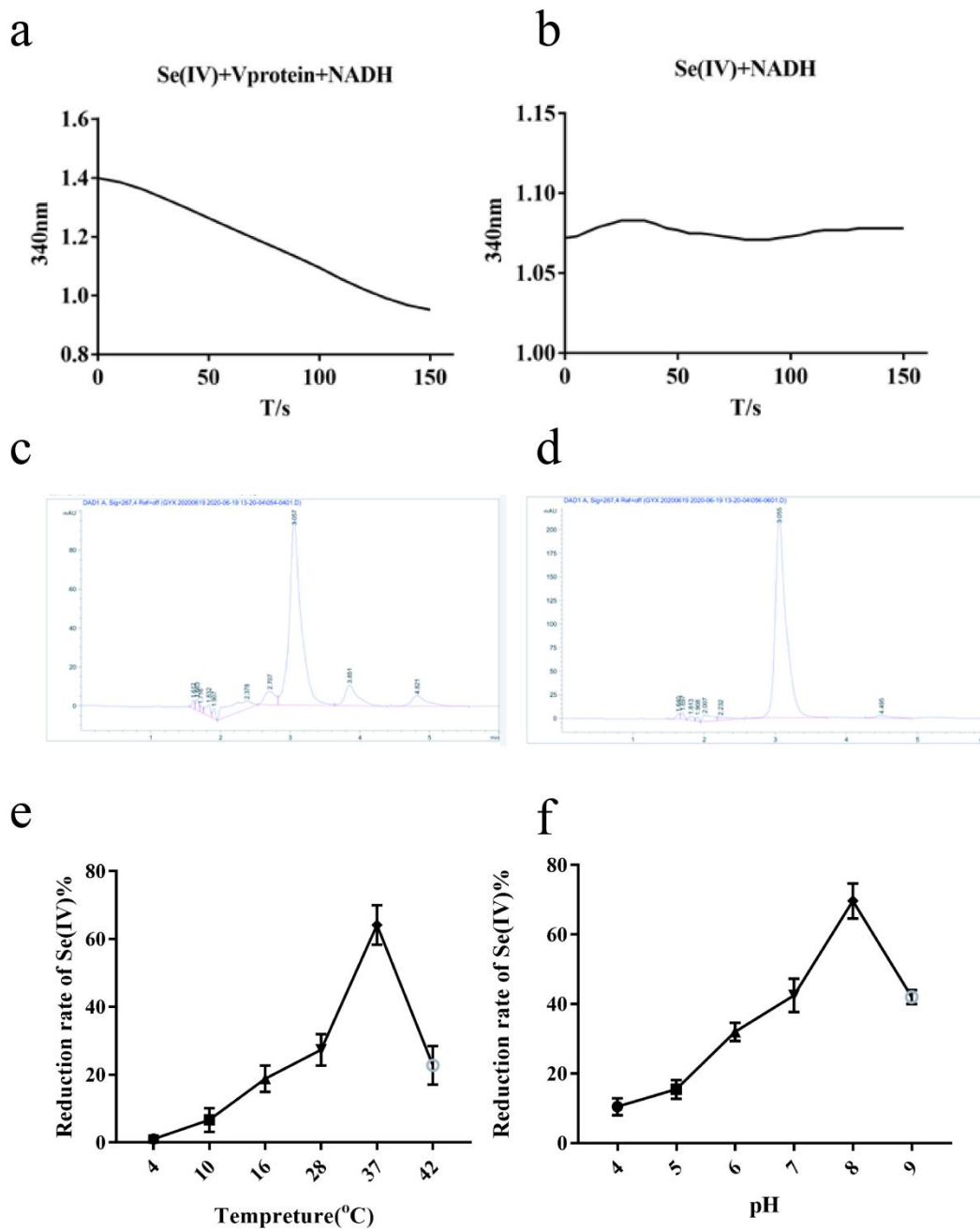
**Fig. S1.** (a) Decrease in NADH at 340nm when SerV01 binds with NADH to reduce selenite. (b) No significant decrease at 340nm when SerV01 without adding NADH (c) HPLC results of protein supernatant, the peak time is 3.055 min. (d) HPLC results of FMN standard liquid. (e) Effects of temperature on enzyme activity (f) Effects of pH on enzyme activity. Data are expressed as mean ±standard deviation (n = 3), with the significant difference ($P < 0.05$).
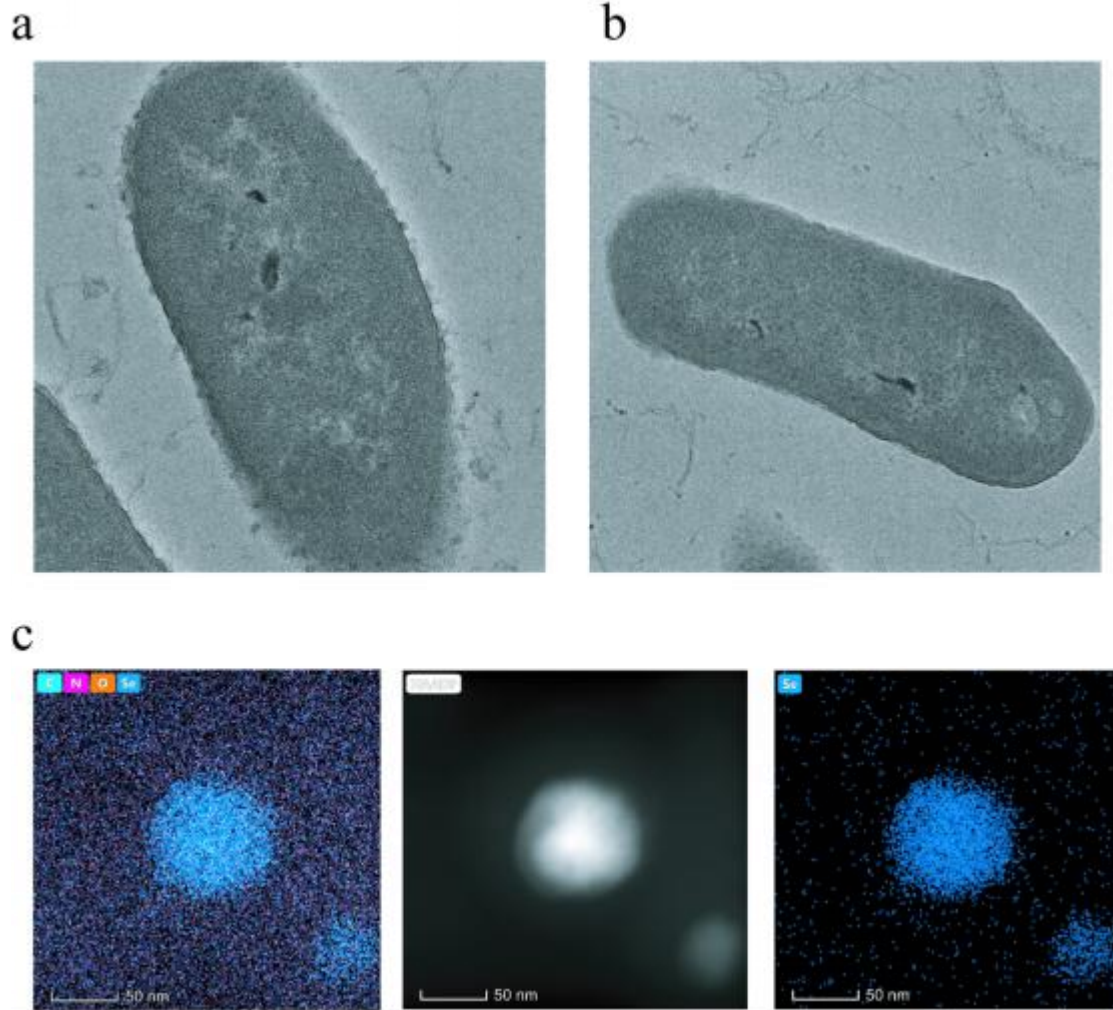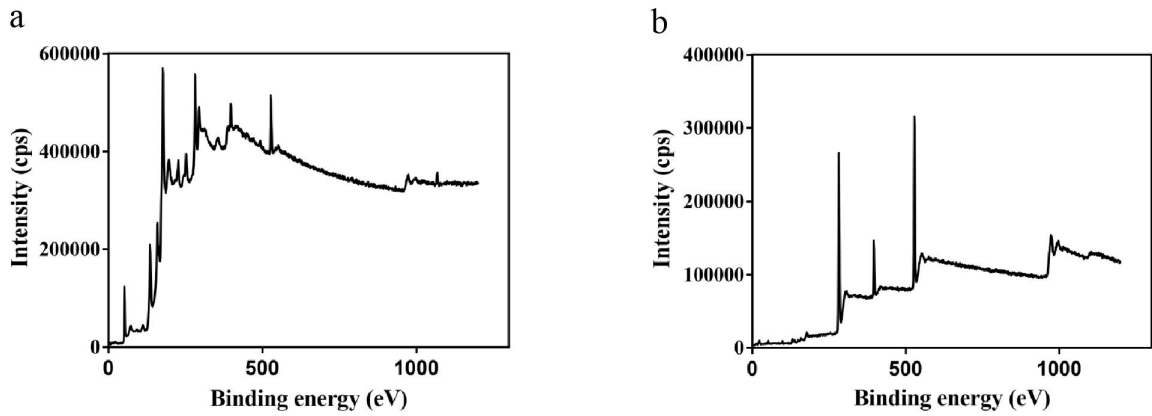
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36　**Fig. S2.** (a) Sections of EcN-IS incubated in LB medium with 1 mmol/L Na_2SeO_3 for

37　4 h and the situation of reduzate SeNPs on cells was analyzed through the TEM. (b)

38　Sections of EcN- pSB1A3 incubated in LB medium with 1 mmol/L Na_2SeO_3 for 4 h

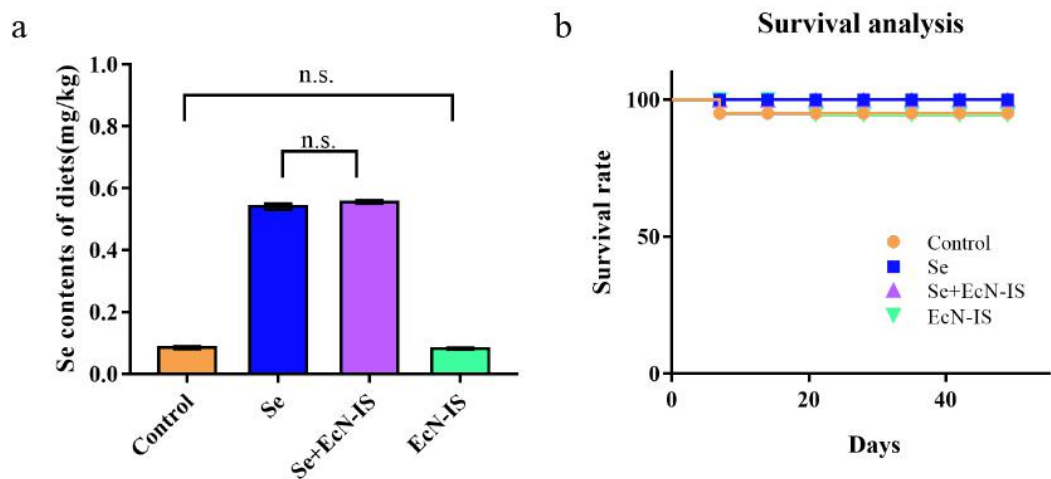39　(c) The reduzate SeNPs were analyzed by the TEM mapping method.

Fig. S3. (a) XPS spectrum of elements C, N, O, P, S, Se in Chem-SeNPs. (b) XPS spectrum of elements C, N, O, P, S, Se in Bio-SeNPs.
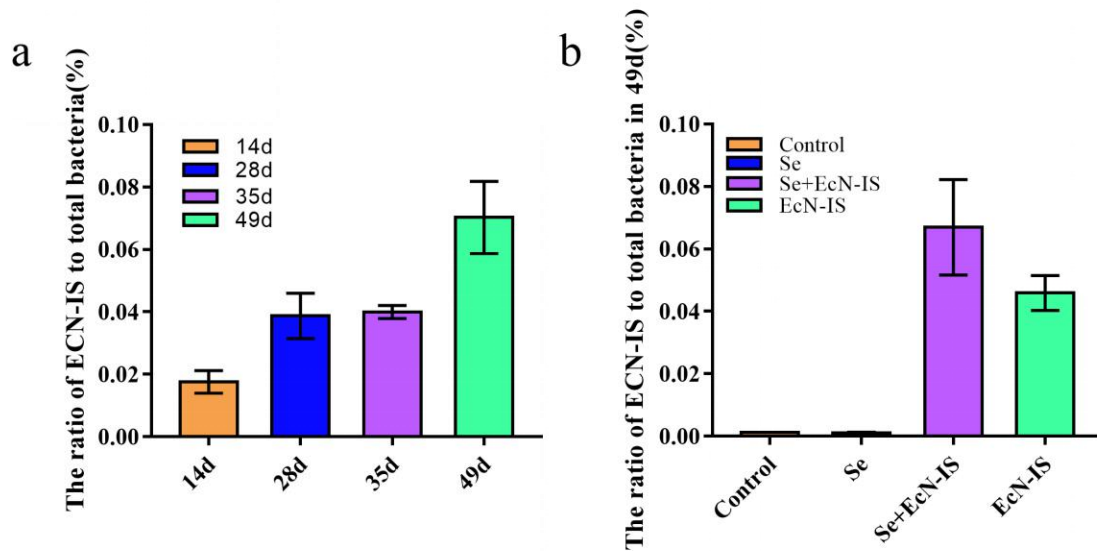

**Fig. S4.** (a) The concentration of Se in different diets (Control, Se, Se+EcN-IS, EcN-IS). (b) The survival analysis of different treatments (Control, Se, Se+EcN-IS, EcN-IS). (n.s. $P > 0.05$, *$P \leq 0.05$, **$P \leq 0.01$, ***$P \leq 0.001$, ****$P \leq 0.0001$).

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Fig. S5. (a) EcN-IS colonization in broilers cecum contents after the oral administration of EcN-IS was terminated at the 14th, 28th, 35tha and 49th days, respectively. (b) Colonization in broilers cecum contents among four groups on the 49th day. Data are expressed as mean ±standard deviation (n＝3), with the significant difference ($P < 0.05$).
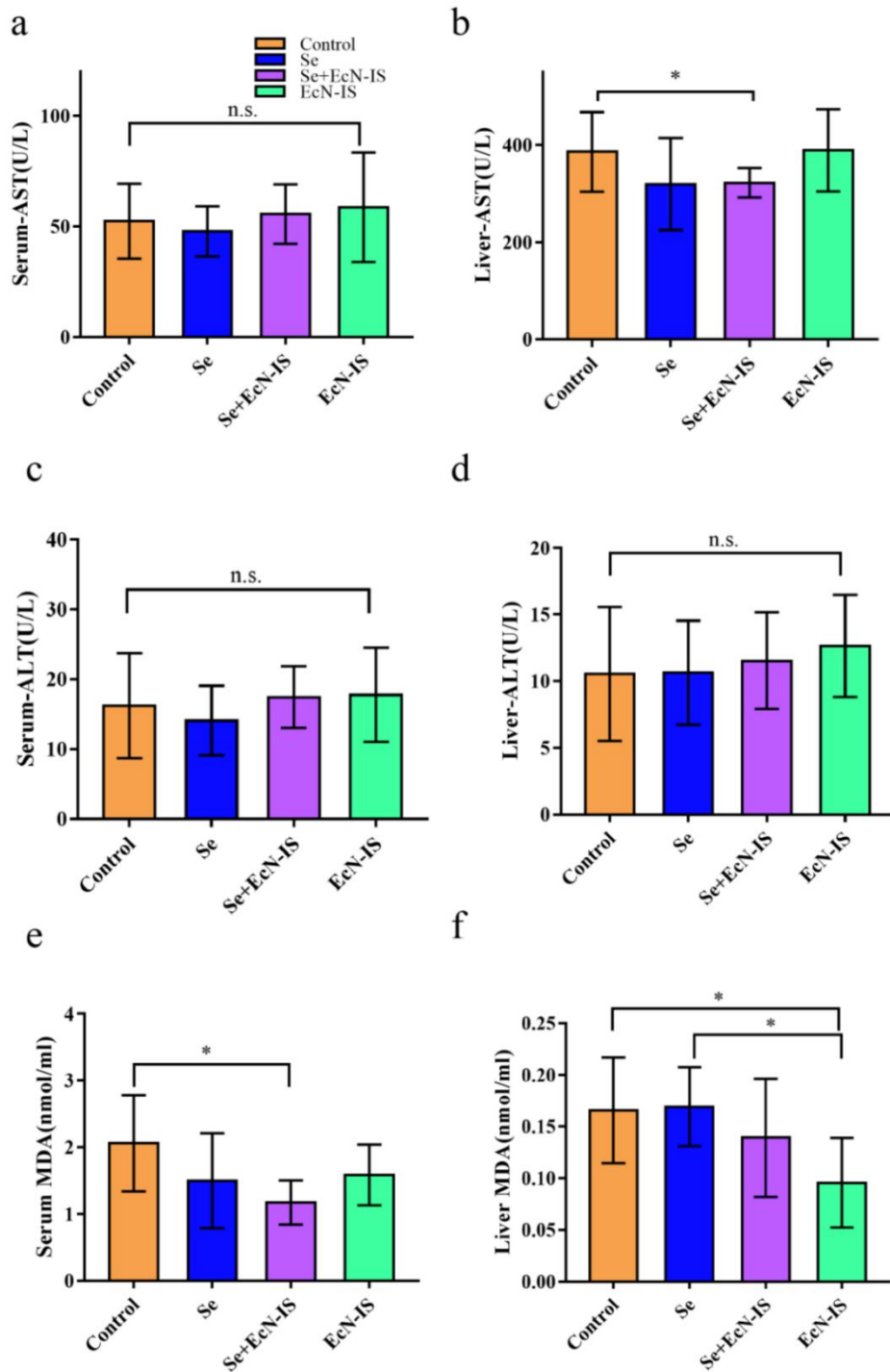
Fig. S6. Activities of hepatic metabolic enzymes and index of membrane lipid peroxidation in liver and serum, (a,b) AST of serum and liver, (c,d) ALT of serum and liver (e,f) MDA of serum and liver. Data are expressed as mean ±standard deviation (n = 10), with the significant difference $P < 0.05$. (n.s. $P > 0.05$, *$P \leq 0.05$, **$P \leq 0.01$, ***$P \leq 0.001$, ****$P \leq 0.0001$).