

Supplementary Material

Distribution and Management of Residual Antibiotics in *Litopenaeus vannamei*

Shrimp Farming Environment: Recommendations for Effective Control

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Table S1. Temperature, salinity, and pH of water bodies in ponds 1-3.

Aquaculture Pond	Temperature (°C)	Salinity (‰)	pH	DO (mg/L)
1	23.06±0.63	1.58±0.01	7.4±0.03	13.96±2.58
2	23.1±0.78	1.59±0.01	8.05±0.05	10.19±3.31
3	24.25±0.69	1.46±0.02	8.16±0.02	10.09±0.53

Table S2. Feed feeding situation in shrimp farming.

Breeding Stage	Feed	Dosage	Number of Times
Before breeding	/	/	/
Post-larvae	Open feed	0.003g	5-7 times a day
Early stage of juvenile shrimp	NO.0 feed	0.01g	4-5 times a day
Middle stage of juvenile shrimp	NO.1 feed	0.1g	3-4 times a day
Adult shrimp stage	NO.1 feed	1g	1-3 times a day

Table S3. The reagents used in the experiment

Reagent Name	Purity/Specification	Manufacturers
Methanol	chromatographic purity	Anpel, CNW
Acetonitrile	chromatographic purity	Anpel, CNW
Propanone	chromatographic purity	Anpel, CNW
Hexyl hydride	chromatographic purity	Anpel, CNW
Acetic Acid	chromatographic purity	Anpel, CNW
Edetate disodium (Na_2EDTA)	analytical purity	Sinopharm chemical reagent
Citric acid monohydrate ($\text{C}_6\text{H}_8\text{O}_7 \cdot \text{H}_2\text{O}$)	analytical purity	Sinopharm chemical reagent
Dibasic Sodium Phosphate ($\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$)	analytical purity	Sinopharm chemical reagent
ultrapure water	The resistivity was $18.2\text{M}\Omega \cdot \text{cm}$	Merck (Germany), Millipore

Table S4. Mass spectrometry condition parameters for various target antibiotics

Chemical Compound	Parent Ion (m/z)	Daughter Ion (m/z)	Retention Period (min)	Cracking Voltage (V)	Collision Energies (eV)
SDZ	250.9	108.0, 155.9	4.98	70	25, 16
SMX	253.9	92.1, 108.0	5.33	71	27, 25
SMZ	279.0	124.1, 185.9	5.38	67	24, 17
SMD	280.9	92.1, 155.9	5.20	76	28, 17
TMP	291.0	230.0, 261.0	4.76	86	25, 23
¹³ C-TMP	294.2	231.1, 262.1	4.77	112	25, 23
NOF	320.2	276.2, 302.2	4.85	116	15, 20
LEOF	362.2	261.2, 317.9	4.59	114	27, 18
TC	445.2	154.0, 410.3	5.07	118	26, 19
OTC	461.2	426.5, 443.9	5.19	135	18, 15
CTC	479.1	444.1, 462.0	5.40	120	20, 17
ETM	716.4	158.2, 558.7	5.76	87	28, 16
RTM	837.8	158.0, 680.0	5.54	82	30, 20

Table S5. The content levels of various antibiotics in feed, pond water, sediment, and shrimp body during a farming cycle.

Antibiotic Name	Aquaculture Available/Prohibited	Feed ($\mu\text{g}/\text{kg}$)	Water (ng/L)	Sediment ($\mu\text{g}/\text{kg}$)	Shrimp ($\mu\text{g}/\text{kg}$)
SDZ	available	n.d.-2.40	n.d. -2.29	n.d. -1.77	n.d.
SMX	available	5.32-13.96	2.17-7.87	0.95 -5.88	1.09-8.95
SMZ	available	n.d.	n.d.	n.d.	n.d.
SMD	available	n.d.	n.d.	n.d.	n.d.
TMP	available	n.d.-1.10	n.d.	n.d.	n.d.
TC	available	n.d.-9.90	n.d.-6.31	n.d. -4.33	n.d.-8.13
OTC	available	16.95-30.73	16.59 -54.37	2.72 -10.52	5.91-26.80
CTC	available	5.69-15.71	n.d.-3.61	n.d. -3.22	n.d.-16.08
NOF	prohibited	n.d.-25.57	n.d.	2.41-8.09	3.50-16.16
LEOF	prohibited	5.45-46.45	n.d.-11.74	n.d.-21.72	21.67-78.02
ETM	prohibited	n.d.	n.d.	n.d.	n.d.
RTM	NA	n.d.-2.92	n.d.	n.d.-2.10	n.d.

Note: n.d.: indicates not detected; NA: indicates no relevant standards; Bold text: indicates prohibited antibiotics in aquatic products and their data.

Table S6. Correlation analysis between the content of TCs antibiotics in feed and residual concentrations in water.

Correlation	Water	Feed
water	1	0.884*
feed	0.884*	1