



Benzocal-50

(Benzoic acid \geq 50%)

Innovative enteric-release preparation

Anti-secretory, Natural performance enhancer

Enteric-release benzoic acid \geq 50%

- ① Original enteric- release preparation technology, 1:3 to replace regular benzoic acid.
- ② MOA: Anti-bacteria, anti- secretory.
- ③ Odorless, beneficial to feed intake, no toxicity even at high dosages.
- ④ Highly stable; no reaction with feed ingredients, no corrosion or sublimation; better mixing uniformity.
- ⑤ Alternative to other acidifiers with superior performance.



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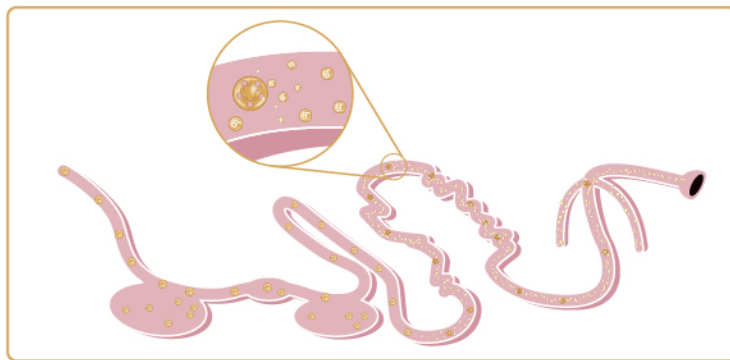
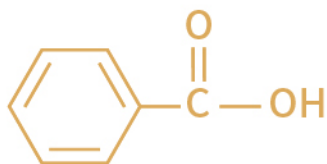
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Insighter®
Solutions Of Gut Problems

1. Main component of Benzocal-50

Enteric-release benzoic acid $\geq 50\%$



Original ion exchange resin technology to ensure benzoic acid was released in the posterior part of small intestine.

2. Why benzoic acid needs to be enteric-release?

- ① The bioavailability of benzoic acid is > 80%. In order to maintain high level in hindgut to inhibit pathogens, the dosage of regular benzoic acid required is too high.
- ② Regular benzoic acid reacts with CaCO_3 added in animal feed.
- ③ High dosage of regular benzoic acid irritates the digestive tract and reduces animal feed intake.

3. Characteristics of Benzocal-50

- ① Intestinal targeted-release, 1:3 to replace regular benzoic acid.
- ② High stability, no package swelling, no corrosion of the equipment, no sublimation.
- ③ Odorless, beneficial to feed intake.
- ④ Target anti-secretory, alternative to acidifier.
- ⑤ Lower cost, better product performance.
- ⑥ A highly effective alternative to AGPs.

Table 1. Comparison of the characteristics and performance of different benzoic acid product

Products	Industrial benzoic acid	Regular benzoic acid	Coated benzoic acid	Benzocal-50
Odor	Pungent	Smelly	Smelly	Odorless
Taste	Sour	Sour	Sour	Tasteless
Toxic impurities	High	Low	High	No
Caking	Yes	Small lumps	No	No (fluidity powder)
Reactivity	Acidic-Strong	Acidic-Strong	Acidic-Strong	Neutral-No
Stability	Sublimate	Sublimate	Sublimate	Stable
Corrosivity	Strong	Strong	Strong	No
Enteric release	No	No	No	Yes
Impact on palatability	Serious	Medium	Medium	No

4. Application effects of Benzocal-50

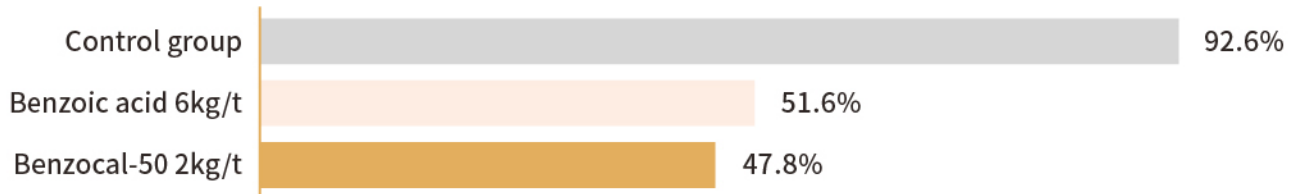


Figure 1. Therapeutic effects of Benzocal-50 on diarrhea piglets (diarrhea rate, %)

Note: Weaned piglet were fed with low zinc, low copper, no AGPs diets. After 5 days of feeding, 60 diarrhea piglets were selected and randomly divided into 3 treatment groups. The therapeutic effects were compared after 7 days.

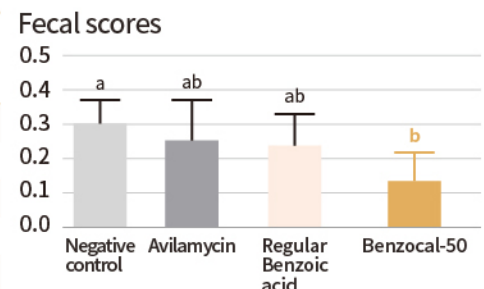
Table 2. Dietary supplementation of Benzocal-50 and antibiotics on the growth performance in nursery pigs

Items	Negative control (NC)	Antibiotics (AS)	Benzocal-50 (MA)	SEM	P-Value	
					vs. AS NC	vs. MA NC
Initial BW,kg	6.6	6.6	6.6	0.3	1.000	0.864
Final BW,kg	19.0	21.3	20.6	0.9	0.046	0.173
ADG,g/d	353	419	398	23	0.043	0.164
ADFI,g/d	515	606	576	31	0.046	0.176
G:F	0.66	0.69	0.70	0.02	0.330	0.295

Note: Animal Research Center, NCSU, U.S. August.2022;36 health nursery pigs (21-day-old), 3 treatments × 12 reps × 1 pigs; Negative control: basal diet (NRC2012); Antibiotics: basal diet + 2.5kg/ton of BMD; Benzocal-50: basal diet + 2 kg/ton (1-10 days) or 1.7 kg/ton (11-25 days) of Benzocal-50; Different superscript in the same row means significant differences ($P < 0.05$).

Table 3. Dietary supplementation of Benzocal-50 on the growth performance in Ross 308 broilers

Items	Negative control	Avilamycin	Regular Benzoic Acid	Benzocal-50	Fecal scores
Inclusion level -		50 ppm	1000 g/t	330 g/t	
ADG, g	70.89	72.42	71.41	72.47	
ADFI, g	112.57	112.07	112.37	113.21	
F : G	1.588 ^a	1.548 ^b	1.574 ^{ab}	1.562 ^{ab}	
Mortality, %	7.292	6.771	5.729	5.208	



Note: University of Manitoba, Dec 1st 2021 -Jan 11th 2022. Floor pen. 4 treatments × 6 replicates × 32 birds; Different superscript in the same row means significant differences ($P < 0.05$).

Table 4. Dietary supplementation of Benzocal-50 on the Product performance and Egg Quality in Lohmann LSL Lite Layers

Items	HDEP, %	Feed intake, g/b/d	Egg weight, g/b/d	Egg mas, g/b/d	FCR, g/g
Control	95.4 ^b	102.5 ^b	57.3 ^c	54.7 ^b	1.878
BMD	96.7 ^a	106.1 ^a	58.8 ^a	56.8 ^a	1.865
Benzocal-50	96.9 ^a	107.8 ^a	58.2 ^b	56.4 ^a	1.911
SEM	0.375	1.209	0.137	0.238	0.023

Note: University of Guelph, September 2022 – January 2023; 3 treatment x 8 replicates x 30 birds, 12 weeks; Control: Basal diet without AGPs (NCR 1994); BMD: Control + 110g/ton BMD; Benzocal-50: Control + 330g/ton Benzocal-50; Different superscript in the same row means significant differences ($P < 0.05$).

Table 5. Comparison of Benzocal-50 or regular benzoic acid on the growth performance in Cherry Valley Ducks

Items	Negative control	CTC	Benzocal-50	Regular Benzoic acid
ADFI, g	171.66±1.15 ^{ab}	173.64±1.30 ^a	166.26±1.44 ^c	168.14±2.22 ^b
ADG, g	96.67±0.56 ^c	99.56±0.60 ^b	100.01±1.35 ^b	95.75±1.36 ^c
Final Body Weight, Kg	4.01±0.02 ^c	4.13±0.02 ^b	4.15±0.05 ^b	3.98±0.06 ^c
F : G	1.82±0.02 ^a	1.77±0.01 ^b	1.70±0.01 ^d	1.78±0.02 ^{ab}
Survival Rate, %	96.21±2.17	98.48±0.96	96.97±1.52	96.21±1.40

Note: Jiangsu Academy of Agricultural Sciences, December 1st 2021 - January 11th 2022. 3 treatments × 6 replicates × 22 birds, 42 days of trail; Control: commercial no AGPs diet; CTC: control + 50mg/kg aureomycin; Benzocal-50: control+650ppm Benzocal-50 (1-21 days) or 330ppm Benzocal-50 (22-42days); Regular Benzoic acid: control+2000ppm Benzoic acid (1-21 days) or 1000ppm Benzoic acid (22-42days); Different superscript in the same row means significant differences (P < 0.05).

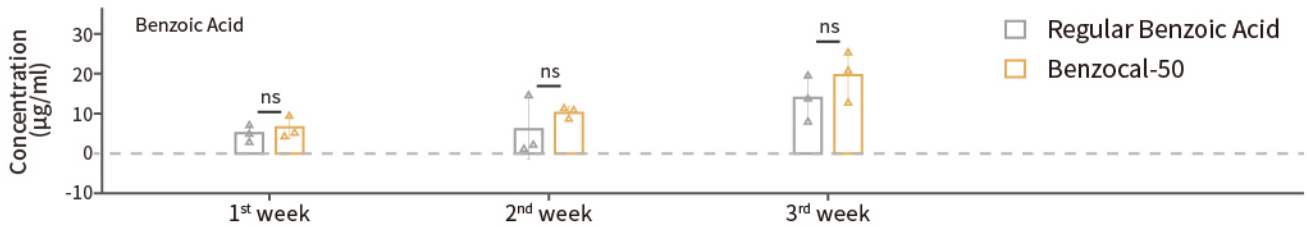


Figure 2. Dietary supplementation of Benzocal-50 or regular benzoic acid on the concentration of benzoic acid in digesta in nursery pigs

Note: 18 piglets (10 kg of BW) were randomly assigned to Regular Benzoic acid group (5000ppm) and Benzocal-50 group (1670ppm). The feeding trail lasted for 3 weeks. On the 7th, 14th and 21th day of experiment, every treatment group sacrificed 3 pigs for sample collection to analysis the benzoic acid concentration in rear part (1/4) of small intestine.

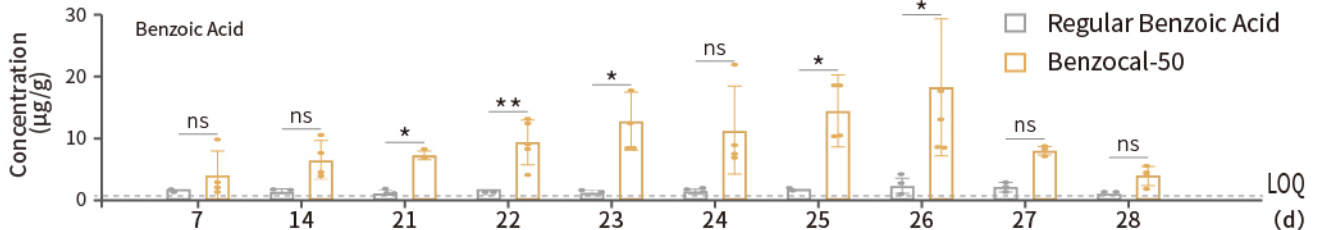





Figure 3. Dietary supplementation of Benzocal-50 or regular benzoic acid on the concentration of benzoic acid in digesta in broilers

Note: 110 broilers (50 days) were randomly assigned to Regular Benzoic acid group (1000 ppm) and Benzocal-50 group (330 ppm). The feeding trail lasted for 3 weeks. On the 7th, 14th, 21th, 22nd, 23rd, 24th, 25th, 26th, 27th and 28th day of experiment, every treatment group sacrificed 8 - 9 broilers for sample collection to analysis the benzoic acid concentration in rear part (1/4) of small intestine

5. Recommended dosage

Animal	Phase	Dosage (g/t)	Animal	Phase	Dosage (g/t)
 swine	Weaned piglet	500 - 2,000	 Chicken	Broiler	150 - 330
	Nursery	500 - 1,500		Laying hens	150 - 330
	Grower	500 - 1,000	 Duck	Meat duck	150 - 330
	Finisher	250 - 500		Laying duck	150 - 330

Note: Benzocal-50 1:3 to replace regular benzoic acid.



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