HR Antibacterial Peptide Feed Additive

Cecropin-based cationic peptide · Supported by quality testing and in vitro assays

Approx. 10%	90 points	2.4 ppm
Effective peptide (HPLC)	Comprehensive retest score	C. perfringens MIC
Sample peak area: 1,300,962	Sample A2	High-activity sample

Product Positioning

HR is a feed additive solution centered on cecropin-based cationic antibacterial peptides. It is intended to support animal nutrition, intestinal microbial management, and programs used during periods of elevated bacterial challenge. Its positioning is built around measurable composition, testable activity, and clearly defined application boundaries. HPLC is used to monitor the effective peptide fraction, while agar diffusion and MIC methods support batch-level in vitro activity assessment.

- **Practical value**
  May be incorporated into routine nutritional management or challenge-period programs. Application should consider species, age, diet, water quality, and farm health status.

Target Organisms and Spectrum

Current technical data focus on Escherichia coli K88, Staphylococcus aureus 01337, Salmonella, Clostridium perfringens (C. welchii), and Riemerella anatipestifer. In vitro observations under defined test conditions do not constitute claims of disease treatment in animals.

Primary Mechanism: Membrane Targeting

- **1 Electrostatic attraction**
  The net-positive peptide can preferentially interact with negatively charged components on bacterial surfaces and accumulate at the membrane.
- **2 Amphipathic insertion**
  Its hydrophilic-hydrophobic structure supports insertion into the lipid bilayer, disturbing membrane organization and local stability.
- **3 Permeability disruption**
  Loss of membrane integrity may disturb ion gradients and release intracellular material, inhibiting growth or causing cell death.
- **4 Mechanistic boundary**
  Membrane targeting is generally a multi-site physical process and may reduce escape through mutation of a single intracellular target. Sensitivity still varies with strain and environment.

Application Fields and Typical Scenarios

Poultry

Routine intestinal-health management in chickens and ducks; feed changes, transfer, stocking-density or environmental stress; nutritional support during bacterial challenge periods.

Livestock

Routine inclusion for pigs and other farm animals; weaning, transfer, transport, and heat stress; management support when feed intake or fecal condition fluctuates.

Companion Animals

A formulation-development direction for dog and cat food, supplements, or gut-health products. Palatability, target-animal safety, and local regulatory compliance require separate validation.

Aquaculture

A potential direction for fish and shrimp feeds or aquatic production management. Dedicated evaluation should consider salinity, temperature, feeding method, and target organisms.

Formulation and Application Notes

- **Scenario-specific development**
  Digestive physiology, pelleting conditions, salinity, and feeding methods differ substantially. Stability, compatibility, and small-scale application testing are recommended.
- **Avoid over-extrapolation**
  The core evidence currently consists of compositional and in vitro antibacterial data. Poultry or livestock outcomes should not be directly extrapolated to companion animals or aquaculture.

Experimental Support and Suggested Use

Reorganized from the current technical dossier; external institution names are intentionally omitted

Evidence Highlights

- **HPLC identity and content**
  A response relationship was built with 1, 2.5, 5, and 10 mg/mL standards. The peak area of the 50 mg/mL test solution was 1,300,962, supporting an estimated effective peptide content of approximately 10%.
- **Agar diffusion activity**
  At 10x, 20x, 40x, and 80x dilution, inhibition zones were 18, 15, 13, and 9 mm for E. coli K88; and 29.5, 26, 20, and 16.5 mm for S. aureus 01337.
- **Minimum inhibitory concentration**
  In a two-fold microplate dilution assay, MIC against C. perfringens was 4.8 ppm for the regular sample and 2.4 ppm for the high-activity sample.
- **Comprehensive retest**
  Sample A2 received a comprehensive score of 90. This supports sample screening and batch comparison; the score is not equivalent to in vivo efficacy.

Suggested Use

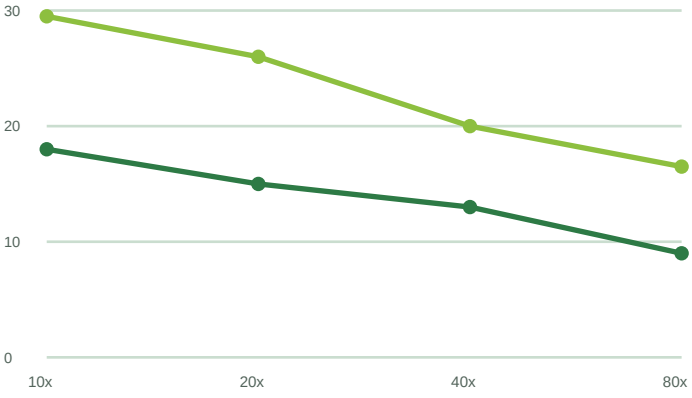
- **Routine feed inclusion**
  100-200 g per metric ton of feed. Premix stepwise and distribute evenly.
- **High-challenge periods**
  300-400 g per metric ton of feed for 5-7 consecutive days.
- **Drinking-water application**
  1-2 kg per metric ton of clean water for 5-7 consecutive days. Maintain water-line hygiene and even intake.
- **Cross-sector application**
  For companion animals and aquaculture, begin with formulation compatibility, small-scale palatability or feeding acceptance, and target-organism assays. Do not directly reuse the above dosages.

Interpretation and Quality Control

- **Meaning of indicators**
  Larger inhibition zones generally indicate stronger activity under diffusion conditions. A lower MIC generally indicates higher in vitro antibacterial activity.
- **Batch management**
  HPLC peak identity, estimated effective content, target-organism inhibition zones, and MIC can be combined for trend monitoring.
- **Application boundary**
  Field performance is affected by pathogen load, husbandry, feed, and water quality. Consult a qualified veterinarian when disease signs occur.

Experimental Data

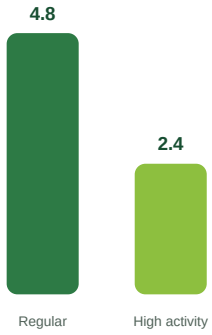
Inhibition Zones at Different Dilutions (mm)



E. coli K88: 18 / 15 / 13 / 9

S. aureus 01337: 29.5 / 26 / 20 / 16.5

C. perfringens MIC (ppm)



HPLC Peak-Area Response

Standard	Peak area
1 mg/mL	125,707
2.5 mg/mL	555,223
5 mg/mL	1,053,387
10 mg/mL	2,640,079
Sample 50 mg/mL	**1,300,962**

Evidence Note

These data were generated with specific samples, organisms, and test conditions. HPLC estimates the effective peptide fraction. Inhibition zones are also influenced by product diffusion, culture medium, and inoculum. MIC compares the lowest inhibitory concentration in vitro. Values from different methods should not be used interchangeably or independently extrapolated into claims of clinical treatment, zero residue, or absolute absence of resistance. Retain original chromatograms, culture records, organism information, and result-review records for each batch.

Batch test results govern final quality acceptance.