

# pHorce

- decontaminating raw materials
- use in premixes
- use in poultry feed
- use in swine feed
- suitable for all monogastrics

Concentrated acidifier – flexible application...

  
Performance in aquaculture&agriculture

# introduction

pHorce provides double benefit protection for animal production

- Controls enteropathogens in raw materials and finished feed.
- Promotes a strong gastric acid barrier in young animals.
- Acidifies the feed to promote digestion.

pHorce combines free carboxylic acids and their ammonium salts on a micropearl carrier. The carrier ensures the product is safe and easy to use and can be readily dispersed into feedstuffs and through premixes.

pHorce has been shown to be significantly more potent than similar acid products using different carrier systems and is used at low application rates, typically 0.5 – 0.7 kg/t of finished feed.

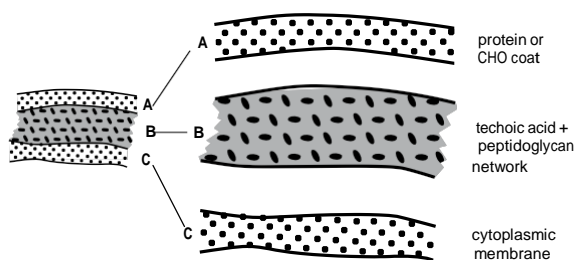
Its flexibility enables it to be particularly useful in

- Decontaminating raw materials - trials show efficacy in salmonella contaminated bulk fishmeal.
- Use in premixes.
- Use in concentrates.
- Use in finished feed.

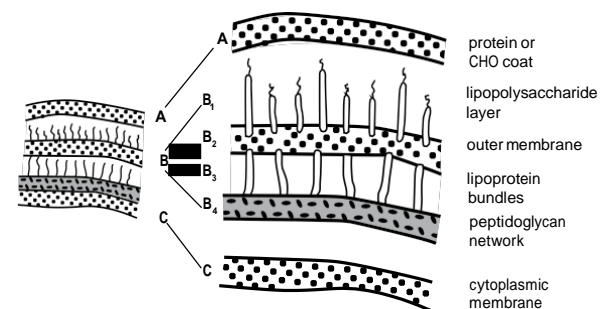
pHorce is a white free-flowing material durable enough to be added to mineral and vitamin premixes.

## acid synergy gives high potency

Gram positive bacterial cell wall



Gram negative bacterial cell wall



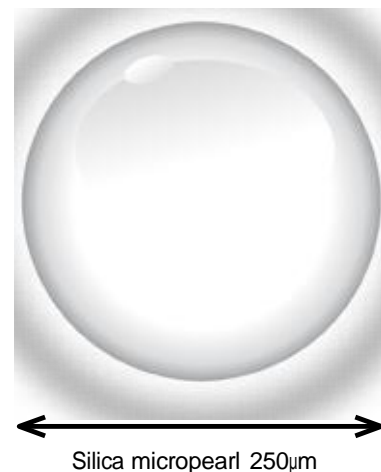
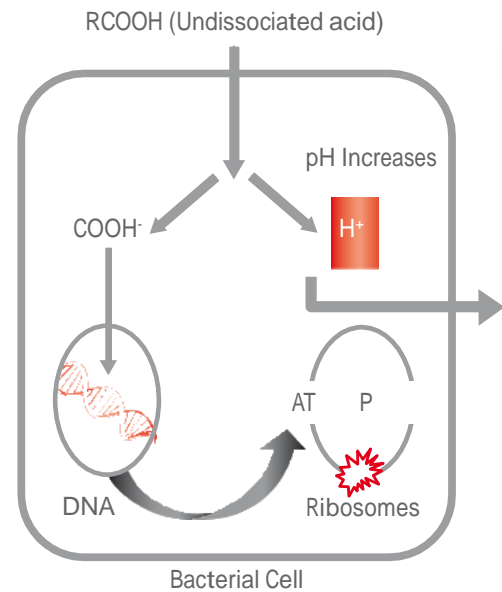
pHorce utilises the combination of two highly effective acids – formic and propionic acids – to combat pathogenic bacteria. Gram negative organisms have more complex cell wall structure compared to the generally more favourable bacterial species classified as Gram positive. Gram negative bacteria are characterised by a thin lipopolysaccharide and lipoprotein network, which is easily dissolved by lipophilic acids such as propionic acid. However, propionic acid does not affect the peptidoglycan layer. Small molecules such as formic acid in its undissociated form can pass through the protein layer and enter the cell through the lipid structure, damaged by the propionic acid, and the porous peptidoglycan layer. The molecular size of medium chain fatty acids are too

large to penetrate this layer in the Gram negative cell and the peptidoglycan layer in Gram positive bacteria is too thick to be porous even for small molecule acids.

- The synergy between formic and propionic acids allows the formic acid to penetrate the cell structure more effectively.
- Once inside the cell the formic acid dissociates.
- Intracellular pH falls and the cell uses vital energy in trying to maintain internal pH equilibrium.
- Anion production interferes with DNA and protein metabolism. The combination of these two actions kills the bacteria.

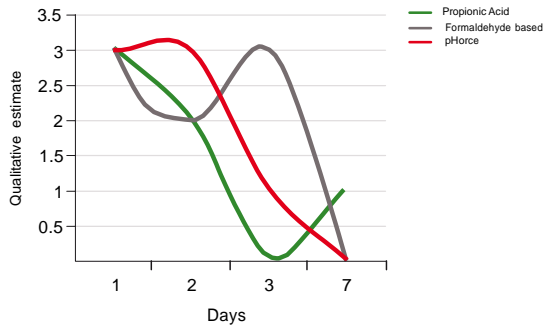
## pHorce characteristics

- In addition to the synergistic action of the acid combination the blend is buffered to a pH of 3.5 and incorporated into a micropearl carrier containing almost 70% liquid acid.
- The open pore structure of the micropearl gives rapid volatility enabling the undissociated acid to penetrate raw materials and feeds with better antibacterial activity than liquid equivalents.
- The micropearl carrier ensures good free flowing properties and excellent dispersion within the finished feed.
- The high concentration combined with the robust micropearl structure allows addition through mineral premixes and concentrates.
- Independent laboratory tests have shown that stability of both water soluble and fat-soluble vitamins is unaffected by pHorce.
- The use of acid salts and a thermally resistant carrier makes it compatible with all forms of pelleting.



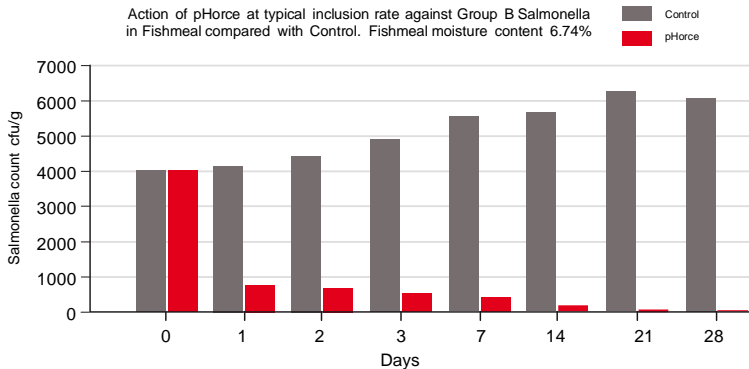
# activity in raw materials

Seven day trial comparing pHorce to two leading antisalmonella treatments in Fishmeal at 8.74% moisture content at the same inclusion rate



In fishmeal, decontamination down to EU requirements has been achieved using similar inclusion rates to pure liquid acids, demonstrating that pHorce provides a low corrosion, safe and easy to use alternative.

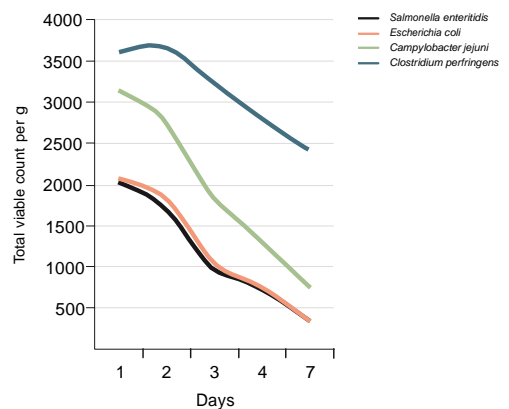
Action of pHorce at typical inclusion rate against Group B Salmonella in Fishmeal compared with Control. Fishmeal moisture content 6.74%



pHorce provides a very rapid reduction in Salmonellae number in fishmeal. Over a 24 hour period reduction was between 46.8% and 64.2% at 5 kg/t depending on the Salmonellae group. It was found that at fishmeal moisture levels higher than 11.85% the kill rate is accelerated, allowing pHorce to be used for effective decontamination at higher application rates. The industry standard for bulk fishmeal decontamination is 30 kg/t. Alternatively, pHorce at low concentrations may be used as a preservative to prevent colonisation and multiplication of Salmonellae from any sources.

The high acid concentration of pHorce reduces bacterial numbers of enteropathogens such as *Salmonella enteritidis*, *E. coli*, *Campylobacter jejuni* and *Clostridium perfringens* and can decontaminate difficult to treat raw materials such as soya meal.

Contaminated Dry Soya Meal treated with pHorce at 2kg/t and Stored at Ambient Temperatures



## in-feed effect

The low pH of pHorce provides additional acidity during early stage feeding in pigs and poultry

- Especially important for newly placed broiler, pre-ruminants and piglets when feed intake is low and gastric acid secretion not fully developed.
- pHorce improves the gastric acidity protection often limited in young animals or when using highly buffered feed rations. This is especially important in layers, breeders and lactating sows, where high calcium diets result in a neutral intestinal tract, more prone to enteropathogen colonisation.
- Improves feed palatability and digestibility, especially important in young animals.

pHorce improves mineral availability

- Effectively combines with inorganic insoluble minerals to provide more biologically available organic acid salts for rapid absorption.

pHorce provides enhanced acid levels in the upper digestive tract

- Increases the efficiency of the gastric acid block to protect the intestine from enteropathogens passing through the stomach or proventriculus, improving performance.
- Effective pathogen control minimises enteropathogen colonisation of the foregut and hindgut, improving performance.
- Carries undissociated acid further down the intestinal tract than simple liquid additions to feed or water. This can be particularly important for the control of *Campylobacter* species that typically prefer a pH close to 7.5 for effective colonisation.

## economic effect

- A major benefit of pHorce is the extremely low inclusion rates required for full efficacy.
- The low rate of use also means reduced transport and storage costs to further improve the feed economics.
- Trials in grower pigs indicate that 1 kg of pHorce per tonne of feed can produce an additional 9kg deadweight pigmeat compared to the control.

# kiotechagil typical acidifier programme

Poultry		Pigs	
Rearing & Laying Flocks	Broilers	Breeding Herds	Grower / Finisher
0-3 weeks	pHorce 0.5 -0.7 kg/t	To 30kg	
SALKIL 3kg/t		PREFECT 3kg/t	
From 3 weeks		Gestation	30kg +
SALKIL 2kg/t	pHorce 1kg/t	BACT-A-CID 1.5kg/t	
		Lactation	
		BACT-A-CID 2kg/t	

- Do not incorporate acids in feeds at the same time as administering live vaccines.
- Acid levels should be increased in high challenge situations.
- Customised programmes can be adapted for specific on farm situations.

## trials

### Growing Pigs with pHorce Plumpton College, UK. Dec. 07

Dung Score 1 (Thin, watery dung)



Dung Score 5 (Firm, dry, stackable dung)

Treatment	FCR	Dung Score
pHorce 1kg/t	1.43	4.0
Control	1.47	3.2

#### Cost Benefit Calculation:

- Dung score improved.
- Due to improved feed conversion, pigs fed pHorce required 1kg less feed to grow from 25 to 50 kg.
- One kg pHorce yields 19 kg additional liveweight pigmeat based on this FCR data.

Farm Manager Testimonial: "Pigs fed pHorce, are cleaner, healthier and shinier. We would use pHorce in the future to improve performance. It pays well to use pHorce."

### Growing Pigs with pHorce Sparsholt College, UK. June 08

In this trial 140 piglets were weaned at 28 days of age and at 13kg live weight they were randomly allocated to

2 pens CONTROL

2 pens with 1kg/t of pHorce

Treatment	Start Weight kg	Finish Weight	ADG g	FCR	Dung Score
pHorce (1kg/t)	13.93	38.62	823	1.68	3
Control	13.68	37.72	801	1.71	2.2

pHorce improved live weight gains, feed conversion and dung score.

#### Cost Benefit Calculation:

One kg pHorce yields 10.4 kg additional liveweight based on this FCR data.

Due to enhanced growth there is also an advantage as pigs move through the farm faster.



## Growing Pigs with pHorce Commercial Unit, Suffolk, UK. Jan 09

In this trial 1041 pigs were grown from 8.45 to 97.97 kg live weight with 1kg pHorce in all feed used, their performance was compared to 946 pigs from the previous batch.

Treatment	Start Weight kg	Finish Weight kg	ADG g	Deadweight FCR
pHorce (1kg/t)	8.45	97.97	668	3.11
Control	8.48	98.56	652	3.15

Cost Benefit Calculation:

- One kg/t pHorce yields an additional 16 g/pig/day live weight gain.
- Due to enhanced growth rate the pigs left the farm 5.94 days earlier- a significant feed saving.
- There was a reduction in mortality from 4.55 to 3.07%- an improvement of 32%.

Normally Prefect would be recommended for the starter period to 30/35kg bodyweight, but this trial showed benefits from using pHorce from weaning to finishing.

## Growing Pigs with pHorce Commercial Unit, Norfolk, UK. Feb 09

In this trial 960 pigs were grown from 35 to 110 kg live weight with 1kg pHorce in all feed used, their performance was compared with 960 control pigs grown at the same time on the same farm.

Treatment	Start Weight kg	Finish Weight kg	Deadweight FCR
pHorce (1kg/t)	35	110	3.34
Control	35	110	3.45

Cost Benefit Calculation:

One kg pHorce yields 9.4kg additional deadweight pigmeat based on this FCR data.



## safety

The microfine formulation means pHorce can be included in feed materials without the need for capital investment. There are no risks associated with pumping corrosive liquids, or blocked jets. It is less corrosive than liquid preparations. pHorce is not a veterinary product and there is no withdrawal period, no residue or microbial resistance risk.

pHorce is safe for all livestock, reducing the need for scheduling of feed production in multispecies mills.

## application rates

pHorce is premixed with raw materials at 2-30 kg/t depending on the challenge risk.

Use 0.5 – 1.0 kg/t in finished feeds.



pHorce is a safe and potent alternative to liquid acids that can be admixed through mineral premixes to provide optimum antimicrobial activity in feed with early gut acidification in young animals and microbial protection for the mature animal.

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