



# GUT HEALTH

## TRIPLE CHECK



**KEMIN**<sup>®</sup>  
INTESTINAL  
HEALTH

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In today's livestock production environment, gut health is increasingly synonymous with animal health. The Kemin Gut Health Triple Check program encompasses many health priorities, such as nutrient digestion and absorption, metabolism and energy generation and more. Proper gut health promotes the absence and prevention of disease, leading to optimal performance.

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UP  
TO **70%**  
**OF THE IMMUNE  
SYSTEM IN PIGS  
RESIDES IN THE  
GASTROINTESTINAL  
TRACT.<sup>1</sup>**

1. Vighi, G., Marcucci, F., Sensi, L., Cara, G. D., & Frati, F. (2008). Allergy and the gastrointestinal system. *Clinical & Experimental Immunology*, 153, 3-6. doi:10.1111/j.1365-2249.2008.03713.x



Kemin has been a proactive leader within the gut health industry. By using decades of scientific research, thorough testing and customer feedback, Kemin created its multi-faceted **Gut Health Triple Check** approach to provide a broad platform of solutions.

## GUT HEALTH BEGINS IN THE NURSERY

A long-term, comprehensive approach to swine gut health is crucial — Kemin solutions support and protect pigs from nursery to finish. Proper gut health support will strengthen intestinal integrity, ensure a healthy microbial balance and support immune function.

**The interaction of these factors determines the optimal nutrient utilization of the animal and helps promote the following:**

- Better nutrient digestion and absorption
- Proper weight gain and management
- Healthy metabolism response for energy generation
- Absence, prevention and avoidance of disease
- Bone and joint health

## HEALTH CHALLENGES CREATE GUT INFLAMMATION

When gut health is compromised, inflammation often occurs. Triggers such as oxidative stress, mycotoxins, social and environmental stress, fast growth rates and dysbiosis of the microbiome can spark this process. Many of these triggers also impact one another (e.g., social stress leading to dysbiosis), which can lead to a cycle of inflammation — ultimately, leaving animals more susceptible to illness. This can result in poor quality of life for the animal and a shrinking profit margin for producers.

### **Pathogens impacting swine gut health:**

- |                           |  |
|---------------------------|--|
| ■ Circovirus              | ■ Porcine Epidemic Diarrhea virus (PEDv) |
| ■ <i>Escherichia coli</i> | ■ Rotavirus                              |
| ■ <i>Clostridium</i>      | ■ <i>Salmonella</i>                      |



# GUT HEALTH

## TRIPLE CHECK

Recently, intestinal health has been elevated to the same level of importance as other management practices. The Kemin Gut Health Triple Check helps you to establish the intestinal integrity and protection your pigs need.

This program serves as a support system to **CLEAN UP** contaminants in feed and water prior to animal exposure, **BUILD UP** intestinal strength and immunity to reduce leaky gut and **KNOCK OUT** harmful pathogens for healthier and better performing pigs.

Over the years, Kemin has researched alternatives to antibiotic use, creating gut health solutions for swine — positively impacting beneficial bacteria and optimizing feed efficiency. Improving swine gut health involves a comprehensive focus on the feed going into the animal, integrity of the intestinal wall and pathogen reduction. Each of these elements are interconnected and all must be checked to optimize efficiency.



A COMPREHENSIVE FOCUS  
ON CONTAMINANT MITIGATION,  
INTESTINAL INTEGRITY AND  
PATHOGEN REDUCTION.

**CLEAN UP • BUILD UP • KNOCK OUT**

# CLEAN UP

With the continued industry-wide reduction in antibiotic usage, producers are discovering an entirely new set of management challenges which impact animal health and performance. When using medications, quality problems can be disguised in fat, grain, water and finished feed. However, in today's production systems, those previously low-priority concerns can become major problems.

## HEALTHY PIG

When gut integrity is uncompromised, contaminants from feed and water move through the animal with little negative impact to the animal or its performance.

## COMPROMISED PIG

If contaminants from feed and water get into the animal and the gut is NOT healthy (due to strain from stressors like heat, feed changes, disease, etc.), contaminants have the ability to invade the gut lining and potentially move into the bloodstream, going systemic and causing major production and health issues.

## HELP PREVENT THE PREVENTABLE

Safeguarding feed and water quality starts with protecting raw materials as they arrive at the feed mill and continues through manufacturing and storage.

**Target specific profit-robbing contaminants in fat, grain, water and finished feed using the following Kemin Gut Health Solutions:**

ENDOX®

OXINE®

KALLSIL™

PRO-OXINE®

KEM SAN®

RENDOX®

Myco CURB®

Sal CURB®

**SAFEGUARD**  
YOUR FEED AND WATER QUALITY



# BUILD UP

Intestinal integrity is all about maintaining the strength of the intestinal barrier in order to maximize nutrient absorption within the pig. The intestinal barrier is made up of a layer of epithelial cells, which prevent harmful pathogens and toxins from entering the system (e.g., leaky gut), and are critical for fluid and electrolyte secretion. The intestinal barrier is regularly exposed to up to 10 trillion microorganisms, making it extremely important to keep it functioning properly.<sup>1</sup>

To strengthen the barrier, the focus is on the tight junctions and minimizing cell damage. By upregulating the proteins making up the tight junctions, the barrier is built stronger, reducing toxin transfer. The barrier can also be stronger and can maintain proper absorption if lesions are reduced or can heal quicker after a challenge has occurred.

Additionally, since up to 70% of the immune system resides in the intestine, preparing the pig for a challenge is imperative.<sup>2</sup> By building up immune cells, the pig can improve their ability to fight off disease and maintain performance during challenges.

**Maintain intestinal barrier strength of your pigs to maximize nutrient absorption and prevent harmful pathogens and toxins from entering the system with the following Kemin Gut Health Solutions:**

**Aleta™**

KemTRACE®  
**CHROMIUM**  
*Essential to you and your operation*

**ButiPEARL®**

**LYSOFORTE®**

**ButiPEARL® Z**

THE INTESTINAL  
BARRIER IS REGULARLY  
EXPOSED TO UP TO  
**10 TRILLION**  
MICROORGANISMS<sup>1</sup>



# KNOCK OUT

A healthy balance of microbiota provides protection against pathogen colonization and contributes to the overall wellbeing of the pig. In order to achieve a healthy balance, knocking out potentially harmful pathogens is necessary. Controlling and inhibiting pathogens can encourage the microbiota to produce metabolic substrates like vitamins and short-chain fatty acids.<sup>3</sup>

## **BENEFITS OF PATHOGEN KNOCK OUT IN THE GASTROINTESTINAL TRACT:**

- Improved host nutrition
- Reduced intestinal pathogen colonization leading to sickness
- Development of proper intestinal morphology
- Enhanced immune function

Balancing microbiota to promote gut health diversifies the complex community of microorganisms living in the digestive tract of pigs. Knocking out harmful bacteria to encourage beneficial bacteria promotes a healthy gastrointestinal (GI) tract by stimulating the immune system and protecting against pathogens.

**Support intestinal balance to inhibit or eliminate harmful pathogens from infiltrating the body with the following Kemin Gut Health Solutions:**

**CLOSTAT®**

**KEM-GEST®**

**CLOSTAT® WS**

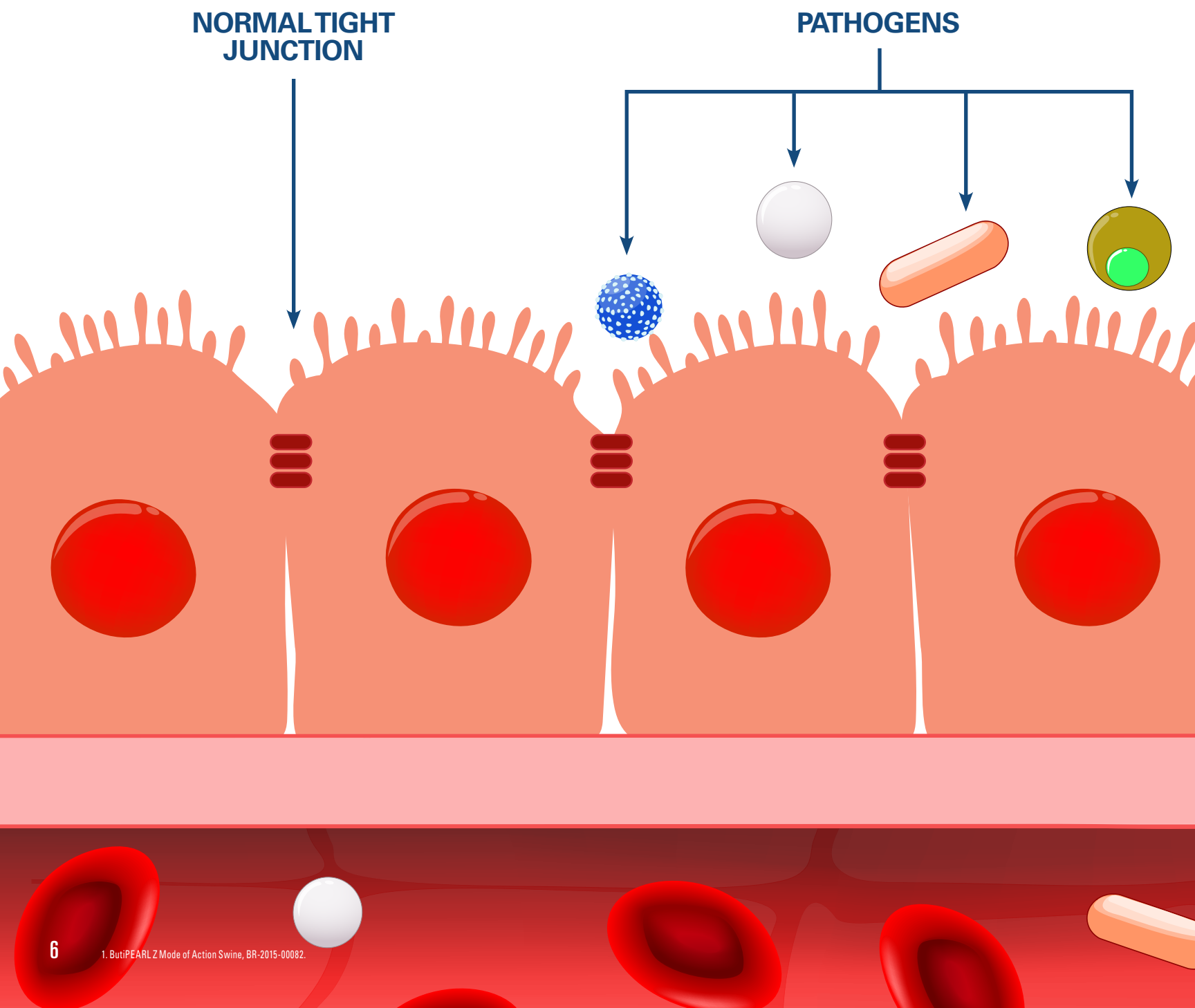
**KEM SAN®**

A photograph of a pig in a pen, with a yellow overlay on the right side. The pig is looking towards the camera.

# PROTECT AGAINST PATHOGENS

# BUILD A BARRIER AGAINST LEAKY GUT

THE INTESTINAL BARRIER IS REGULARLY EXPOSED  
TO UP TO 10 TRILLION MICROORGANISMS.<sup>1</sup>



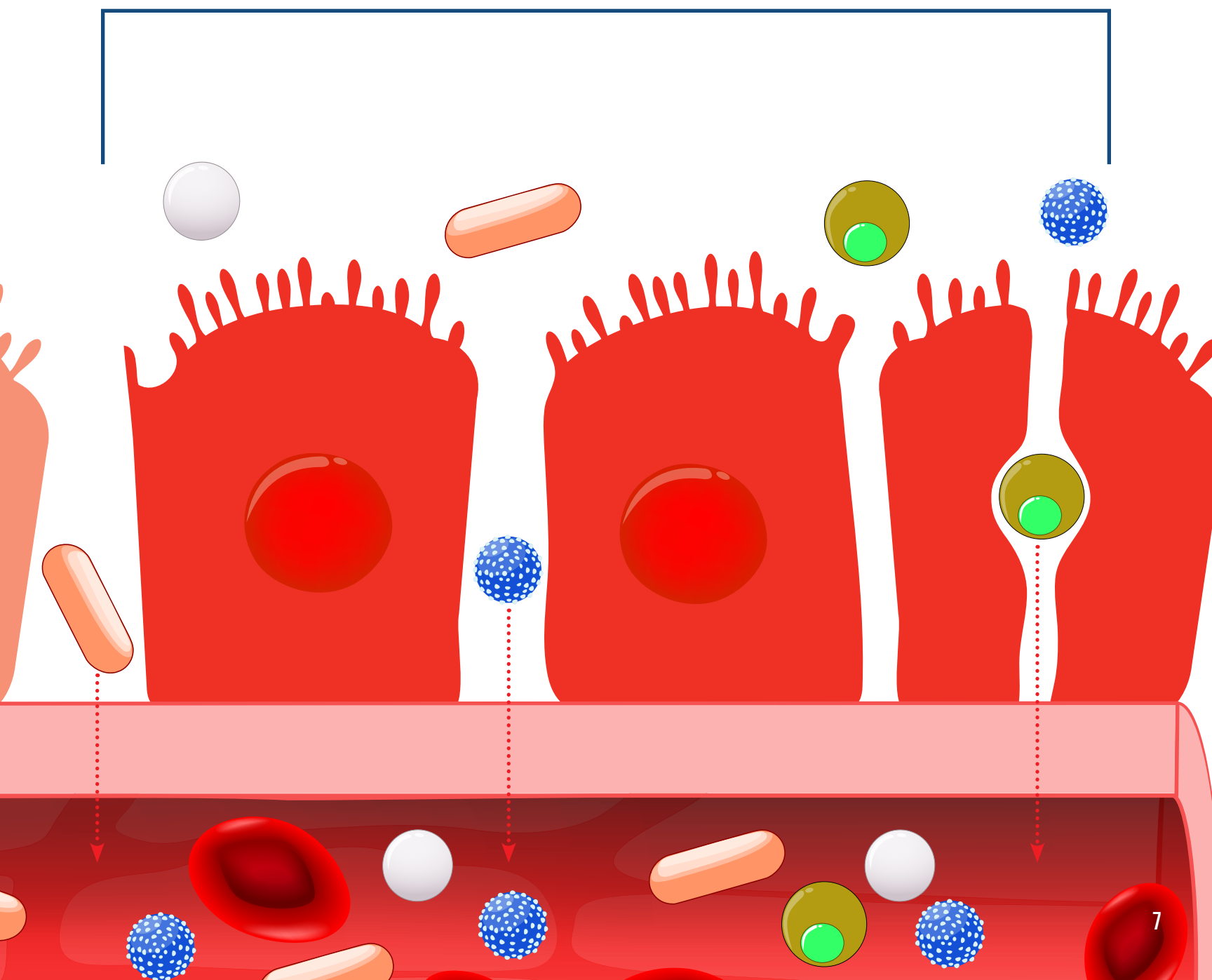


**The intestinal barrier is made up of a layer of epithelial cells, which prevent harmful pathogens and toxins from entering the system — also known as leaky gut.**

The intestinal barrier is regularly exposed to up to 10 trillion microorganisms, making it extremely important to keep it functioning properly. Additionally, up to 70% of the immune system resides in the gastrointestinal tract, so preparing the animal for a challenge is imperative.

By upregulating the proteins making up tight junctions, the barrier is built stronger, reducing toxin transfer and inflammation, and helping to maintain proper nutrient absorption for optimal animal performance.

## LEAKY GUT



# GUT HEALTH TRIPLE CHECK SOLUTIONS

Check out our lineup at [kemin.com/guthealth!](http://kemin.com/guthealth!)

## Aleta™

Aleta offers a concentration greater than 50% of 1,3-beta glucans. Beta glucans have been used in humans and livestock as a way to enhance host protective immunity. Minimizing the impact of disease challenges early on in an animal's life can have an effect on their ability to gain weight faster, convert feed more efficiently and may be less likely to spread disease.

## ButiPEARL®

ButiPEARL is the leading source of encapsulated butyric acid for providing targeted delivery along the GI tract. Butyric acid is an integral, short-chain fatty acid acting as an energy source for epithelial cells. Butyric acid also increases the expression of tight junction proteins in the intestines and increases antioxidant levels to promote healing in the GI tract.<sup>1,2</sup>

## ButiPEARL® Z

ButiPEARL Z uses proprietary MicroPEARLS® spray freezing technology to encapsulate two synergistic nutrients, butyric acid and zinc. Butyric acid and zinc play an important role in key biological processes affecting the health and performance of livestock.

## CLOSTAT® AND CLOSTAT® WS

CLOSTAT and CLOSTAT WS contain a proprietary, patented strain of *Bacillus subtilis* PB6 to support intestinal balance. PB6 is a unique, naturally occurring, spore-forming microorganism. Kemin internal research has shown PB6 can inhibit *C. difficile* as well as other pathogens.<sup>3</sup> CLOSTAT WS utilizes the same technology with water-soluble ingredients.

## ENDOX®

ENDOX was formulated specifically to protect finished feeds by safeguarding fat-soluble vitamins against degradation, protecting complete feeds from fat oxidation, vitamin loss and more.

## KALLSIL

KALLSIL is an enhanced zeolite flow agent for broad-spectrum fungal metabolite control to improve feed quality and support performance. By absorbing moisture from feed, KALLSIL also reduces caking, resulting in improved flow in feed and feed ingredients.

## KEM-GEST™

KEM-GEST is a blend of organic and inorganic acids designed to provide an economical means to acidify swine feed. This multi-acid approach helps protect a pig's GI tract from growth-limiting pathogens. Inhibition of pathogens promotes better gut health and production efficiency.

## KEM SAN®

KEM SAN is a unique combination of effective organic acids. It has been proven to inhibit and kill a broad spectrum of pathogenic bacteria in drinking water. By reducing the pathogen load in the water, there are fewer challenges presented to the pig, which helps maintain gut health.

## KemTRACE® CHROMIUM

KemTRACE Chromium — the first product of its kind on the market — is a safe, proven trace mineral. This highly bioavailable, organic source of chromium propionate helps to reduce the negative effects of stress and improve glucose utilization.

## LYSOFORTE®

LYSOFORTE is a nutritional emulsifier designed to enhance digestion and absorption of energy-rich feed ingredients, including fats, oils and fat-soluble nutrients. Lysolecithins in LYSOFORTE help to reduce the energy required for fat digestion, thereby maximizing feed efficiency and providing better feed cost control.

## OXINE® AND PRO-OXINE®

OXINE and PRO-OXINE are effective, fast-acting, broad-spectrum antimicrobial solutions for food processing, equipment, water and animal health applications.

## Myco CURB®

Myco CURB is a mold inhibitor for feed, formulated to inhibit mold growth in processed feed ingredients, complete feed and total mixed rations (TMR). Myco CURB contains propionic acid blended with sorbic and benzoic acids and is buffered for improved equipment and employee safety.

## RENDOX®

RENDOX stabilizes animal fats and protein meals during the rendering process with antioxidants to maintain product freshness, protect product quality, and increase product shelf life.

## Sal CURB®

Sal CURB is an antimicrobial agent made from a blend of aqueous formaldehyde and organic acids. It is used as a *Salmonella* control in feed or feed ingredients to keep products *Salmonella*-negative for up to 21 days.

1. Peng, L. et al. 2009. Butyrate Enhances the Intestinal Barrier by Facilitating Tight Junction Assembly via Activation of AMP-Activated Protein Kinase in Caco-2 Cell Monolayers. *J. Nutr.* 139:1619-1625.

2. Ma, X. et al. 2012. Butyrate promotes the recovering of intestinal wound healing through its positive effect on the tight junctions. *J. Anim. Sci.* 90:266-268.

3. Inhibitory Characteristics of *Bacillus subtilis* PB6 on Clostridial Isolates From Poultry, BB-09-00010.



**Visit [kemin.com/guthealth](https://kemin.com/guthealth)  
to find out what gut health solutions  
can improve your swine operation.**





## A COMPREHENSIVE APPROACH TO GUT HEALTH

Help each pig reach its full production potential. Establish the intestinal integrity and protection your pigs need using our Gut Health Triple Check.

Kemin offers a range of nutritional solutions for raising healthy animals. We understand your need to raise healthy livestock that gives consumers the nutritional and health benefits they are looking for, while also returning a profit. Our products and services help you with nutrition, feed quality, gut health and pathogen control.

**[kemin.com/guthealth](https://kemin.com/guthealth)**

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