



We create chemistry

COMPOUND FEED INDUSTRY

 **BASF**
We create chemistry

Organic Acids

Preservation · Feed Hygiene · Acidification





ONE OF THE WAYS TO KEEP FEED PRODUCTION AND YOUR SHEETS CLEAN

In times of worldwide population growth and increasing demand for food, the importance of feed hygiene and feed preservation cannot be overstated. If we want to meet the needs of a growing population, we have to produce more from less because losing food to feed contamination is not an option. In addition, the cost of grain, corn and other raw ingredients of feedstuffs is rising. As a result, compound feed has become an even more valuable agricultural product. Feed

THE EASIEST WAY TO KEEP YOUR DUCTS BALANCED IS TO PREVENT MOLD AND BACTERIA FROM GROWING IN THE FIRST PLACE.

spoilage, which ranges from a musty smell to visible mold and, probably toxin formation, is a typical consequence of the proliferation of microorganisms. Fungi and bacteria can endanger the quality of feed and harm not just animals and humans but can also have a negative effect on the food supply. In light of the global population growth over the next decades and the booming demand for safe and high-quality food, finding a solution to this problem is of the utmost importance.

We at BASF know that high-quality feed and sustainable business go hand in hand. With our organic acids, maintaining the quality and quantity of your product is not only safe and natural but also highly efficient. Doing the best for the ecological and financial balance sheet of your business has never been so easy.



ORGANIC ACIDS FROM BASF: HOW SOUR CAN MAKE BUSINESS SWEETER.

With organic acids from BASF, protecting the quality of your feed is safe and easy as these acids take their potency from nature's realm. Propionic acid and formic acid, the liquid starting materials for our Luprosil® and Amasil® product lines, occur in plants, in silage and even in foods. As natural preservatives, these organic acids are completely metabolized. Using Luprosil® and Amasil®, we therefore combat the dangers of feed contamination and loss by perfecting what nature already has to offer.

BASF has been working with Luprosil® propionic acid and Amasil® formic acid for decades in an effort to produce the best feed for your animals and your budget. Luprosil® is traditionally known for its preservative and mold-inhibiting properties. Amasil® in its purest form has a strong acidifying effect and pronounced antimicrobial efficacy. It is also a powerful weapon in the fight against pathogens such as salmonella and E. coli.

To provide you with the benefits of both substances, our various products combine them differently, guaranteeing the best results for every type of application. You can either choose from our pure acids Luprosil® and Amasil® and pure acid mixtures, such as Lupro-Cid® and Lupro-Mix®, or you can opt for a milder, less corrosive (irritant) alternative. Our buffered acids and buffered acid mixtures such as Amasil®NA, Lupro-Grain®, Lupro-Cid®NA and Lupro-Mix®NA are user-friendly and easy to handle – the ideal way to improve the storage life of your feed.

CORROSIVE	IRRITANT
Amasil® 85	Amasil® NA
Luprosil®	Lupro-Grain®
Lupro-Cid®	Lupro-Cid® NA
Lupro-Mix®	Lupro-Mix® NA



Untreated barley after 4 weeks' storage (25 % moisture content)



Luprosil®-treated barley after 4 weeks' storage (25 % moisture content)

ORGANIC ACIDS FOR THE COMPOUND FEED INDUSTRY.

In the compound feed industry, one has to meet the needs of various customers. Providing safe, high-quality and nutritious feed for various kinds of livestock is a huge responsibility that cannot be underestimated. In light of the global rise in the price of grain, corn and other raw ingredients of feed-stuffs, compound feed has become an even more valuable agricultural product. It is vital, therefore, to effectively protect it against microorganisms so as to preserve its immense physiological and economic value. Only compound feed that is hygienically safe can ensure the animals' performance and make your work more efficient and sustainable.

At BASF, our aim is to provide you with easy-to-handle product lines and a wide-ranging portfolio for every application. With preservation, feed hygiene and acidification, BASF organic acids assist you in three central fields of feed production. Moreover, all our products are liquids, providing you with a range of advantages:

- **Save time:** Time-consuming transactions like putting powdered products into storage and removing them is no longer required.
- **Save waste:** We generally deliver every product in bulk in a tanker truck and fill it directly into your stationary storage tank.
- **Save money:** Liquid products are more effective than solids and thus need lower inclusion rates to achieve the desired effect.

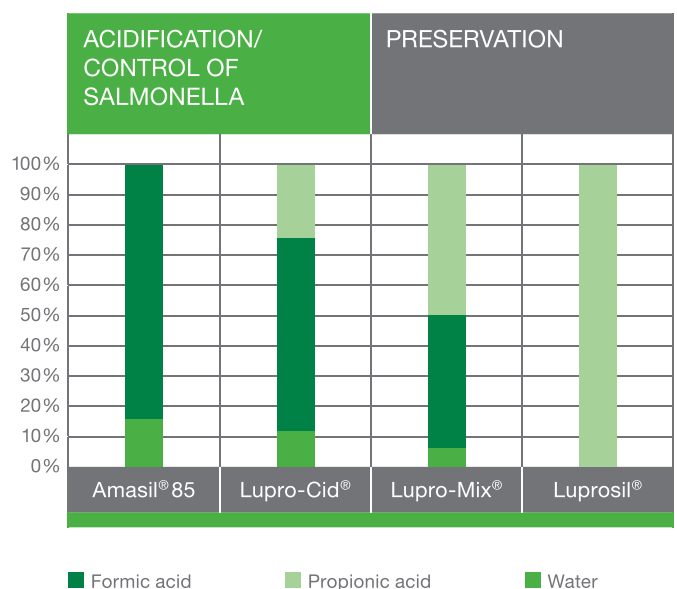




STRONG AND EFFECTIVE: PURE ACIDS AND THEIR MIXTURES.

As a very effective and easy way of acidifying feed while eliminating salmonella and inhibiting molds, organic acids from BASF in their pure form enjoy considerable use in the compound feed industry. Propionic acid and formic acid, under the trade names Luprosil® and Amasil®, have already been in widespread use for feed preservation for decades. To provide you with the benefits of both, we developed their Lupro-Cid® and Lupro-Mix® mixtures, i.e., unbuffered products that combine the effects of propionic acid and formic acid in a single product. With one application step you can easily acidify your feedstuffs, eliminate salmonella and inhibit molds. With pure organic acids you have an easy way to keep your feed clean and enhance animal vitality.

However, they require high-quality equipment and careful work-safety measures for their use because they are corrosive.



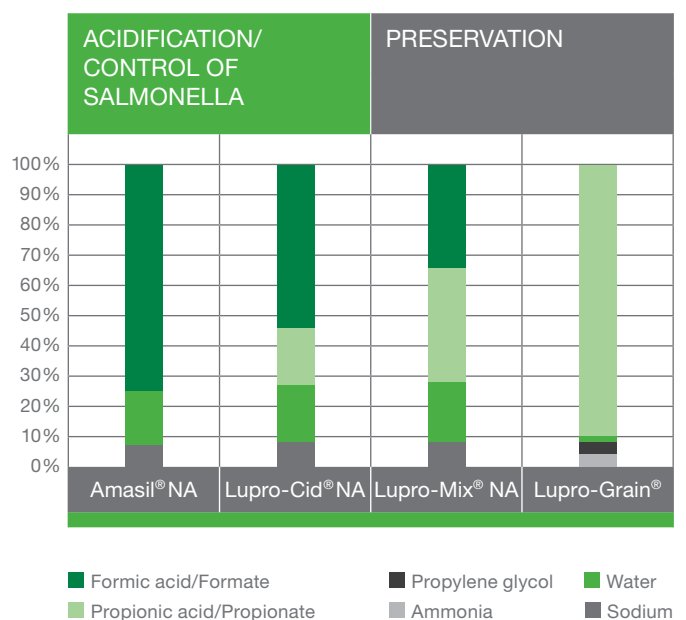


EFFECTIVE AND MORE GENTLE: BUFFERED ACIDS AND THEIR MIXTURES.

As an easy-to-handle, user-friendly and at the same time highly effective alternative to pure acids, we have developed our buffered acids, also known as non-corrosive products. The process of buffering attenuates the biological activity so that acids go from being corrosive (caustic) to irritant (non-corrosive). As a result of constant product improvement, we can offer Lupro-Grain® and Amasil® NA, which in their active-substance content are very similar to the pure acids Luprosil® and Amasil® 85. As mixtures of both, Lupro-Cid® NA and Lupro-Mix® NA combine the strengths of propionic and formic acid without the corrosive effects of pure acids. This way you can easily keep your feed free from any microorganisms while enhancing animal performance.

Buffered acids offer even more advantages:

- **Less high-quality (e.g., stainless steel) equipment needed**
- **Not classified as “dangerous goods” by the regulations governing the transportation of dangerous goods**
- **Enhanced safety due to a higher flash point than pure acids**



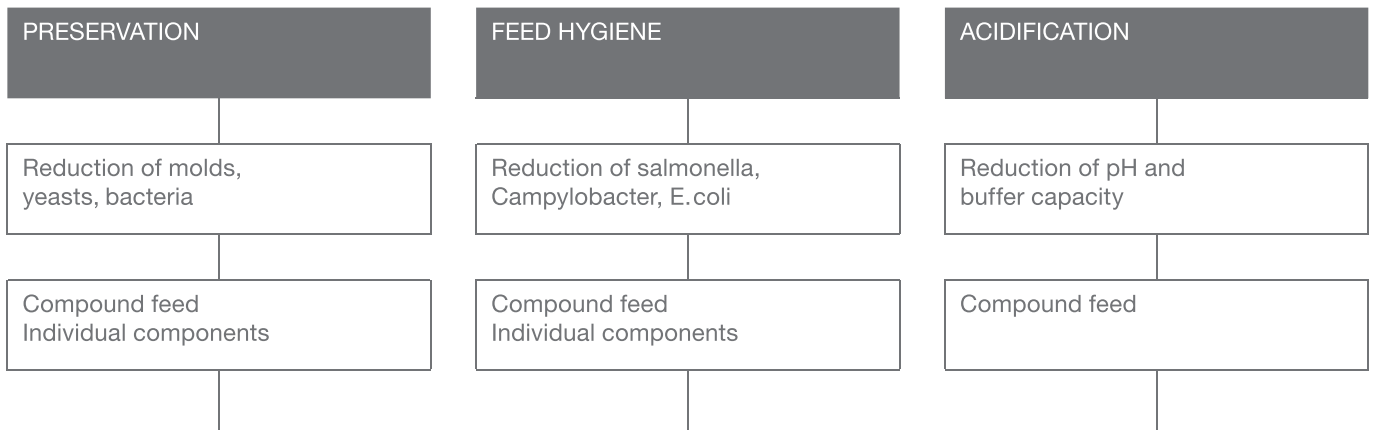


IMPROVE YOUR FEEDS' SHELF LIFE WITH BASF.

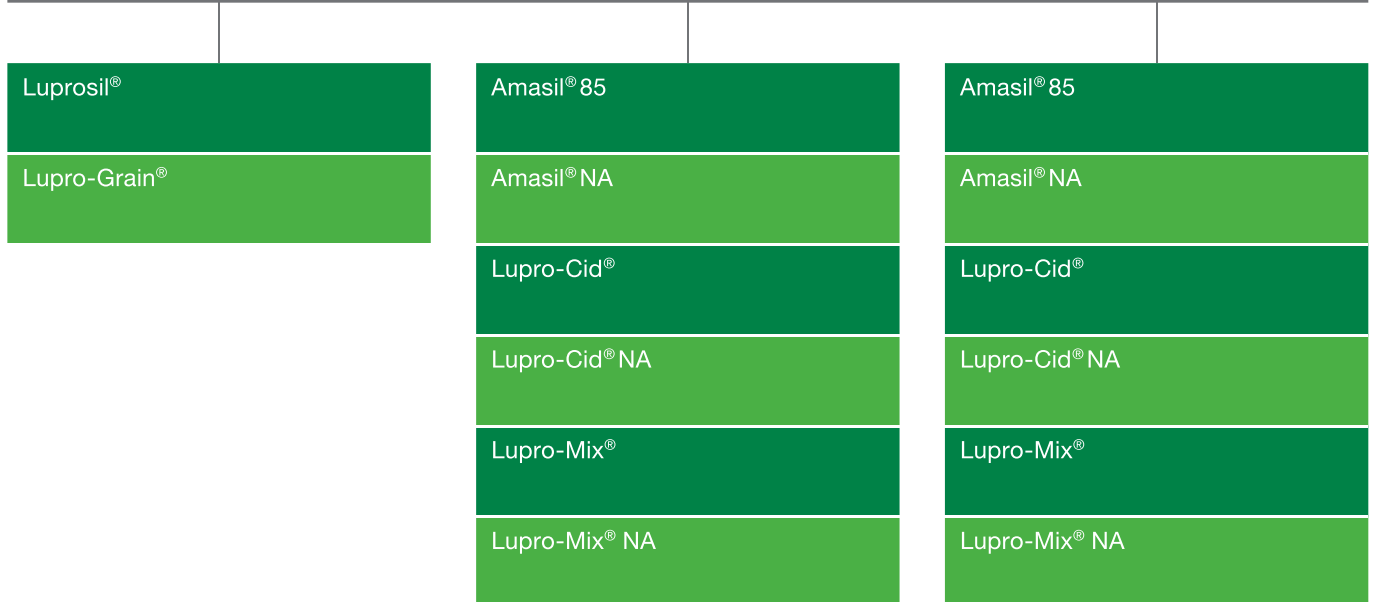
There are several ways in which BASF can help you produce safe, nutritious and high-quality feed while keeping your business financially sound and environmentally sustainable. We offer products for preservation, improvement of feed hygiene and acidification of feedstuffs.

Our wide range of products covers all kinds of applications for the compound feed industry. To achieve the desired effect, you can easily choose products that bring you a combined effect in pure form or as buffered versions. This way you can be absolutely sure that the product suits your needs.

POSSIBLE USES FOR BASF ACID PRODUCTS IN THE COMPOUND FEED INDUSTRY



BASF ORGANIC ACID PRODUCTS



■ Buffered acids ■ Pure acids





FEED PRESERVATION: NO CHANCE FOR MOLDS.

Preservation is one of the most important areas for the use of organic acids. Here, the acids prevent raw ingredients and finished feed from going moldy – a danger common to materials with a higher moisture content during storage. Compound feed can easily go moldy during storage in outdoor silos or bags due to the formation of condensation. This often leads to unwelcome claims for damages or compensation.

A pioneer in the use of Luprosil® for preservation, BASF has considerable experience in the field of feedstuff conservation. To prevent feed from going moldy, we have developed Luprosil® propionic acid and, as its buffered alternative, Lupro-Grain®. All formulas help keep your feed quality high while enhancing animal performance.

BASF PRODUCT RECOMMENDATION:

Luprosil®, Lupro-Grain®

Dosage: 0.5 and 3.5 kg preservative per ton of finished feed (depending on the moisture content of the latter and the planned duration of storage).



FEED HYGIENE: A WEAPON AGAINST PATHOGENS.

Apart from preservation, the elimination of bacteria and thus the control of diseases is essential for all manner of feed-stuffs and within the human food chain. Even before the EU regulation EC 2160/2003 came into effect, farmers and feed manufacturers attempted to prevent salmonella and other pathogens from spoiling feedstuffs and endangering the lives of animals and humans.

Feed can be infected by pathogens through the actual raw ingredients, but also in the course of processing. There is also a risk of it becoming contaminated with salmonella through contact with rodent pests, pigeons, or gulls during transportation or storage.

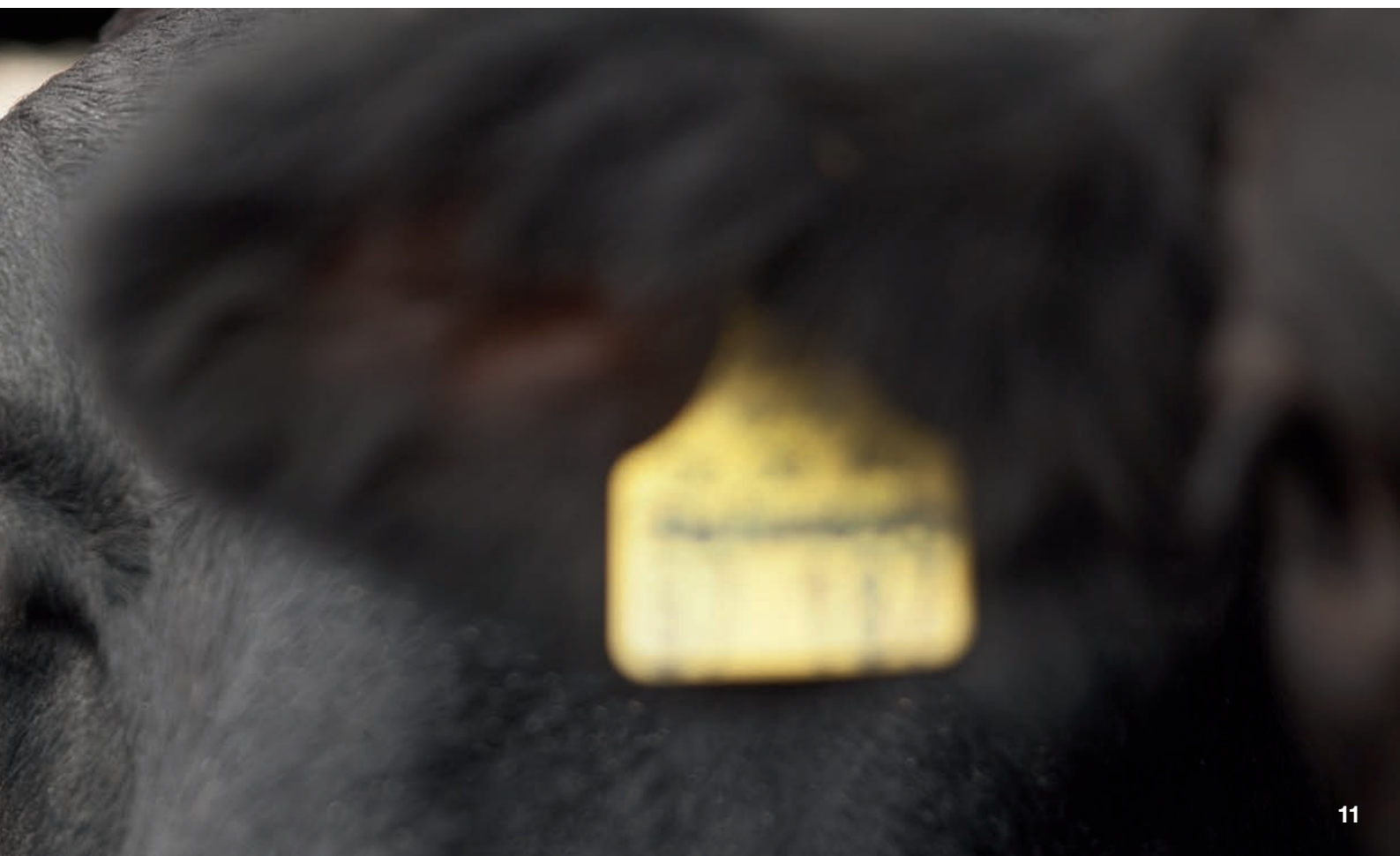
Formic acid's effectiveness against salmonella in feed is well documented in scientific literature. This makes our products safe weapons in the fight for pathogen-free feed. Amasil®85, Lupro-Cid® and Lupro-Mix® as well as their non-corrosive alternatives Amasil®NA, Lupro-Cid®NA, and Lupro-Mix®NA guarantee hygienic and high-quality feed from pelleting to the feeding trough. If Lupro-Cid® or Lupro-Cid®NA is used, protection of the feed against mold formation is already included, thanks to the propionic acid component.

BASF PRODUCT RECOMMENDATION:

Amasil®85, Amasil®NA, Lupro-Cid®, Lupro-Cid®NA, Lupro-Mix®, Lupro-Mix®NA

Dosage: To protect compound feed against recontamination with salmonella: between 4 and 10 kg Lupro-Cid® (buffered – Lupro-Cid®NA) or Amasil®85 (buffered – Amasil®NA) per ton of compound feed (depending on the duration of storage, the moisture content, and the conditions of transportation).

To achieve a salmonella-free status, raw ingredients already contaminated with salmonella need to be treated with a dose of 2–3% of the stated acid products, conditional to the level of contamination and the potential duration of storage.





ACIDIFICATION: MAKE IT SOUR TO MAKE IT MORE DIGESTIBLE.

Due to limited gastric acid production, some animals such as young piglets are unable to digest feed properly – important nutrients cannot find their way into the animal’s body.

Acidification of piglet feed with Lupro-Cid® and Amasil® 85 lowers the pH of the feed and reduces the buffer capacity. This enables the piglet, even with limited gastric acid production, to digest the feed in its stomach in an optimal manner and make full use of all nutrients. Thanks to the antimicrobial effect of the acid treatment, there is also a sustained reduction in microbe levels in compound feed.

Since the buffered products Lupro-Cid® NA and Amasil® NA still have a very low pH of about 3, they can likewise be highly recommended for the acidification of compound feeds. If Lupro-Cid® or Lupro-Cid® NA is used, protection of the feed against mold formation is already included, thanks to the propionic acid component. Reduction of the buffer capacity in the piglet feed is particularly effective if administration of the above mentioned acid products is combined with the use of Natuphos® phytate (and a reduced P and Ca content).

BASF PRODUCT RECOMMENDATION:

Amasil® 85, Amasil® NA, Lupro-Cid®, Lupro-Cid® NA, Lupro-Mix®, Lupro-Mix® NA

Dosage: Between 3 and 10 kg acid product per ton of feed (see table below).

RECOMMENDED DOSES FOR THE ACIDIFICATION OF FEED (kg/t feed)					
SPECIES	AMASIL® 85	AMASIL® NA	LUPRO-CID®	LUPRO-CID® NA	LUPRO-MIX® NA
Piglets	5–8	6–10	6–8	8–10	8–10
Fattening pigs	3–5	4–6	4–6	5–8	5–8
Breeding sows	4–6	5–9	5–6	7–8	6–8
Broilers	2–3	3–4	2–4	3–5	3–5
Turkeys	3–5	4–6	4–6	5–8	5–6



For further information on possible uses and on doses please refer to our "Feed Preservation Guide".

CONTACTS

North America

BASF Corporation
Animal Nutrition, North America
100 Park Avenue
Florham Park, New Jersey 07932
USA
Phone: +1-800-527-9889
Fax: +1-973-245-6766
e-mail: nutrition-north-america@basf.com

Asia/Pacific

BASF South East Asia Pte. Ltd.
Animal Nutrition, Asia/Pacific
7 Temasek Boulevard, #35-01
Singapore 038987
Phone: +65 6337 0330
Fax: +65 6432-3298
e-mail: nutrition-asia-pacific@basf.com

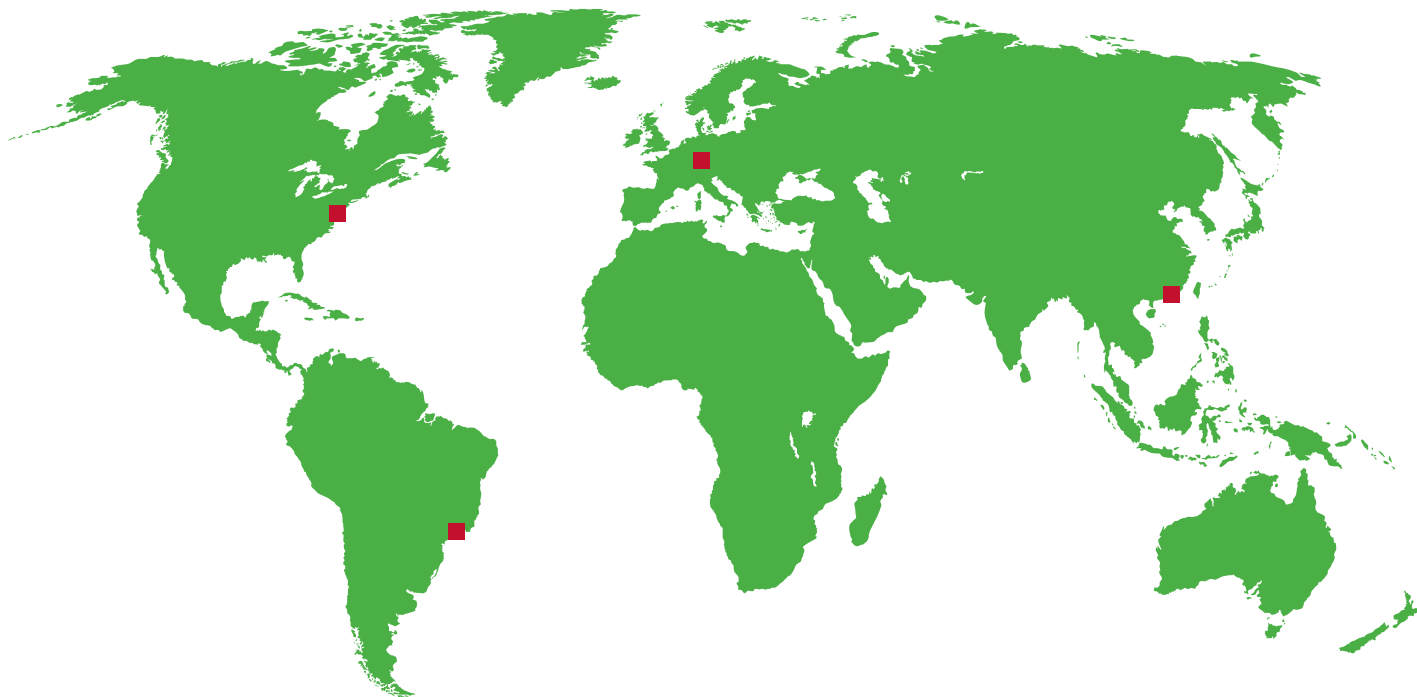
www.animal-nutrition.basf.com

Europe, Africa, West Asia

BASF SE
Animal Nutrition, Europe
Chemiestrasse 22
68623 Lampertheim
Germany
Phone: +49-621 60-28073
Fax: +49-621 60-28363
e-mail: nutrition-europe@basf.com

South America

BASF S.A.
Animal Nutrition, South America
Avenida das Nações Unidas 14.171 – 10th floor
04794-000 São Paulo SP
Brazil
Phone: +55-11-2039-2292
Fax: +55-11-2039-2344
e-mail: nutrition-south-america@basf.com



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