



# Successful preservation for on-farm feeds

AIV  
Eastman Propcorn  
Eastman Stabilizer

**AIV**<sup>®</sup>  

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**EASTMAN**



## Succeed in ensiling and preservation.

Preserving on-farm feedstuffs is critical for highly productive and cost-effective milk and meat production. Finding the right products and a reliable supplier to help you succeed is of utmost importance. Eastman's range of feed preservatives provides reliable preservation solutions for a variety of forage plants, harvesting conditions, and harvesting methods. The effectiveness of our products is based on organic acids that naturally occur in living cells. You can trust us for reliable ensiling and preservation solutions because all of our products have been widely studied and tested in independent research institutes, providing proven evidence of product efficacy.

### AIV®

AIV\* products are based on the method created by Finnish chemist Prof. Artturi Ilmari Virtanen. The aim of his research was to promote effective utilization of protein-rich crops and to produce milk of the same vitamin content in winter as that produced on summer pastures.

The Nobel Prize in Chemistry was awarded to Virtanen for his research and inventions in agricultural and nutrition chemistry, especially for his fodder preservation method. The AIV method (named for his initials) is an essential part of Finnish ensiling tradition and the basis for the high standard of Finnish silage and dairy products.

Formic acid is the main component of AIV products. It is a highly effective organic acid for pH reduction. Compared to many other organic acids, formic acid has a strong inhibitory effect against bacterial growth.

*\*AIV is a registered trademark of Valio Ltd.*

## Effects of AIV ensiling

At the beginning of ensiling process, rapid pH drop is needed to inhibit growth of harmful, contaminating bacteria. AIV products quickly drop pH and reduce the risk of malfermentation as well as losses during ensiling. Having the proper level of acidity also minimizes silage protein degradation, and that can be seen in the low ammonium levels in AIV-treated silages.

AIV products help to restrict fermentation, which is essential with wet forages. Silage with restricted fermentation has been proven to increase feed intake, milk protein, and fat content as well as milk yield compared to excessively fermented silage.

AIV-treated silages normally have a low number of yeasts. Consequently, silage is not prone to heating during feed-out.

Figure 1. Effects of AIV ensiling

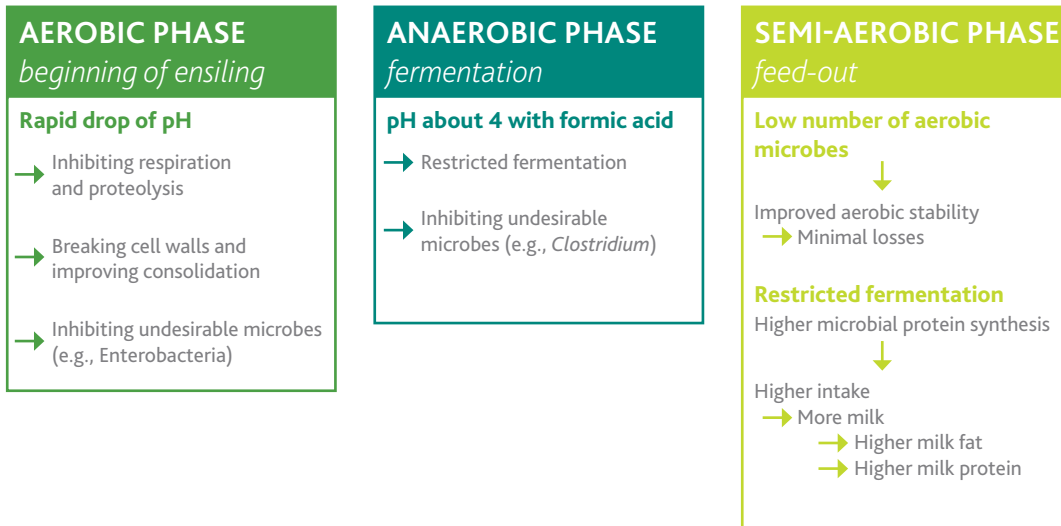
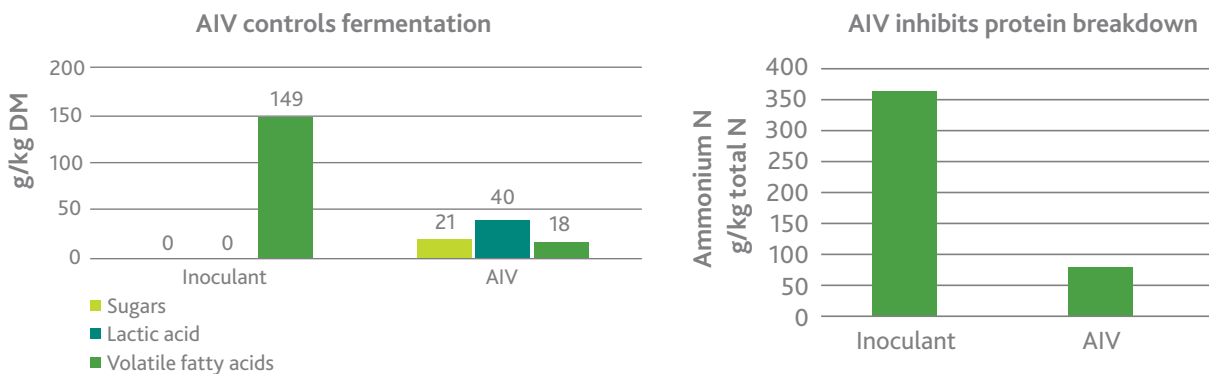
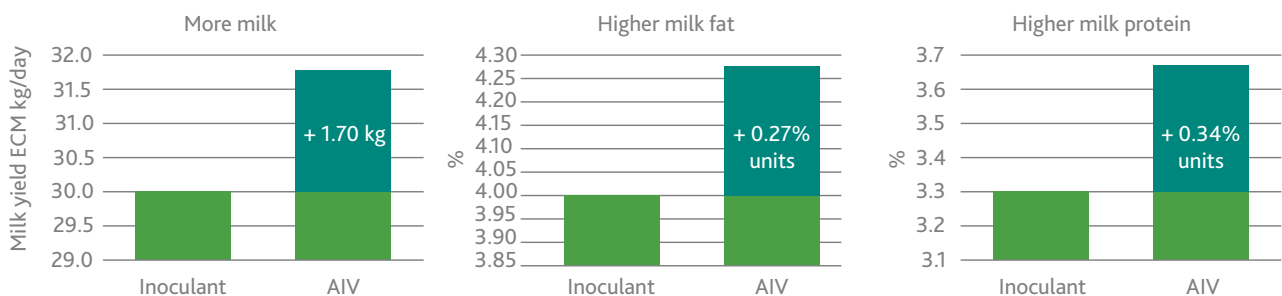


Figure 2. Improved silage quality through AIV method



Fermentation quality of wet lucerne silage was clearly improved by using AIV 2 Plus Na at 5 L/ton at ensiling. Source: Seppälä, Arja; Hoedtke, Sandra; and Wolf, Petra. "Ensiling wet lucerne with biological or formic acid based silage additives." Proceedings of the XVIII International Silage Conference. 2018, p. 282–283.

### Expected effects on milk production



Note: Effect of fermentation quality on milk production parameters are calculated based on Huhtanen, P. et al. 2003, "Relationships between silage fermentation characteristics and milk production parameters: analysis of literature data." *Livestock Production Science* 81: 57–73.



### AIV 2 Plus Na

AIV 2 Plus Na is a reliable solution when challenges include low dry matter (DM), variable weather, or high proportion of legumes. By using AIV 2 Plus Na as silage additive, good fermentation quality also can be achieved without prewilted. Reduced weather dependency means flexibility in harvesting without compromising silage quality. The product is rich in formic acid, which helps ensure rapid pH drop, minimized proteolysis, and restricted fermentation even in high-moisture conditions.

**Active ingredients:** formic acid and sodium formate

### AIV 3 Plus Na

AIV 3 Plus Na is a formic acid-based product used for prewilted silage (DM 25%–45%) and for ensiling crimped grains. Formic acid and its salt act by inhibiting the activity of microorganisms involved in spoilage. Propionic acid, in turn, has inhibitory effect against yeasts and molds. AIV 3 Plus Na supports silage aerobic stability during feed-out by preventing growth of yeasts and molds. The product is highly buffered.

**Active ingredients:** formic acid, sodium formate, and propionic acid

### AIV 2000 Plus Na

AIV 2000 Plus Na is a multipurpose product recommended for prewilted silage (DM >30%) and ensiling crimped grains and high-moisture corn. AIV 2000 Plus Na contains formic acid and its salt and acts by inhibiting the activity of microorganisms involved in spoilage. Propionic acid and sodium benzoate in the product strengthen the inhibitory effect on molds and yeasts. In addition, the product controls heating after silo opening. AIV 2000 Plus Na combines the beneficial effect of formic acid with sodium formate buffering to reduce metal corrosivity.

**Active ingredients:** formic acid, sodium formate, propionic acid, and sodium benzoate

### AIV Ässä Na

AIV Ässä Na combines restricted fermentation with good aerobic stability after silo opening. It shows strong performance in applications that require efficacy against several types of spoilage organisms: bacteria, yeasts, and molds. AIV Ässä Na has high concentrations of free formic and propionic acids for immediate effect. The versatile composition is complemented by potassium sorbate, which increases efficacy, especially against yeasts. As a result, the product is more effective at preventing nutrient losses caused by aerobic microbes than formic acid alone. AIV Ässä Na can also be used to stabilize total mixed ration.

**Active ingredients:** formic acid, propionic acid, sodium formate, and potassium sorbate

### AIV Pro NC

User-friendly AIV Pro NC is specially formulated for ensiling prewilted silage. The versatile composition provides a broad range of activity against the contaminating microbes and improved aerobic stability during the feed-out phase. AIV Pro NC is high in sodium for silage palatability. It also contains glycerol and sodium formate and is classified as only an irritant to skin.

**Active ingredients:** formic acid, sodium formate, propionic acid, sodium benzoate, glycerol, and propylene glycol



## Eastman Propcorn and Stabilizer

Eastman Propcorn™ and Stabilizer products help prevent aerobic spoilage of on-farm grown feeds. They can be used for aerobic preservation, grain crimping, and high-moisture corn preservation as well as for stabilizing ensiled feed and feed raw materials during the feed-out phase.

Eastman Propcorn products are especially suitable for mold prevention. The efficacy of the products is based on propionic acid and its salt form, which are both normal compounds in animal digestive tracts.

### Eastman Propcorn NC

Eastman Propcorn NC is a multipurpose product that is especially suited to preventing mold growth in hay, straw, and crimped grain or high-moisture corn. It is also used in aerobic grain preservation. The product maintains the nutritional value and natural color of the hay and reduces dusting when handling bales. It is also suitable for silage surface treatment. Eastman Propcorn NC contains ammonium propionate, which gives the product a mild odor also reducing corrosivity.

**Active ingredients:** propionic acid and ammonium propionate

### Eastman Propcorn Plus

With Eastman Propcorn Plus, whole grain, crimped grain, or high-moisture corn can be preserved cost-effectively. It is a propionic acid-based product and therefore suitable for the most demanding mold control needs such as whole grain preservation, which is mostly aerobic preservation of moist grains. Adjust application level based on the grain moisture and ensure even distribution for the best result.

**Active ingredients:** propionic acid and ammonium propionate

### Eastman Stabilizer Crimp

Eastman Stabilizer Crimp is a specialty product for grain crimping as well as high-moisture corn preservation. The product composition is designed especially for improving aerobic stability of crimped grains after storage opening. Eastman Stabilizer Crimp is a propionic acid-based product that also contains sodium benzoate to improve efficacy against aerobic spoiling organisms. It improves microbial quality and aerobic stability of crimped grains and is a non-ADR product with mild odor classified as only an irritant to skin, which enables a better user experience.

**Active ingredients:** propionic acid, ammonium propionate, sodium benzoate, glycerin, and propylene glycol

### Eastman Stabilizer TMR

Eastman Stabilizer TMR is a user-friendly solution to improve total mixed ration (TMR) stability and hygienic quality and reduce nutrient losses. It is applied into the TMR at the time of preparation and mixed well into the entire batch. The sodium-based buffering makes the product non-ADR and helps reduce corrosivity and evaporation.

**Active ingredients:** formic acid, sodium formate, propionic acid, sodium benzoate, glycerin, and propylene glycol

## Combine efficacy with safety in ensiling.

Eastman works with customers to deliver innovative products and solutions while maintaining a commitment to safety and sustainability. Our superior-quality ensiling and feed preservation solutions help ensure safe, high-quality feed for livestock. In addition to safe feed, user safety is important. User experience and machine durability are taken into consideration in product development.

Our product compositions are significantly more user friendly than unbuffered pure acids thanks to the added salt forms of acids: formate or propionate. In addition, consumption monitoring is easy during application due to the brown caramel color in our AIV products.

Customer safety is very important to Eastman. To prevent injuries, be sure to use suitable protective clothing and equipment, including gloves, respiratory and eye protection, and other personal protective equipment (PPE) during product handling. In addition, always have water available to rinse potential splashes. Additional information on safety can be found in the product safety data sheets.

## Organic acids are naturally present in living cells.

Organic acids have many positive effects on feed quality and animal performance—and they can also be found in nature. For instance, formic acid is found in ants, wasps, and nettles. And propionic acid is produced by microbial fermentation in rumen and in colon. For ruminants, propionic acid is an important source of energy and a precursor of blood glucose and milk lactose.

Our products also contain salt forms of organic acids, such as formate, propionate, and sorbate. Sorbate is the salt form of sorbic acid, and benzoate is the salt form of benzoic acid. Sorbic acid and benzoic acid are naturally present in many berries such as lingonberry. In addition to salt forms, they also contain minerals such as sodium or potassium.

In products containing multiple organic acids, the combined effect of different acids extends the effectiveness against harmful microbes.



## Proper application ensures success.

The following application recommendations are based on research results. It is important to apply a sufficient rate of additive and to distribute it evenly. This ensures the optimal benefits of successful ensiling and preservation are achieved.

A typical recommended application rate of AIV for grass ensiling is 5 liters per ton of harvested crop. It is advisable to monitor product consumption during harvesting. When grass dry matter content changes, weighing loads helps to adjust the application rate. It is recommended to increase the application rate if harvested forage is very wet or dry or if the proportion of legumes exceeds 50%.

For ensiling crimped grain, the application rate is 3 to 7 liters per ton of grain. The higher rates are for dryer grains. The most challenging moisture range for grain crimping is 20%–28%, which allows air to penetrate easily through the grain. In that case, propionic acid-based products such as Eastman Stabilizer Crimp are recommended.

## Product recommendations

	Forage ensiling grass, whole crops, maize			Grain crimping (anaerobic)		Aerobic grain preservation		Total mixed ration (TMR)
	Dry matter %			Moisture %		Moisture %		
	Unwilted < 30%	Prewilted, 23%–45%	Haylage, > 40%	15–30	30–45	15–25	25–30	
<b>AIV 2 Plus Na</b>								
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<b>AIV Pro NC</b>								
<b>Eastman Propcorn NC</b>								
<b>Eastman Propcorn Plus</b>								
<b>Eastman Stabilizer Crimp</b>								
<b>Eastman Stabilizer TMR</b>								

Note: Not all products are available in all countries.

For all animal nutrition enquiries, contact  
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