



# How betaine alleviates heat stress in broilers

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**R**ising temperatures are causing an increased challenge for poultry producers the world over. Heat stress can severely impact broiler performance, leading to decreased growth rates, poor feed conversion, and increased mortality.

Fortunately, nutritional solutions are available that can assist in mitigating heat stress issues. One of the most interesting compounds to consider as a feed (or drinking water) additive for animals under heat stress is betaine.

## The role of betaine

Betaine is a naturally occurring nutrient, scientifically recognised for its effectiveness in supporting animals and plants during heat stress or periods of drought. Focussing on heat stressed broilers, this is how betaine works:

### Organic osmolyte

Betaine acts as an osmolyte, helping cells to maintain their water content (= cellular hydration). During heat stress, broilers often experience dehydration due to excessive panting. By maintaining cellular fluid balance, betaine helps mitigate the adverse effects of dehydration.

### Protective action

Betaine stabilises the structure of membranes and certain cellular metabolites (such as proteins or DNA). This protective effect offers an additional advantage during periods of (heat) stress, safeguarding the cellular structures and cellular activity.

### Enhanced gut health

Heat stress can disrupt the intestinal barrier, leading to poor nutrient absorption and an increased susceptibility to infections. Betaine supports gut integrity by reducing intestinal permeability and promoting the growth of beneficial gut microbiota. A healthy gut is crucial for optimal nutrient absorption and overall immunity.

### Energy efficiency

Feed intake of broilers under heat stress is reduced. Moreover, the bird's metabolism will utilise energy for active cooling mechanisms such as panting. Optimal energy efficiency is important to minimise retardation in growth. Betaine helps to enhance nutrient utilisation and supports metabolic processes. In addition, betaine can reduce the energy expenditure for cooling, as lower body temperatures are observed when betaine is supplemented to the diet. This allows broilers to maintain productivity even under stressful conditions.

### (Oxidative) stress reduction

Heat stress triggers the release of stress hormone such as corticosterone and increases the production of oxidants, resulting in oxidative stress. Betaine has been shown to modulate stress responses, reducing the detrimental effects of heat stress, and enhancing the antioxidant support. Reduction in (oxidative) stress translates to a better feed intake, growth performance, and overall well-being in broilers.

### The beneficial effects of betaine

Numerous studies have shown that betaine supplementation can significantly improve the performance of heat stressed broilers. Research indicates that broilers fed betaine during heat stress show improved weight gain, better feed conversion ratios, reduced mortality rates, and a modified carcass composition with higher breast meat yield and reduced fat content.

On average, betaine can enhance the growth rate by approximately 5 to 10%. This improvement varies depending on the specific conditions of the study, such as the level of heat stress, duration, and dosage of betaine used.

### Practical recommendations

For optimal results, it is recommended to start betaine supplementation



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before the onset of heat stress and to continue throughout the period of high temperatures. The advised inclusion rate to enhance broiler resilience and performance under challenging environmental conditions is 1 to 2kg betaine/ton feed. By integrating betaine into the standard diet, producers can mitigate the adverse effects of (unforeseen) heat stress and promote more robust growth in their flocks.

### Conclusion

As the poultry industry faces increasing challenges from climate change, finding effective solutions to support poultry during heat stress is crucial. Betaine offers a promising nutritional tool to enhance broiler health, productivity, and welfare, especially when environmental temperatures are high. By incorporating betaine into broiler diets or drinking water, you can reduce the detrimental effects of heat stress, ensuring sustainable and profitable poultry production.

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