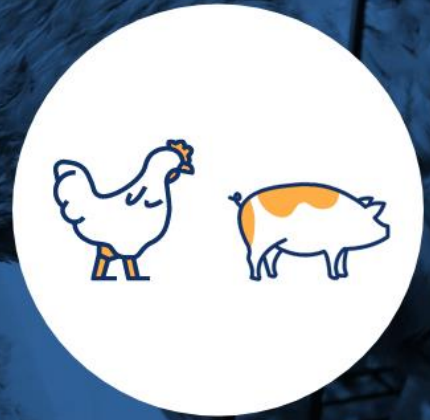


# Use of betaine (Heat stress)



Last update: 4 September 2023

- **Type of challenge:** Animal welfare.
- **Challenges:** Decrease in feed intake due to heat.
- **Action:** Implement a targeted feeding strategy to align diet composition with the physiological needs during heat stress.
- **Animal category:** Monogastric animals, specifically focusing on pigs. Works also with ruminants.
- **Technique:** Addition of betaine in the diet.
- **Mode of action:** Pigs have limited ability to efficiently regulate their body temperature due to the absence of sweat glands and panting mechanisms. Betaine acts as an osmoprotectant, helping to maintain cellular hydration by balancing water movement across cell membranes and supporting proper electrolyte levels.
- **Potential efficacy:** No direct efficiency indicator; betaine supplementation has been linked to better osmoregulation and improved nutrient utilization.
- **Nature of evidence of efficacy:** Peer-reviewed scientific publications.
- **Factors impacting on efficacy:** Level of temperature, dosage, diet composition, pigs genetics, housing conditions.
- **Mode of use:** Incorporating into feed at 0.1 to 0.5% or using in water during heat wave above 30°C.
- **Requirements/limitations:** The additive must be incorporated into a compound feed by a registered feed business operator applying HACCP (R183/2005).
- **Economic consequences:** Higher cost of diet depending on the cost of additives, offset by better zootechnical performance (costs of heats stress for US pig industry evaluated at nearly \$1 bio/year).
- **Other considerations:** In addition to managing heat stress, feeding betaine to pigs can offer other positive effects, including improved growth performance, better fertility for sows, enhanced nutrient utilization, leaner carcasses , and potential reductions in oxidative stress due to their antioxidant properties.
- **References:**
  - Cottrell *et al.* (2015). *Nutritional strategies to alleviate heat stress in pigs*. Journal of Animal Science and Biotechnology, 6(1), 37. <https://doi.org/10.1071/AN15255>.
  - Cronje (2005). *Heat stress in livestock – the role of the gut in its aetiology and a potential role for betaine in its alleviation*. Conference on Recent Advances in Animal Nutrition in Australia 15, 107-122.
  - Mayorga *et al.* (2019). *Heat stress adaptations in pigs*. Animal Frontiers, Volume 9, Issue 1, January 2019, Pages 54–61. <https://doi.org/10.1093/af/vfy035>.
- **Other techniques:** Feeding strategy consisting in lowering the protein content of the diet (in particular reduction of non-essential amino acids) to reduce heat production due to fermentation; increasing electrolytes like sodium, potassium and chloride to maintain proper fluid balance and prevent dehydration; addition of glutamine; addition of chromium (no chromium compound authorised yet as feed additive for pigs in the EU).