

# MICROENCAPSULATED BUTYRATE IN POULTRY: BENEFITS DURING HEAT STRESS



**Many animal producers operate in consistently tropical climates and as we know, temperatures are even rising due to global warming. Considering that stress from heat already starts at moderate temperatures for several production animals, this is a worldwide threat with no single solution. Animals facing the threat of heat possess several coping mechanisms. These enable the animal to survive the heat but severely impact their production parameters.**

Poultry farming in summer is important to understand because environmental stress causes adverse effects on the performance of the poultry. Heat stress negatively affects both welfare and productivity of broilers and laying hens. The detrimental effects of heat in poultry range from reduced growth and egg production to decreased quality and safety of poultry meat and eggs. Understanding and controlling heat stress in poultry is crucial to successful poultry production and welfare. Ideal temperatures for poultry rearing are 18-28°C and at temperature above 30°C, the important negative influence of heat stress starts.

## **Effect of hot summer on poultry includes:**

- Rapid respiration/panting
- Decrease in feed intake and increase in water intake
- Prostration due to heat stroke
- Poor feed conversion efficiency
- Decrease in weight gain of birds
- Lower resistance to diseases
- Metabolic imbalances
- Decrease in egg production and egg size
- Poor shell quality of eggs and increase in cracked eggs
- Decrease in fertile eggs and reduced hatchability %

The impact of heat is also highly variable for each animal breed and for each individual within that species. Individuals are not equal in their ability to recover from heat stress episodes.

Therefore, managing heat stress implies dedicated and adapted strategies for each of them individually. Feeding strategies are versatile and help the animal to better protect itself when the threat hits. Electrolyte balance and osmoregulation are important mechanisms to consider during heat stress and can be steered via nutrition and appropriate feed additives.

## **Influence of Heat Stress on Intestinal Health**

In the digestive tract, the (small) intestine plays a very important role as most of the nutrient absorption occurs here. The poultry intestine harbors a diverse community of microorganisms, which helps in the breakdown of complex nutrients to simple forms that can be easily digested and absorbed. The arrangement and adherence of epithelial cells of the intestinal wall play a very important role in absorption of nutrients and protection of the body from the invading, harmful microorganisms into the blood stream. Environmental factors, especially heat stress, have a very important effect on the microbial population and the intestinal structure of the poultry gut. Heat stress alters the microbial population and the activities performed by these microbiota, but the exact mechanism of its alteration is still unknown. Heat stress adversely affects the morphological structure of the duodenum, jejunum, and ileum of the small intestine. During heat stress, the intestinal morphology is adversely affected, including changes in intestinal relative weight, villi height, villi surface area, crypt depth, and surface area of the epithelial and immunoglobulin A-secreting cells.



**Excential Butycoat** is an excellent supplement for the support of poultry against heat threat

During heat stress, feed intake is reduced and water intake is enhanced, which adversely affects the intestinal mucosa leading to oxidative stress and inflammation. Heat stress can result in decreased populations of beneficial bacteria (*Lactobacillus* and *Bifidobacterium*) in the intestine which will be replaced by harmful bacteria like *Coliforms* and *Clostridium*.

Physiological changes resulting from heat stress can also lead to leaky gut syndrome, which allows the pathogenic bacteria to enter the bloodstream by crossing the intestinal barrier to cause inflammation and septicemia. In this manner, heat stress leads to lower performance, less egg production, low meat yield, retarded immunity status, and low reproductive performance.

**Protection of Intestinal Health with Butyrate**

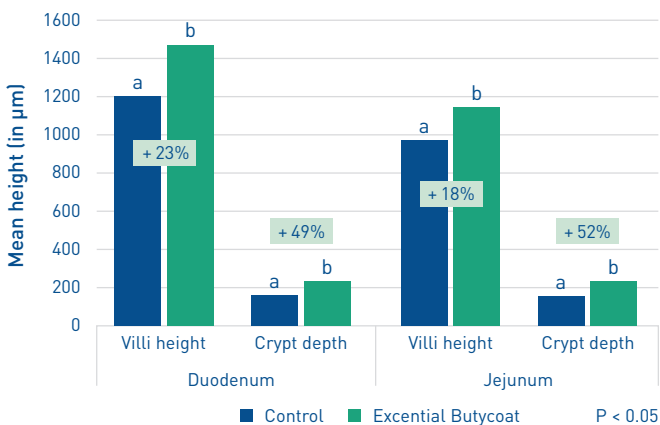
Butyrate is known to be an important energy source for intestinal epithelial cells and has multiple beneficial effects on vital intestinal function. Butyrate is naturally produced in digestive tract of animals during fermentation by beneficial microbiota. For optimal support, and in periods of microbiota disbalance, additional butyrate can be added to the diet. However, unprotected butyrate will be directly absorbed in the first part of the digestive tract before reaching the large intestine. **Excential Butycoat** is a micro-encapsulation of sodium butyrate, which results in the targeted release of butyrate over the whole digestive tract. This micro-encapsulation is increasing the mode of action and scope of activities to various gut levels as well as expanding effectiveness per unit active ingredient. Just as importantly, correct coating reduces the typical unpleasant smell of butyrate.

Butyrate has antimicrobial potency and strengthens the barrier functions of the gut. Research shows that low doses of butyrate can down regulate the expression of invasion genes in *Salmonella* and *E. coli*, thereby reducing the ability of the bacteria to attach to host cells of the intestinal epithelium, which prevents that they become invasive and virulent. Recent studies also reveal a novel role of butyrate in the host defense system by increasing the antimicrobial activity of host immune cells to release antimicrobial defense peptides. These host defense peptides have broad-spectrum antimicrobial activities against bacteria, protozoa, enveloped viruses and fungi. Typically the concentration of pathogens such as *Salmonella*, *E. coli*, *Clostridium perfringens* and others are lowered, as well as their invasiveness. Thereby making Excential Butycoat a very useful component in antibiotic free diets.

Above the antimicrobial potency, butyrate is also improving a variety of colonic mucosal functions, such as inhibition of inflammation and decrease of oxidative stress. As a result, supplementation also improves the carcass weight and breast meat in broilers.

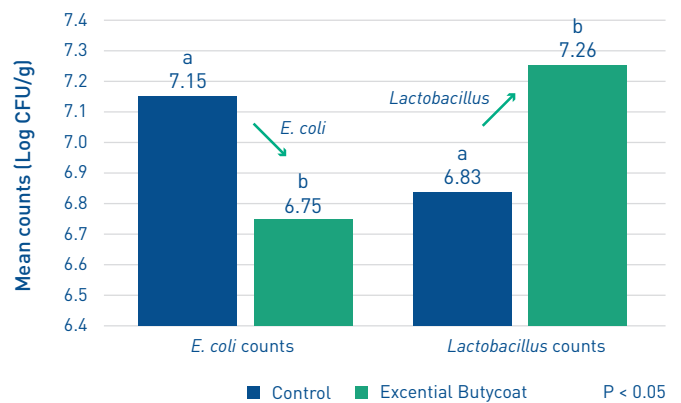
In conclusion **Excential Butycoat**, a microencapsulated sodium butyrate, is an excellent supplement for the support of poultry against heat threat and will benefit the gastrointestinal tract in the challenged birds.

**Beneficial effect on intestinal morphology**



Graph 1: Excential Butycoat effect on intestinal morphology in broilers (Research trial in Veterinary College, Bengaluru, India. 2022)

**Beneficial effect on intestinal microbiota**



Graph 2: Excential Butycoat effect on intestinal microbiota in broilers (Research trial in Veterinary College, Bengaluru, India. 2022)