Effects of a coated betaine based product on performance and muscle membrane integrity in heat-stressed broiler chickens

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Context & Objectives

- Exposure to **high temperatures could affect meat quality**, through alterations in muscle membrane permeability and metabolism.
- Anhydrous betaine is especially interesting under summer conditions, related to osmoprotective properties, but its **hygroscopicity makes it difficult to manipulate** in feed plants.
- This study aims at validating the impact on broiler performance and muscle integrity of a **non hygroscopic fat coated form of anhydrous betaine** over a non coated form.

Materials & Methods

- In Vivo Trial at MiXscience Research Center (http://www.mixscience.eu/rid/mixscience-research-center/)

✓ **Experimental plan:**

- Day old male Ross PM3 chicks allocated in 40 cages, with 4 birds per cage and 6 to 7 replicates per group.

6 pm – 8 am	24°C
8 am – 11 am	28°C
11 am – 3 pm	30°C
3 pm – 6 pm	28°C

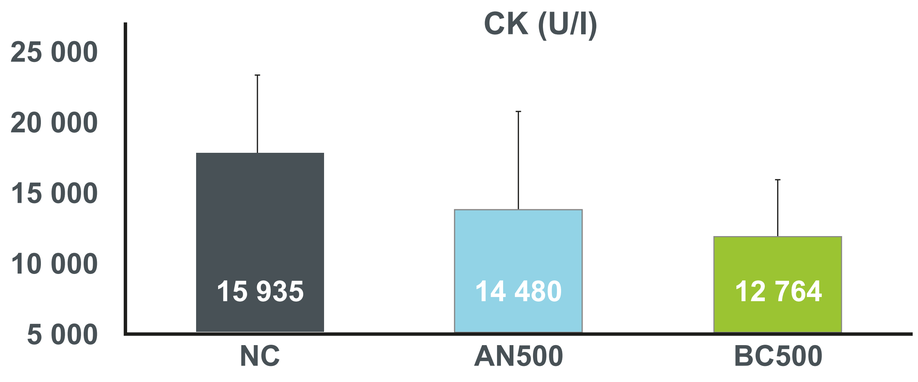
✓ **Measurements:**

- Zootechnical performances for all groups
- Analysis on jugular vein blood at 34 days for groups NC, AN500 and BC500: (n=16 per group)
  - Creatine kinase (CK)
  - Glutamic-pyruvic transaminase (GPT)
  - Glutathion peroxydase (GPx)

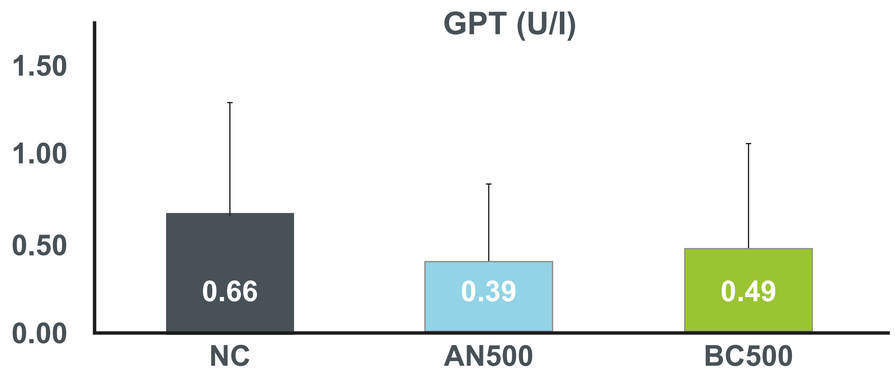
Group	**NC**	**AN250**	**AN500**	**AN1000**	**BC250**	**BC500**
Betaine form	Ø	Free anhydrous betaine			Coated anhydrous betaine	
Added betaine in the diet from 0 to 34d (g/T)	0	**250**	**500**	**1000**	250	500

Results

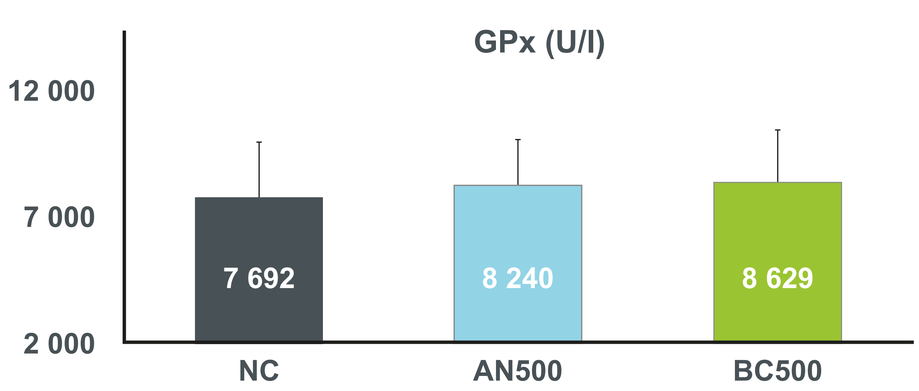
✓ Performances tend to be improved for all groups compared to NC, with the best result for BC500 (2.6kg corrected FCR between 0 and 34 days: 1.48 for BC500 vs.1.53 for NC).



✓ Tendency to reduce the skeletal muscle-derived isoenzyme CK with both betaine forms, especially with the coated one (-9.1% and -19.9% for non coated and coated forms, respectively), which may indicate a reduction of heat stress related damage to muscle membrane.



✓ Numerical decrease of plasmatic glutamic-pyruvic transaminase (GPT) (-41% and -26% for non coated and coated forms, respectively), which may indicate lower cellular injury related to hyperthermia.



✓ Tendency to increase glutathione peroxidase (GPx) (+7.1% and +12.2% for non coated and coated forms, respectively), an enzyme protecting the organism from oxydative damage.

Conclusion

- **The specific fat-coated form of betaine produced by MiXscience is of particular interest under summer conditions and can be used in feed plants due to his low hygroscopic effect.**
- **This study confirms the in vivo efficacy of coated betaine in broiler chickens, with a tendency to improve performance and meat quality compared to negative control and free non-coated betaine.**