# The potential of in ovo fed AA to improve thermotolerance in broiler chickens

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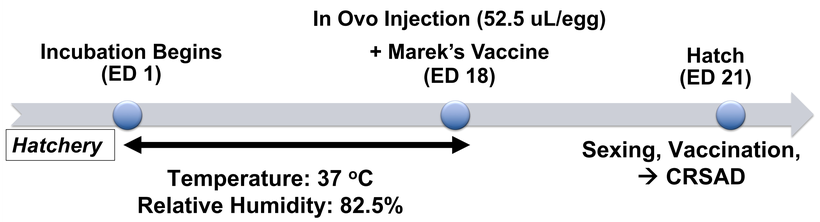
## Research Question

Could *in ovo* feeding of leucine (branched-chain AA), methionine and cysteine (sulfur AAs) potentially alleviate the impact of heat stress on broiler chickens?

## Experimental Design

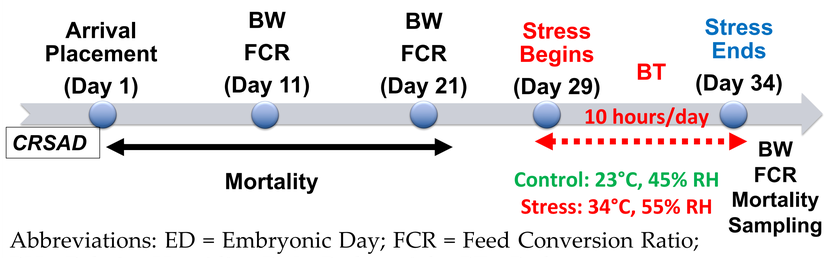
1680 fertile **Ross 308** eggs were taken from a commercial broiler breeder flock and injected with one of **six** treatments.

| N° of Eggs/Treatment | Treatment | Amino Acid Content *Injection volume = 52.5 µL/egg* |
|---|---|---|
| **280** | CTRL | Sterile diluent |
| **280** | B | 1 mg Leucine |
| **280** | C | 0.45 mg Leu + 1.15 mg Met |
| **280** | D | 3 mg Met + 2 mg Cys |
| **280** | F | 0.4 mg Leu + 1.6 mg Met + 1.6 mg Cys |




Chicks were placed in a **randomized complete block design with 6 blocks and 10 replicates** per treatment (n = 5 control, n = 5 stress) and kept under optimal conditions for 28 days.

| Randomized Complete Block Design | | |
|---|---|---|
| **Control** | | **Stress** |
| Blocks = 6 | | Blocks = 6 |
| Treatments = 6 | | Treatments = 6 |
| Replicates = 5 | | Replicates = 5 |
| Pens = 30 | | Pens = 30 |




Abbreviations: ED = Embryonic Day; FCR = Feed Conversion Ratio; RH = Relative Humidity; BW = Body weight; BT = Body temperature.

## Preliminary Results

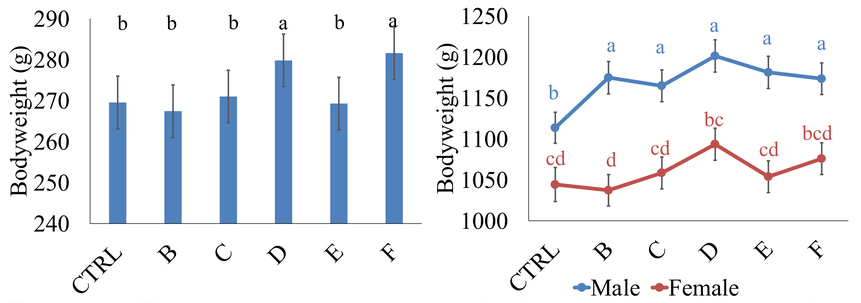



**Figure 1**: Effects of *in ovo* AA on chicken (**Left)**: bodyweight at d10, *P*(TRT) < 0.05; (**Right)**: bodyweight at d21, *P*(TRT × Sex) < 0.05.

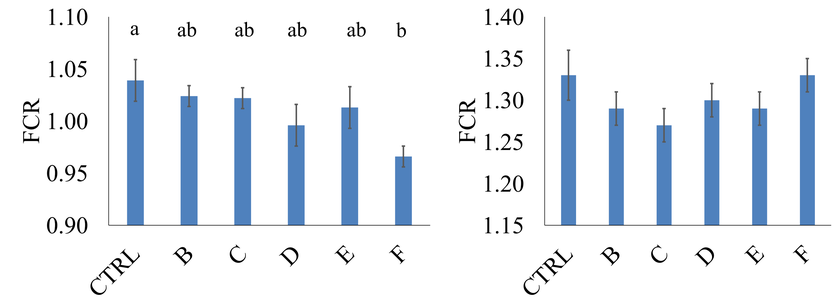



**Figure 2**: Effects of *in ovo* AA on chicken **FCR** at the end of (**Left)**: starter phase (d10), *P*(TRT) < 0.05; (**Right)**: grower phase (d21), *P*(TRT) > 0.05.

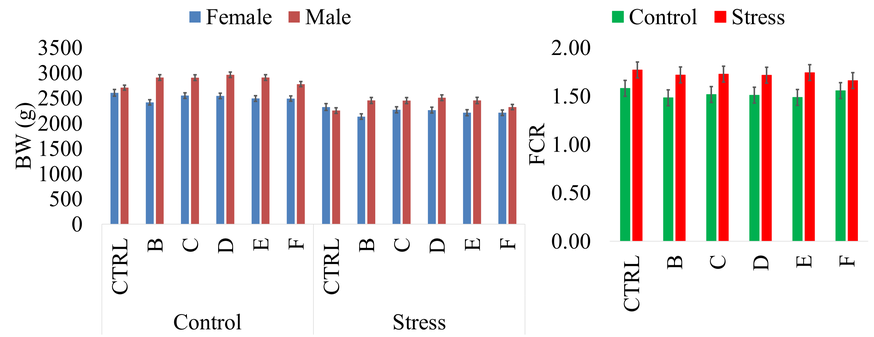



**Figure 3**: Effects of *in ovo* fed AA on body weight (**Left)** and on FCR (**Right)** at the end of the stress. *P*(TRT) > 0.05, *P*(condition) < 0.05.

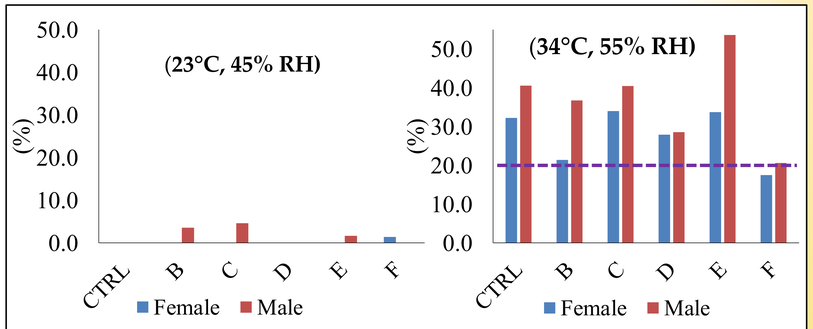



**Figure 4**: Effects of *in ovo* AA on chicken **mortality** during stress period (d29-d34) under (**Left)**: control conditions; (**Right)**: stress conditions. *P*(condition) < 0.05, *P*(TRT) > 0.05.

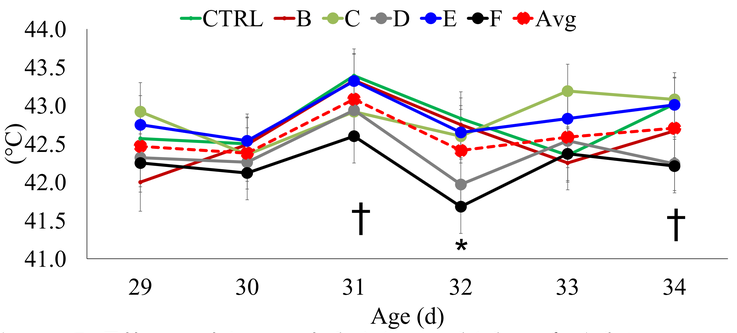



**Figure 5**: Effects of *in ovo* fed AA on chicken **facial temperature** during stress period (d29-d34) under stress conditions. *P*(**TRT** × **Age**) < 0.05. **P* < 0.05, †*P* = 0.05.

## Conclusion

- These preliminary findings suggest that a combination of BCAA and SAA could be leveraged to improve performance during the starter and grower phases.
- This combination of AA was successful in reducing body temperature under stress and has thus the potential to alleviate the harmful effect of exposure to high ambient temperature in broiler chickens.

## Perspectives

- ✓ Validate preliminary results in large-scale experiments.
- ✓ Elucidate mechanisms of action of AA treatments using metabolomics and transcriptomics.

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