

NEWS RELEASE

UP study finds that vitamin C and probiotics could help farmed chickens cope better with heat stress

As global warming turns up the heat, ascorbic acid (vitamin C) and a probiotic added to the feed of chickens raised for meat on small-scale farms in South Africa could help them cope better with heat stress.

This simple solution – although yet to be tested on large numbers of birds – has produced promising results in initial research on chickens raised during the hot summer season of 2022.

This is according to Professor Joseph Chamunorwa, head of the University of Pretoria’s Anatomy and Physiology Department in the Faculty of Veterinary Science, who is part of a UP research team investigating nutrition-based solutions for the growing threat of heat stress among chickens at small-scale farms.

Heat stress is already a major factor in losses in the poultry meat industry – as was seen earlier in 2023 when thousands of birds on commercial farms died during air conditioning failures linked to load shedding.

However, it is specifically small-scale farmers whom the UP researchers seek to assist – especially as global warming gains momentum.

Why small-scale farmers need help

“Heat waves interspersed with flooding are going to be the norm and small-scale farmers are not that well-resourced. They rely on natural ventilation, which has limitations. If the birds’ mechanisms for dealing with stress are overwhelmed, an external intervention becomes important,” says Prof Chamunorwa.

Chickens (and in fact all bird species) do not have sweat glands and their normal cooling mechanisms are behavioural. One of the most important is respiration – chickens pant so that heat can move out of their bodies via their lungs and air sacs.

If conditions are simply too hot for them, intensively farmed chickens experience heat stress and then oxidative stress, which can damage their cells, tissue and organs, impairing their health, inhibiting their growth and potentially causing death.

Ascorbic acid is known to inhibit the oxidation process, while yeast probiotics have both antioxidant and anti-stress characteristics. The UP research team therefore set out to evaluate the effectiveness of these two elements in mitigating the damaging effects of oxidative stress on chickens exposed to heat stress under natural conditions.

They carried out their experiment on 56-day-old chicks divided into four groups of 14. For the next 35 days, the control group received standard chicken feed, and the chicks in the other three groups received either the probiotic or the ascorbic acid or both.

While the control group experienced the negative effects of heat stress throughout the study, the results for the other three groups were encouraging.

Anti-stress effects and better growth

“Our results showed that the probiotic and/ or ascorbic acid mixed in feed were effective in reducing oxidative gene damage and alleviating the detrimental effects of heat stress,” says Prof Chamunorwa. “The birds that received this treated feed showed anti-stress effects, improved antioxidant capacity and improved growth.”

In fact, the chickens given the treated feed reached an average weight of 2.5 kilograms – about 1 kg more than the weight at which most chickens in South Africa are sent for slaughter – in five weeks instead of the usual six weeks.

Minimising heat stress in this way could save South Africa’s small-scale poultry farmers approximately R17 000 a year in feed for every 100 birds, he says.

“If slaughtered earlier, depending on required market weight, this translates into even higher savings on feed and greater profits as more cycles could then fit into the year. On the meat sales, this translates into more kilograms of meat in a shorter cycle.”

Next stage of the study

Prof Chamunorwa says the study is not yet at a stage where the research team can make definitive recommendations to the poultry industry. “Our findings need to be substantiated through replicated production studies with larger numbers of birds, which is the next stage of our study.”

This is where the feed companies, with their know-how in optimal mixing methods at scale, could play an invaluable role. “The feed companies are the important stakeholders at this stage and should already consider producing feed with these additives as an option for farmers to buy as ready-mix,” he says.

“The science is sound, and I am hopeful that the feed companies will come on board and that farmers will embrace the use of these additives in pre-mixed feed as it becomes available. Global warming is becoming a real threat, and higher ambient temperatures have become a reality to contend with.”

*More details about the study and its findings can be found in the Animal Gene journal article titled *“Effects of probiotic (*Saccharomyces cerevisiae*) and ascorbic acid on oxidative gene damage biomarker, heat shock protein 70 and interleukin 10 in broiler chickens exposed to heat stress”*. The authors are Victory Osirimade Sumanu, Charles Byaruhangar, Anne-Mari Bosman, Sunday Ochonu Ochai, Vinny Naidoo, Marinda Caterina Oosthuizen and Joseph Panashe Chamunorwa, all from the Faculty of Veterinary Science.

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ABOUT THE UNIVERSITY OF PRETORIA

The University of Pretoria (UP) is one of the largest contact and residential universities in South Africa, with its administration offices located on its Hatfield Campus in Pretoria. This 115-year-old institution is also one of the largest producers of research in South Africa.

Spread over seven campuses, it has nine faculties and a business school, the Gordon Institute of Business Science (GIBS). It is the only university in the country with a Faculty of Veterinary Science, which is ranked the best in Africa. UP has 120 academic departments and 92 centres and institutes, accommodating more than 56 000 students and offering about 1 100 study programmes. It has the most academic staff with PhDs (70%), NRF-rated researchers (613).

The 2023 QS World University Rankings by Subject ranked UP first in South Africa in Accounting and Finance, Law, Economics and Econometrics, Mechanical Engineering, Electrical and Electronic Engineering, Chemical Engineering, Mathematics, and Veterinary Science.

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