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“Towards multi-functional agro-ecosystems  
promoting climate resilient futures”

## Novel heat-resilient broiler chicken lines: drivers of food security and sustainability for Egypt and beyond

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### Abstract

Local genetic resources, when integrated into innovative breeding programs, are key drivers for climate-resilience and food security—regionally in Africa and Asia—and globally. In Egypt, for instance, local chicken breeds are gene-pool reservoirs that have adapted to diverse environments and play crucial roles in rural household food security, bringing rural prosperity, and sustainability. Recognizing their strategic and genetic value, Egyptian poultry breeders have initiated innovative programmes to develop next generation of novel broilers derived from diverse local genetic stocks, as a model for similar initiatives in low- and middle-income countries. At Cairo University, since 2003, we are practicing breeding schemes on adapted local chickens to develop two novel lines (Cairo and Giza) from the initial crosses between two commercial dam and sire lines and two local breeds; White Baladi and Bandara. Individual selection for high growth at 6-week was practised afterward. In Giza line, we introduced the Na gene to enhance heat tolerance by crossing Giza males with the Naked-Neck breed. This has led to establishment of three distinct populations: Cairo; Giza, normal feathering; and Giza, naked-neck. In 2022, we crossed Giza males with Cairo females to produce, for the first time in Egypt, the Cairo-Mix broiler. Although it is not as fast-growing as the international commercial strain, it performed much better (1340 g) than the locals (600 g) by 56 days of age. It also exhibits a favourable feed conversion ratio of 2.13 and a low mortality of 2%. Despite its longer growing period, it offers satisfactory economic efficiency, enhancing chicken welfare and food security. This research aligns with the SDGs-UN, African-Union-2063, and SDS-Egypt-2030 goals. Moving forward, we plan to integrate genomic selection to accelerate our breeding strategies. By identifying genes associated with growth, heat tolerance, and disease resistance, we can further enhance breeding programmes to produce more resilient birds with high growth. Having their immense practical implications, the preliminary findings from the genome analyses will be presented during the conference. This strategy not only supports small-holder farms in Egypt but also holds promise for larger production enterprises globally, fostering a resilient and sustainable future.

**Keywords:** Adaptation, biodiversity, breeding and genetics, food security, global warming, resilient-local Egyptian chicken, sustainability

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