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DON'T LOOK NOW!

The secrets of running guineafowl

Anyone witnessing the consternation that ensues when a flock of Helmeted Guineafowl is taken by surprise will know that these birds are capable of a remarkable turn of speed as they leg it for cover in a cloud of dust and alarmed cackling. Less common knowledge, perhaps, is that this species has attracted considerable attention from researchers working in the field of biokinetics. Studies involving trained guineafowl have yielded important insights into the mechanics of running and revealed that these birds are finely tuned sprinting machines whose athletic abilities have been honed by millions of years of evolution.

Although often taken for granted, running is a mechanically complex activity that requires a sophisticated level of interaction between muscles and the nervous system. The mechanical challenges are multiplied many times over when an animal is running over anything other than a perfectly flat surface. In the real world, animals often run over rough and varied terrain where they must cope with sudden and unexpected changes in the substrate. Recently, scientists from Harvard University in the USA devised a cunning experiment to understand how guineafowl maintain their stability when running over an unpredictable surface.

Birds obtained from a local breeder were first trained to run at a steady speed down an eight-metre-long runway. Next the runway was modified so that there was a half-metre-wide gap midway along it. An electronic sensor at the bottom of the gap, positioned nine centimetres lower than the runway surface, precisely measured the forces produced by a running guineafowl when it encountered the drop-off, allowing the scientists to determine exactly how the bird's posture, balance and gait were affected. The guineafowl's ability to cope with a sudden change in the surface was then tested in two ways. In the first experiment, the approaching drop-off was visible to the running bird. In the second, the drop-off was disguised with a piece of tissue paper taped over the gap, ensuring that the bird had no prior warning.

The researchers' findings were surprising, to say the least. Paradoxically, the guineafowl coped with the drop-off far better when they could not see it approaching, compared to when it was clearly visible. During 19 trials when the gap was concealed, there was only one case where a running bird stumbled, whereafter it immediately recovered its balance. On the other hand, when the drop-off was clearly visible, the birds stumbled in no fewer than four out of 20 runs. In two of those four instances the birds were unable to recover their balance and fell. In another six instances, running birds came to a dead stop as soon as they reached the visible drop-off.

These peculiar results suggest that the birds' reflex reactions are more effective at coping with unexpected challenges to their balance than are their conscious, anticipatory responses. One possible reason concerns limb stiffness, which is a function of the extent to which a limb is bent; when a guineafowl's leg drops through a layer of tissue paper, it is straighter and therefore better at absorbing energy when it comes into contact with the surface than when the bird's brain is consciously calculating the best leg position.

Whatever the ultimate explanation for these findings, it certainly seems that guineafowl perform better when not thinking too hard!

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REFERENCE

Daley, M.A. et al. 2006. 'Running over rough terrain: guinea fowl maintain dynamic stability despite a large unexpected change in substrate height.' *Journal of Experimental Biology* 209: 171–187.