Mass loss in Masked and Cape Weavers and Redbilled Quelea

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Introduction

Diurnal birds lose weight overnight and this weight must be regained during the day. Although many weight lists have been published, no studies on weight loss have been undertaken in South Africa, although there have been many elsewhere (e.g. Ens *et al.* 1990). In this study Masked Weavers *Ploceus velatus*, Cape Weavers *P. capensis* and Redbilled Queleas *Quelea quelea* were trapped en route to their roosts to record their weights in the evening and mass loss overnight. These species, particularly the latter, are agricultural pests and the weight losses indicate the minimum amount of food (by mass) that must be eaten daily by a single bird.

Study sites and methods

The Masked Weavers were trapped at the CSIR (25°44'S, 28°16'E) in suburban Pretoria, Gauteng province. Several different roosts were used by large flocks of this species. One of the main roosts was a very dense patch of reeds at the edge of the main dam at the CSIR. Birds forage along the Moreletaspruit and in suburban gardens near the CSIR during the day. Birds were trapped at the CSIR wetland or on a kopje over which the birds flew to their roost. Three sets of birds were trapped on different occasions. Seven birds were trapped on 8 April 1996; 11 birds on 14 May 1996; and 32 on 7 April 1997. The data are combined since the time of year is similar over the three data sets, with a total of 50 birds. Most of the birds were immatures and were not sexed (but six birds were sexed as immature males and three as adult males).

The Cape Weavers were trapped at Betty's Bay, (34°21'S, 18°55'E) Western Cape on 27 June 1987 by L.G. Underhill. The birds (n = 31) were weighed and kept overnight in two boxes.

The Redbilled Queleas were trapped by a team of ringers led by Sam de Beer and Andries Nel at De Paarl (26°04'S, 25°55'E) near Lichtenburg, North-West Province, on 6 September 1997 between 17h35 and 18h15. Fifty birds were kept of several thousand birds caught. The birds were full grown but not sexed because males were not in breeding plumage.

Ten Redbilled Queleas were trapped at Hattingspruit Dam (28°04'S, 30°07'E) near Dundee, KwaZulu-Natal, on 14 December 2000 between 17h20 and 18h10. These birds were weighed three additional times during the night to determine rate of mass loss. Four birds were males, and six were females.

The methodology was the same for all species. Birds were trapped in one or more 12 m mistnets as they returned to the roosts in the evenings. Time of capture was recorded for the Masked Weavers and the Hattingspruit quelea. The birds were weighed in the bags, taken out and ringed, and bag weight and time were recorded. The birds were kept in the same bags and kept overnight inside buildings at room temperature (without any heating). In the morning the birds were weighed (in the same chronological order), bag weight and time were recorded and each bird was released approximately 12 hours after capture. Weights were recorded with a 50 g Pesola balance (0.5 g intervals). The individual time differences and weight differences were calculated for each individual bird.

To test if the weight loss was linear or exponential, the Hattingspruit quelea were

Table 1. Weights on evening capture and release on following morning, and percentage weight loss per hour in three weavers.

Species	n		Mean (g)	Range (g)	SD	% Loss/h
Cape Weaver	31	initial mass	45.5	37.7–50.9	4.2	0.5
		release mass	42.7	35.0–48.2	4.1	
Masked Weaver	50	initial mass	26.3	21.1–33.1	3.3	0.7
		release mass	24.0	19.5–30.3	2.9	
Redbilled Quelea (De Paarl)	50	initial mass	20.9	17.1–23.3	1.3	1.1
		release mass	18.0	15.2–20.0	1.1	
Redbilled Quelea (Hattingspruit dam)	10	initial mass	19.4	17.8–21.2	1.2	1.0
		release mass	17.2	15.6–18.5	1.1	

weighed twice during the night in addition to the capture and release weights. The first additional weight was about two hours after capture, then two and a half hours after that to concentrate on the initial rate of loss.

Results

Weights

The mean mass of Cape Weavers caught in the evening was 45.5 g (SD 4.2, range 37.7–50.9 g, n = 31). The following morning these birds weighed 42.7 g (SD 4.1, range 35.0–48.2 g, n = 31).

The mean mass of Masked Weavers caught in the evening was 26.3 g (SD 3.3, range 21.1–33.1 g, n = 50). The following morning these birds weighed 24.0 g (SD 2.9, range 19.5–30.3 g, n = 50).

The Redbilled Queleas from De Paarl weighed 20.9 g (SD 1.3, range 17.1–23.3 g, n = 50) in the evening and 18.0 g (SD 1.1, range 15.2–20.0 g, n = 50) on the following morning.

The Redbilled Queleas from Hattingspruit weighed 19.4 g (SD 1.2, range 17.8–21.2 g, n = 10) in the evening and 17.2 g (SD 1.1, range 15.6–18.5 g, n = 10) on the following morning.

These weight ranges lie within those given by Maclean (1985).

Overnight weight losses

Percentage mass loss per hour was calculated as a measure comparable across species (Table 1). In Cape Weavers weight loss was on average 2.8 g (6.1% of initial weight) over 11.8 hours, i.e. 0.5% loss/hr. In Masked Weavers weight loss was on average 2.3 g (8.5% of initial weight) over 12 hours, i.e. 0.7% loss/hr. In Redbilled Queleas from De Paarl weight loss was on average 2.9 g (13.7% of initial weight) over 12.9 hours, i.e. 1.1% loss/hr. In Redbilled Queleas from Hattingspruit weight loss was on average 2.2 g (11.3% of initial weight) over 11.4 hours, i.e. 1.0% loss/hr. The percentage mass loss per hour assumes that the weight loss is linear during the night.

Rate of overnight weight losses

The rate decreases more quickly initially and then more slowly (Fig. 1). Visually this rate appears to lie between a linear decrease and an exponential decrease.

Discussion

The Cape Weavers lost 6.1% of their mass overnight, Masked Weavers lost 8.5% and the Redbilled Queleas lost 11.3–13.7% of their evening weights. Because the birds were trapped near the roosts, it is valid to use the evening weights as the final maximum weights. Ginn (1971) conducted a similar weight loss experiment in Masked Weavers and the quelea, though with few individuals, in May 1970 in Zimbabwe. One Masked Weaver lost 8.6% of its weight, while four

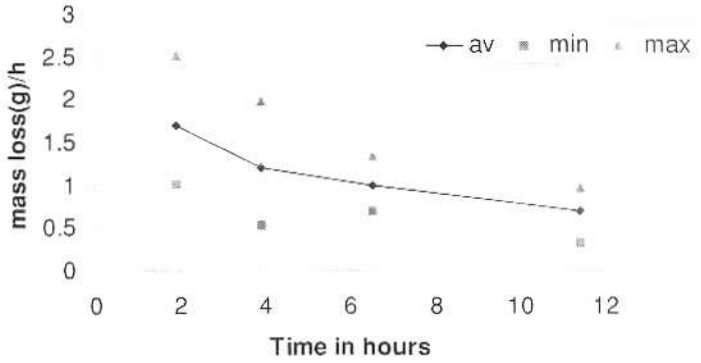

Fig. 1. Mass loss per hour in 10 Redbilled Quelea kept overnight.

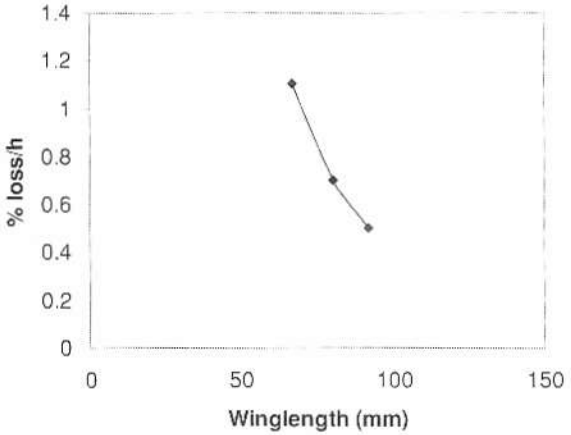

Fig. 2. Percentage overnight mass loss versus weaver size (i.e. wing-length). An exponential curve has been fitted.

Redbilled Queleas lost an average of 13.8%. These results correspond very closely with those obtained in this study (Ginn did not record the hours that the birds were kept, but it was presumably also close to 12 hours).

Ward (1965) weighed queleas in the mornings and evenings (not the same birds kept overnight) and found that males increased their weight during the day by 6.3% and females by 4.8% (p. 202). Queleas lost as much as 17% during experiments on a hot day (Brown & Tinney 1998).

Although the weight is not lost evenly during the night, the hourly average may be used to compare different species (as long as the total night period is used). The average hourly loss is 0.5% in Cape Weavers, 0.7% in Masked Weavers and 1.0–1.1% in Redbilled Quelea. This is in inverse order of the species' size (mean wing length of males 92, 80.3, 67 respectively, Maclean 1985). It may be possible to derive a predictive relationship between these two variables (Fig. 2), although some more weavers need to be weighed, especially some larger ones, e.g. Whitebrowed Sparrowweaver *Plocepasser*

mahali. The smaller the bird the higher the expected metabolic rate, resulting in a greater weight loss overnight.

These values could be used as minima quantities of food consumed per bird per day, though biology of the bird needs to be considered (e.g. type of food eaten in different seasons). Bruggers & Elliott (1989) provide estimates of damage by quelea to crops, in which food amount consumed is needed.

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References

Brown, C.R. & Tinney, G.M. 1998. Thermal relations of Red-billed Quelea: implications for extending distribution. Poster abstract, 22nd International Ornithological Congress, Durban, 16–22 August 1998. Ostrich 69(3&4): 379.

Bruggers, R.L. & Elliott, C.C.H. (eds). 1989. *Quelea quelea* – Africa's bird pest. Oxford: Oxford University Press.

Ens, B.J., Duiven, P., Smit, C.J. & Van Spanje, T.M. 1990. Spring migration of Turnstones from the Banc d'Arguin in Mauritania. Ardea 78(2): 301–314.

Maclean, G.L. 1985. Roberts' birds of southern Africa. Cape Town: John Voelcker Bird Book Fund.

Ward, P. 1965. Feeding ecology of the Blackfaced Dioch *Quelea quelea* in Nigeria. Ibis 107: 173–214.

Masked Weavers roosting in reeds at the CSIR. Photo by H.D. Oschadleus.