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BREEDING AND DEVELOPMENT OF THE NEW ZEALAND FANTAIL Rhipidura fuliginosa

By IAN G. McLEAN and PETER F. JENKINS

ABSTRACT

Fantail breeding was studied on Cuvier Island during the summers of 1972 and 1973. Data are presented on nest sites, nest building, and breeding success on the island. A summary of the information available in the OSNZ nest record cards for fantails suggests that clutch size increases through the season but that numbers of fledglings do not.

INTRODUCTION

Available information on breeding by the New Zealand Fantail *(Rhipidura fuliginosa)* is limited to anecdotes or to detailed studies of only one or two pairs (see especially Moncrieff 1931; Cunningham 1954; Oliver 1955; Blackburn 1965, 1966). In general these birds are monogamous breeders, with a breeding season extending from August until early February. A single pair may have five successful nests and fledge 15 young in one season (Blackburn 1965).

Fantails nest in a small cup built in the trees and shrubs of the bush understorey. A tail may be attached to the cup, and there is often a sheltering overhang of leaves. Usually three or four white eggs with brown spots are laid. Incubation and feeding of young are shared by both male and female for the first clutch, but for subsequent clutches the female may incubate while the male continues to feed the fledglings of the previous brood. A new nest is built for each brood although there are reports of nests being re-used (Coates 1966; Blackburn 1966; four in OSNZ nest records). Other examples of unusual nesting are summarised in McLean (1975).

The aims of this paper are to present some new data on breeding

by the fantail and to provide a summary of the information available on this species in the OSNZ nest record cards.

METHODS

We worked on a 35 hectare study area on Cuvier Island (36° 26′ S 175° 64′ E) off the Coromandel Peninsula. The island was visited in the periods 15 November-20 December 1972, 7-23 November 1973, and 5-12 December 1973. I. G. McLean also visited the island for 10 days in May and 14 days in August 1973. The island has been described by Jenkins (1978). At least one individual of each of the 10 (1972) or 12 (1973) pairs resident in the study area were individually colour-banded. Adult birds were caught with mist nets, or by hand while on the nest. Young birds were banded in the nest after hatching. Most nests were found by following adults, and nests were most easily located if the pair was building or feeding nestlings. Sex was determined by watching to see which bird laid the eggs (three pairs). Males sang much more than females during the day and were more difficult to follow to nests. Only males sang from song posts in the early morning (see McLean 1980).

RESULTS

All fantail nests on Cuvier Island were built in the bush understorey (up to 3 m, Table 1). Of the 46 nests, 44 (96%) had an overhead sheltering canopy, 43 (93%) were at a forked branching site, and 44 (96%) were on a horizontal branch. All trees used were

TABLE 1 — The distribution of nesting heights and tree species used for fantail nests on Cuvier Island.

Tree species*	Number of nests	Height range (m)	Mean height	Use of each species (%)
Macropiper excelsum	24	1.0 - 3.0	1.6	52
Brachyglottis repanda	7	1.0 - 3.0	2.0	15
Cyathea sp.	5	2.5 - 3.0	2.8	11
Geniostoma ligustrifolium	4	0.8 - 1.8	1.3	9
Dysoxylum spectabile	4	1.3 - 1.7	1.5	9
Entelea arborescens	1	3.2	3.2	2
Coprosma robusta	1	1.7	1.7	2
Total	46	0.8 - 3.2	1.68	100

* From Cheeseman (1925), and Cockayne and Phillips Turner (1967).

common in the bush understorey, and all except *Geniostoma ligustrifolium* had leaves broad enough to provide a canopy. Two nests built in *G. ligustrifolium* had a canopy of leaves from a nearby tree. *Macropiper excelsum* was the most common shrub in the area and was used most often. There were no significant differences in the success of nests built in different tree species ($P > 0.1$, Kruskal Wallis test), although two of the seven nests built in tree ferns (*Cyathea* sp.) failed because the frond in which they were built fell to the ground.

Nests were built of small pieces of dried wood, dried grass, tree fern fibre, mosses and lichens, and were bound together with spider web. Materials were generally gathered within 15 m of the nest site. Mean tail length of 21 nests was 10.5 cm, range 0.0 to 28.5 cm. Nests built in November and December (presumably second or third nests) were completed in 4-6 days, but the only nest begun in August had part of the tail completed after one week.

Full details for all nests are lodged with the OSNZ Nest Record

TABLE 2 — The success of each breeding stage for fantails from Cuvier Island and the OSNZ nest record cards.

	No. of nests observed containing					
No. of eggs or chicks in nest	Eggs		Nestlings		Fledglings	
	*CI	OS	CI	OS	CI	OS
1	-	-	4	4	2	8
2	-	1	2	4	6	7
+ 3	3	23	7	30	6	15
4	3	25	1	17	3	8
5	-	1	-	1	-	-
Mean	3.5	3.5	2.4	3.1	2.6	2.6
Total	6	50	14	56	17	38

* CI = Cuvier Island, OS = OSNZ cards.

+ Example for reading table:

3(CI) and 23(OS) nests were found containing three eggs, 7(CI) and 30(OS) were found containing three nestlings, and 6(CI) and 15(OS) families of three fledglings were found.

TABLE 3 — The length of time for each breeding stage.

Breeding stage	No. nests observed	Mean time period (days)	Range (days)	Mean no. of eggs/chicks in nest	Range of eggs/chicks in nest
Building/ laying	4	7.25	6-9	3.25	3-4
Incubation	1	14	-	4	-
Nestling*	2	11.5	11-12	1	1
Fledgling	6	12.5	3-30+	2.5	1-4

* Estimates from several other nests indicated that this period was slightly longer for a larger number of nestlings.

\+ This period based on (i) day on which juveniles were last seen fed if no new nest was begun;

(ii) day next nest was begun. In two of the six cases, the female renested three days after fledging had occurred. The male probably continued to feed the young but was difficult to find (c.f. Blackburn, 1966). In the other four cases both parents fed the fledgings.

Scheme. The data for each breeding stage (Table 2) and for the length of time of each breeding stage (Table 3) are based on different samples of nests due to discontinuous study periods. All results agree with those of Cunningham (1954) and Blackburn (1966).

Eggs were laid one per day (5 nests) except for one clutch in which the fourth egg was laid on the fifth day. All clutches contained three or four eggs (Table 2). Incubation began immediately after the last egg was laid with both birds sitting for alternating periods of 10-30 minutes. The female sat at night.

Nestlings in each nest hatched naked and blind over a period of up to 24 hours. They were fed and brooded by both parents with the adults spending more time gathering food and less time brooding as the chicks grew older. Mean number of nestlings per nest immediately after hatching was 2.35 (14 nests). Broods of three or four became overcrowded in small nests. This resulted in increased chances of a chick being pushed out (seen once in Auckland), or of early fledging (Blackburn 1966).

Young birds could barely fly at fledging. Fledglings were fed by one or both parents until the beginning of the next breeding cycle. On two occasions the female left the family to begin the next nest

3 days after fledging occurred (broods of 1 and 3) while the male continued to feed the young. Mean fledging per nest was 2.58 young (17 nests). Two of 36 fledged young died during the first week.

Development until fledging was monitored in four chicks (two broods of one, one brood of two). Measurements after fledging were taken from any young bird captured whose age was known (complete data in McLean, 1975). Young birds attained adult size in beak, toe, and leg lengths, and in weight by fledging, but not in wing or tail lengths (Fig. 1).

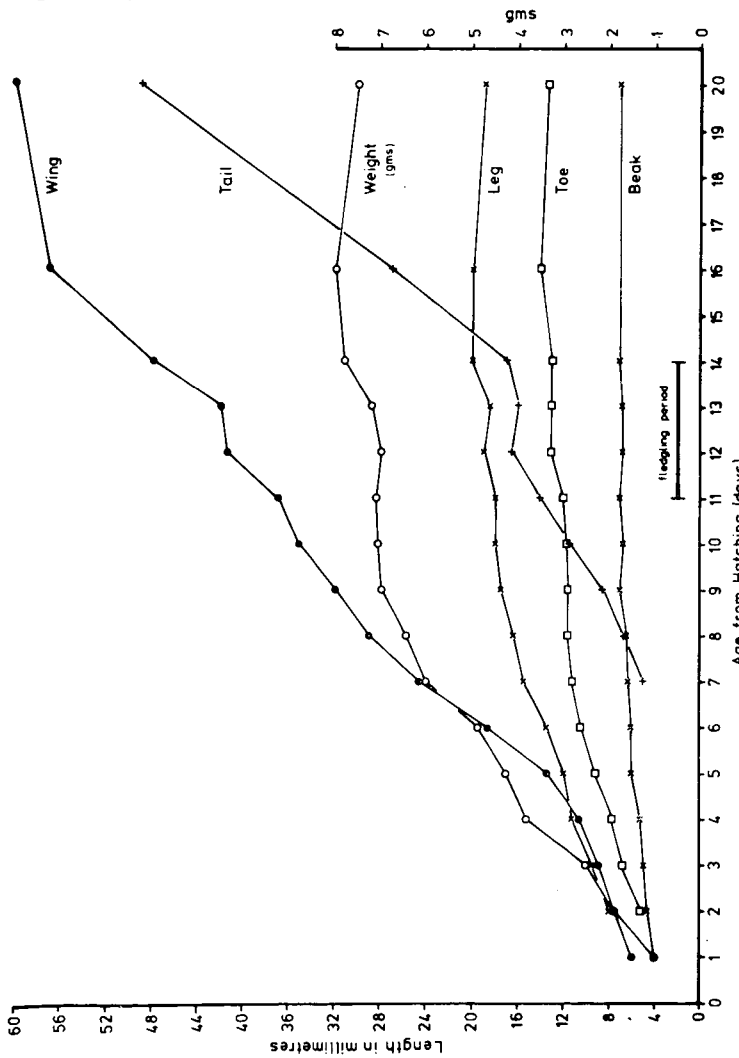

FIGURE 1 — Development of juvenile fantails on Cuvier Island (each point represents a mean of between one and four measurements).

The wings continued to grow rapidly through fledging, but tail growth slowed then increased again after fledging occurred. Neither wings nor tail had attained adult size by 20 days after hatching. Differences between adult and juvenile plumage, which are distinctive, have been noted by Andersen (1926) and Wilkinson (1952). Colour prints are in McLean (1975). We quote Wilkinson (p. 64):

> " The young pied fantail lacks the light eyebrows of the adult bird and also the light and dark bars on the throat. The head is almost black, the back pinkish brown, breast yellowish brown, and tail white with the centre feathers black."

Unlike Wilkinson, we found no easily distinguishable differences in coloration of the head or tail. The most useful distinguishing field characteristics were the brown " eyebrows," the lack of a solid white bar on the throat, and the rufous breast. In addition, the wing bars, which in the adult were white, were brown in the juvenile. Five birds banded as juveniles in the breeding season had moulted to adult plumage by the following May. After becoming independent, juveniles remained on the breeding areas and occasionally formed flocks in places where swarms of insects occurred. Adult birds that encountered juveniles did not attack them as aggressively as they did other adults and usually allowed them to continue feeding in the area.

Wing length of adult males was significantly greater than females ($P < 0.05$, Mann Whitney U test, Table 4). No other adult measurement was significantly different.

Adult survival was high and juvenile survival was low during this study. All of nine breeding adults banded in November of 1972 survived to breed in November of 1973. Three probable adults banded

TABLE 4 — Measurements of adult male and female fantails from Cuvier Island.

	N		Mean		Range	
	M	F	M	F	M	F
Beak (mm)	6	6	7.25	7.17	6.5- 8.0	7.0- 7.5
Leg (mm)	6	6	19.00	18.25	17.5- 21.0	18.0-21.0
Toe (mm)	6	6	13.75	12.67	12.0- 15.0	11.0-14.0
Wing (mm)	6	6	74.25*	70.67*	71.5- 76.0	69.0-73.0
Tail (mm)	7	5	86.71	84.80	80.0-101.0	80.0-91.0
Weight (gm)	8	6	7.95	7.95	7.0- 9.6	6.8- 8.8

* Significantly different (see text).

by C. R. Veitch in January 1972 all bred in November 1972, and one of these bred in November 1973. Of 26 banded juveniles known to become independent in 1972, five were seen in May 1973, two were seen in August, and one bred in the study area in 1973. Most of the island was searched on each visit and birds not seen had probably died. One individual banded during this study was still alive in December 1979 (Lovegrove, pers. comm.) and so was 5+ years old.

At least four nests were robbed by predators. Possible nest predators were the kiore *(Rattus exulans)* and the Long-tailed Cuckoo *(Eudynamis taitensis)*. Droppings found by egg shells below one nest were probably those of the cuckoo. Possible predators of juveniles included the Australasian Harrier *(Circus approximans)*, Kingfisher *(Halcyon sancta)*, Long-tailed Cuckoo, and Bellbird *(Anthornis melanura)*. Bellbirds were seen to knock young fantails to the ground on two occasions, but they did not continue the attack. Kingfishers almost certainly took young Bellbirds on the island, but I saw no attacks on fantails.

Data from OSNZ Nest Record Cards

Information was available from 204 cards dating from 1950 to 1973. Figure 2 does not include the Cuvier data.

Of 185 nests for which the tree species was noted, 74.6% were in native species, 23.8% were in exotic species, and 1.6% were not built in trees (two on wire, and one on a rock ledge). Many native species were used, although *Macropiper excelsum* was one of the most common, as it was on Cuvier Island. Mean height of 190 nests was 3.7 m (range 0.7 to 24 m). Three (1.6%) were over 10 m high, and 61 (32%) were over 3.0 m.

Data on number of eggs laid, number of chicks hatched, and number of chicks fledged, were extracted from cards in which the actual day of the event was noted (Table 2). The most frequent clutch sizes were three and four, and less than one chick was lost between laying and fledging. Overall breeding success could not be calculated, as failure and predation were recorded erratically in the cards. An estimate of success between each breeding stage was obtained (Fig. 2), but these data do not include nests that failed during each stage.

The number of fledglings decreased through the season despite an increase in clutch size of almost one egg (Fig. 2). This decrease was due primarily to nestling mortality in September and October and to egg mortality in December. Egg and nestling mortality were similar in November.

DISCUSSION

Fantails have a long breeding season, a short breeding cycle, and several nests per season. Nests were built rapidly once breeding had begun, eggs were laid every day, chicks fledged when they could barely fly, and a new nest was sometimes begun before fledglings

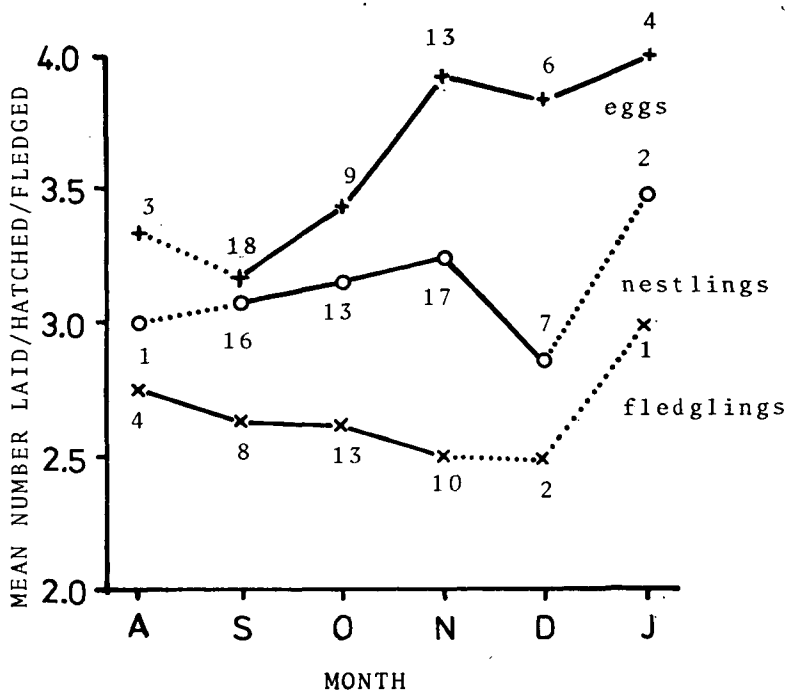

FIGURE 2 — Monthly breeding success for fantails from OSNZ nest record cards. Sample size (number of nests) for each point is indicated.

became independent. These observations suggest that fantails attempted to produce a large number of young, possibly at the expense of parental care.

Some differences were found between mainland (from OSNZ nest records) and Cuvier Island birds. Mean nest height on Cuvier was much lower than on the mainland, perhaps because of the lack of introduced predators on the island or because the island vegetation is still regenerating after the eradication of feral goats. Breeding had barely begun on Cuvier at the end of August 1973 (one incomplete nest), whereas a number of nests were recorded for August in the OSNZ cards. The start of breeding in small birds is affected by the availability of food (Perrins 1970; Kallander 1974), and in fantails is affected by the weather (Blackburn 1966). August 1973 was a wet month on Cuvier Island and this may have delayed breeding. Wet weather could either prevent breeding directly by causing decreased activity, or indirectly by affecting the food supply. The start of breeding probably varies considerably between years and location in this species.

The presence of both dependent and independent juveniles in the breeding territories later in the season may cause the decreased breeding success that was suggested by the OSNZ nest record cards. Adult birds were sometimes feeding fledglings during courtship and copulation, and may also be competing with independent juveniles for food for themselves and fledglings. The relatively high nestling mortality found for November could also be a result of decreased food availability due to the activities of independent juveniles. Alternatively, higher survival of young hatching from heavier eggs has been found in other species (Ankney 1980), and so fantails could be laying lighter eggs later in the season.

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IAN G. McLEAN and PETER F. JENKINS, *Department of Zoology, University of Auckland, Private Bag, Auckland, New Zealand.*