A TRIP TO SEE THE BALI STARLING

by John Horton

During the middle two weeks of June this summer I visited the Indonesian island of Bali. An obvious priority was to attempt to see the Bali Starling *Leucopsar rothschildi* in the wild. Currently the only refuge for the birds is the Bali Barat National Park (*Taman Nasional Bali Barat*) which is located on the north-west of the island. It incorporates the whole of west Bali's mountain range covering 760sq km (approx. 290sq miles), 90% of which is out-of-bounds to visitors. Within the park's perimeter about 160 species of birds have been seen, these include a number of Indonesian endemics and otherwise scarce or difficult to see species.

The Bali Starling or Rothschild's Myna (*jalak putih Bali* in Bahasa Indonesian) is considered never to have been common on the island, even though in the 1920s naturalists reported seeing 'hundreds of birds'. In 1966 the species was put on the endangered list and by the mid-1980s excessive trapping for the pet trade had reduced the number in the wild to about 150. The total had dropped to 14 by 1998. The current situation will be discussed further later in this account.

Bali has a thriving cage bird trade and as one travels around the island it is clear that almost every dwelling has at least one bird in a small Victorian-style cage. Bird sellers are numerous and there are a number of bird markets. I did not visit these, as having seen similar markets elsewhere in south-east Asia, I knew that the conditions under which the birds were being kept would be somewhat dire with numerous unsuitable species being offered for sale. It is little wonder the Bali Starling has suffered such a rapid decline, as apparently they fetch well in excess of $1,000 each on the black market.

Surprisingly the national park is not advertised locally and does not appear on any hotel excursion list. The vast majority of tourist accommodation is in the south and east of the island. I stayed at a hotel about 10km (approx. 6 miles) north of the resort of Kuta and by hire car it was a four hour drive to the park headquarters at Cecik, a short distance from Gilmanuk where you can take the 30 minute ferry ride to Java. Everything on Bali is haggled over, even hotel rates, and a sturdy Jeep (a *Kijang*) eventually cost the equivalent of £6 (approx. US$10) per day. There are several cheap small hotels at Gilmanuk, hence it is not a problem finding accommodation. At the park headquarters there are chalets which can be rented, but on my visit they had lost the keys and after some searching I was directed up the road!

In order to go anywhere in the park it is compulsory to hire a guide. My previous experience of such guides was that they range from superb to

virtually useless and when my guide, Yudi, was presented things looked ominous, as he spoke little English and had no binoculars. As it turned out he had sharp eyes when it came to spotting things and knew reliable sites for Green Junglefowl *Gallus varius* and Rufous-backed Kingfisher *Ceyx rufidorsus*. I used one of the many birding guides during my trip and though it was generally accurate, it was clear that as the national park has become more organised, prices have risen sharply. Fees for guides and park entry are fixed and you are handed a price list for various excursions. In the previous 10 months the set price of a guide for three hours had risen from the equivalent of £1.25 (approx. US$2.00) to £7 (approx. US$11.20), with trips to the Bali Starling release site having risen from £8 a person to over £100 (from approx. US$12.80 to US$160), and prices are set to rise again for the Millennium.

Unaware of this colossal inflation, I did not have sufficient money with me to cover the cost of visiting the starling site. Fortunately though the Director of the park was present at the time and due to the combination of my employment at Jersey Zoo and the 'donation' to him of my field guide, I was eventually granted permission to make the trip as his official guest. I got the distinct impression they are not overly keen on anyone visiting the starlings, which may explain the rise in the cost, which in retrospect, can only be good for the birds. It should be pointed out that it is not possible to visit the Bali Starlings at all, if you have not first written to the Director requesting to do so and giving the proposed date of your visit. I had indeed done this but on my arrival found that the Director's staff had 'mislaid' the correspondence, he had though read it and made a note about my forthcoming visit. Once the Director recognised that my interest and enthusiasm for his starling breeding project was genuine he was very happy to divulge the latest information which enables me to report that at the captive breeding centre at Sumber Kalmpock there were, at the time of my visit, 81 Bali Starlings. There were a further 10 captive birds at the pre-release site at Brumbun. The total number of Bali Starlings in the wild was 37.

The captive breeding centre at Sumber Klampock is situated within the park and is about 10 minutes from the headquarters. It is a small complex of aviaries in two blocks in a forest clearing. Each block has a central corridor with the birds' indoor quarters on either side. The adjacent aviaries have a complete bamboo surround to minimise human contact. I have seen cleaner facilities but could not fail to be impressed by the keeper's enthusiasm for his birds. Using pidgin English I managed to establish that almost all breeding pairs parent-rear their chicks but was also proudly shown a three week old hand-reared individual. The birds are fed local fruits, predominate among them being papaya. They are also offered a commercial softbill pellet (soaked) that is imported from Jakarta, as well as red ant larvae and

caterpillars collected from the adjacent forest and mealworms bought from the local bird market. The adults are kept in pairs and two of the aviaries boasted groups of young birds. The rangers make rings for them from aluminium and keep a record of each bird.

The pre-release centre and the wild birds are at Brumbun on the Prapat Agung Peninsula, which is reached by driving to Labuan Lalang. According to the information in my birders' guide the starlings were to be seen on Deer Island (*Palau Menjangan*) but the Director told me that the small colony 'introduced' there has died out, leaving Brumbun the only site. From the park headquarters I was escorted by two rangers for the entire visit. The small boat from Labuan Lalang took about 45 minutes to reach Brumbun and landed on a small shingle beach, where we jumped ashore. One of three full-time rangers was waiting to meet us. Just ahead was the rangers' office and accommodation, 50m (approx. 165ft) from which is a huge aviary some 60ft (18m) high, the shape of a giant marquee, housing the pre-release birds. I was taken about 400m (approx. 440yd) up-hill to a watch tower from where there were superb views of the surrounding savannah forest and good birding, culminating in brief, distant views of two Bali Starlings. I was then led back down and along a track beside the sea for about 3km (almost 2 miles) to a spot where 12 birds, one of which was close ringed, were feeding in nearby trees, and felt privileged to witness such a superb spectacle. The Director of the park had confirmed earlier that released birds had successfully bred with existing wild birds for the first time in 1998, which is a real breakthrough. The next release birds are due to join the colony later this year.

The starlings have few natural predators. Chicks are occasionally lost to snakes and young monitor lizards and adults may apparently be taken sometimes by Crested Hawk Eagles *Spilornis cheela bido*, but this is rare. Although three years ago some Bali Starlings were illegally trapped, trapping has now been largely eradicated and heavy fines and jail sentences await would-be transgessors.

The Bali Forestry Department has received captive bred stock that originated from Jersey Zoo. Currently a bird park on Bali which is working closely with Vogelpark Walsrode in Germany, has begun its own Bali Starling Foundation and this contributes funds to the Forestry Commission. There is some confusion as to who is doing what for the Bali Starlings but it is evident that whilst the Balinese Forestry Department are making great efforts to save the species there are clearly good numbers in reserve in zoos, bird gardens and private collections, should their efforts falter.

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HAND-REARING A SUPERB FRUIT DOVE *Ptilinopus superbus* AT LONDON ZOO

by Paul Harrington, Amanda Ferguson and Patsy Joseph

Introduction

It is generally known in avicultural circles that hand-rearing Columbids from hatching is very difficult and has rarely been successfully achieved. During the early part of their development pigeons are reared entirely from crop milk - a curd-like substance secreted from the lining of the crop of the parent birds and fed to the chicks by regurgitation (Goodwin, 1983; Grimminger, 1983). Baptista et al. (1997) contains a full discussion of Columbid reproduction.

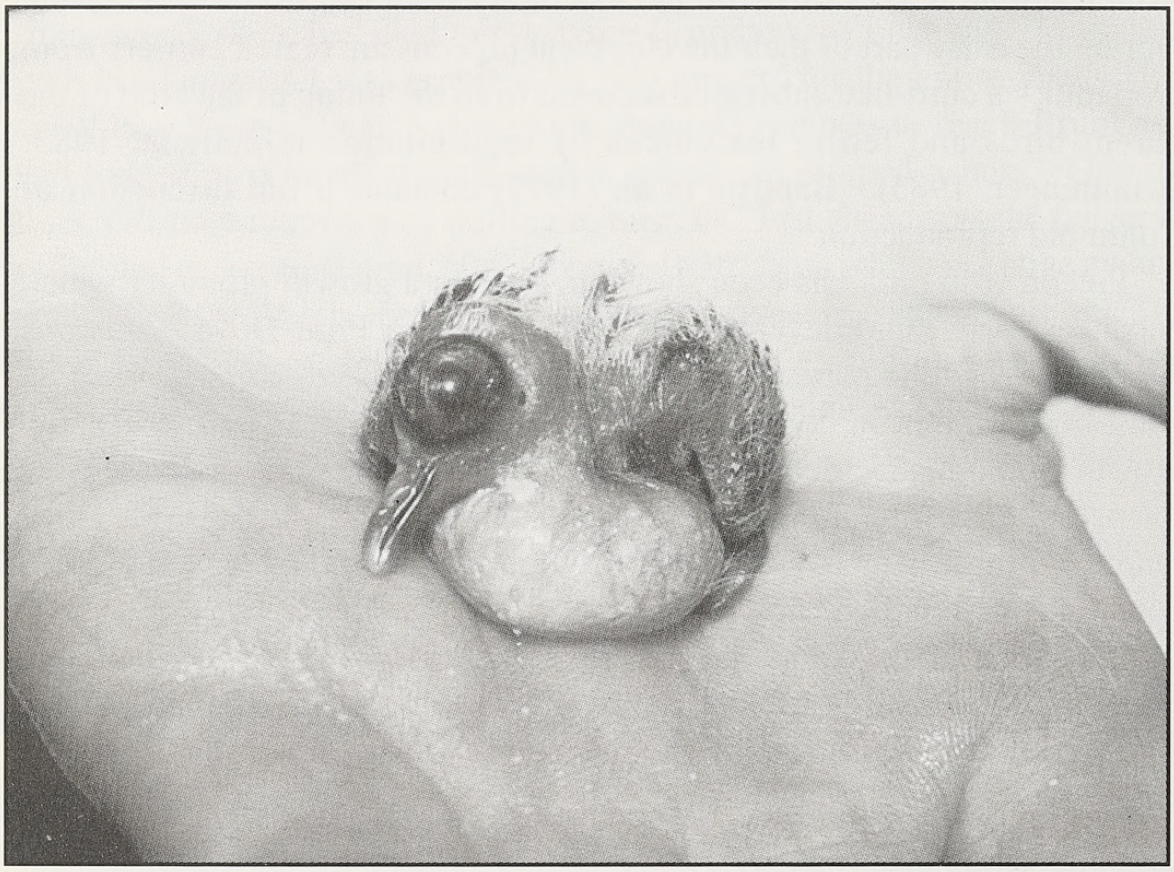
Pigeon crop milk has been shown to contain a growth promoter which enhances early rapid development. In the Superb Fruit Dove *Ptilinopus superbus* growth is particularly fast with a chick able to attain 25% of its adult body weight in as little as six days (Crome, 1975). However, the growth promoting factor has yet to be identified and so cannot be reproduced for use in an artificial crop milk. Development of a Superb Fruit Dove reared on an artificial rather than a natural crop milk could therefore potentially be retarded.

In February 1998 a Superb Fruit Dove was hand-reared from hatching at London Zoo. This followed the removal of an egg for artificial incubation, when it became clear that it was not being properly incubated by the parent birds.

Hand-Rearing

A hand-rearing diet to simulate a natural crop milk was formulated using Quark (a soft cheese product), Tofu (soya bean curd), hard-boiled egg, 0.9% saline solution, calcium lactate and SA37. The protein and fat percentages in the mix were 11% and 4% respectively. These were at the lower end of the scale for the known protein and fat levels in natural crop milk. It was thought that higher percentages of these two dietary components might lead to too viscous a mix which would reduce the motility of food through the crop. It was also thought that too high levels of these components might compromise liver function. Animal and vegetable proteins were used in the formula to cover the full spectrum of essential amino acids. Carbohydrate in the form of starches and sugars were close to zero which was in line with the levels found in natural crop milk. As the chick developed, other food items were added to the formula which increased the carbohydrate component of the diet (see Table 1).

The consistency of the mixture needed to be such that it was neither too liquefied, which could result in aspiration of food, or too thick which could result in crop stasis and impaction. The chick was fed using a syringe. The bottom of the syringe was enlarged to allow the chick to insert its beak and swallow the mix (Brown, 1995). To offer food from a syringe was considered a more passive feeding method, with less chance of accidental aspiration, than to feed using a spoon.



Young *P. superbus* at four days old showing full crop immediately after a feed

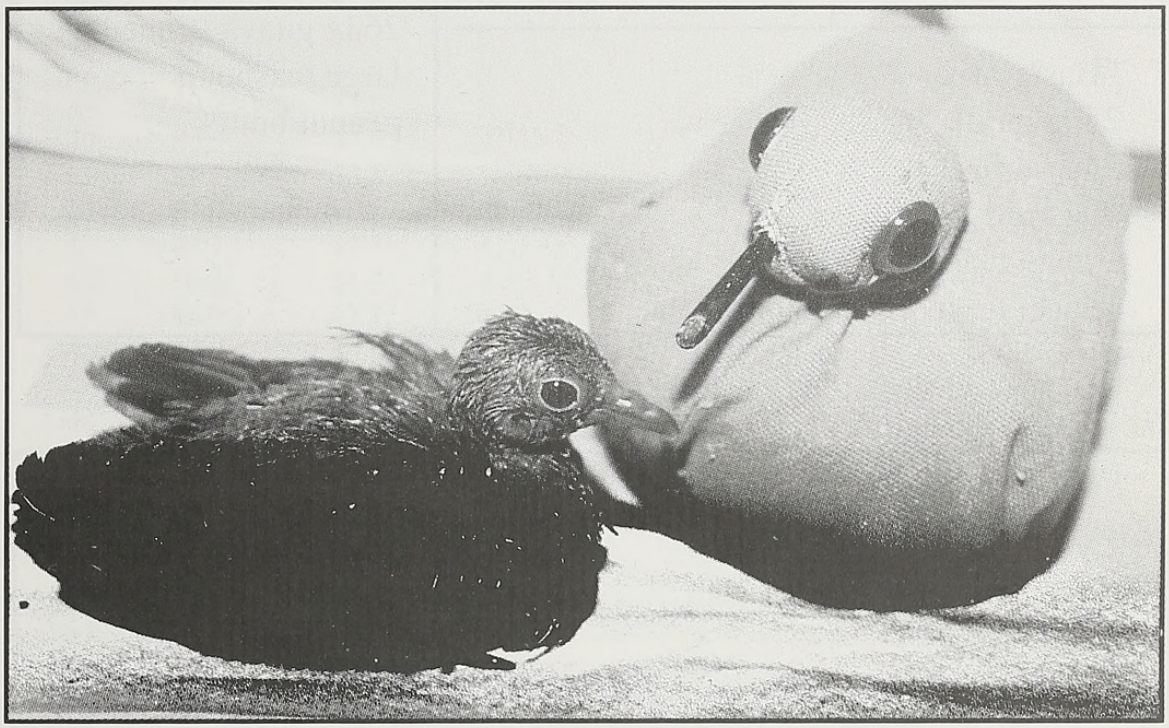
In the absence of the benefits derived from natural crop milk to promote rapid development in the chick it was considered essential, when hand-rearing with an artificial diet, to maximise the chick's food intake. This was achieved by:

1. Incorporating a high number of feeds. The number of feeds for the first 10 days averaged eight per day. These were spread over a 16 hour long day. While we could find no data on the frequency of feeds in any parent-reared *Ptilinopus* species, data from other parent reared pigeon species showed the number of feeds were higher in the first two to three days and then dropped off markedly thereafter (Skutch, 1991).

2. Filling the crop to capacity at each feed. In parent reared parrots a crop filled to its capacity speeds the rate at which food passes out of the crop and is digested (Voren & Jordan, 1992). Care was taken not to overfill or overstretch the crop.

3. Not allowing the crop to fully empty between feeds. This ensured that food was available for assimilation by the chick throughout the 16 hour feeding day. The crop was allowed to empty completely overnight, to reduce the risk of a bacterial infection.

From a hatch weight of 5.7g, the chick achieved 25g at 10 days, close to 25% of the adult weight (Higgins & Davis, 1996). On the 20th day the chick weighed 67g. Hand-feeding ceased on the 58th day when the chick weighed 103g (see Table 2a). Table 2b shows comparable weight gains for a wild reared conspecific and for a captive parent-reared Rose-crowned Fruit Dove *P. regina*, a similarly sized sympatric congener, obtained from Higgins and Davis (I996).



Young *P. superbus* at 15 days old alongside surrogate female puppet

Weaning was encouraged by:

1. Including chopped fruit and pulses in the rearing mix. This encouraged the chick to mandibulate the food particles before it swallowed them. This contrasted with the reflex swallowing action it had hitherto used when fed the mix.

2. Offering food from a pair of forceps, particularly favourite food items such as tinned guava.

3. Placing a female congener in its enclosure to stimulate copycat feeding.

4. Reducing the amount of hand-rearing mixture fed to the chick.

Table 1. Superb Fruit Dove hand-rearing diet

Day 1-4	Day 5-9	Day 10-14
Basic Mix†	Basic Mix†	Basic Mix†
100ml Saline	28g fruit puree	28g fruit puree
	70ml saline	92g wheatbread
		30ml saline
Day 15-19	**Day 20-43**	**Day 44-80**
Basic Mix†	Basic Mix†	Basic Mix†
28g fruit puree	28g fruit puree	28g fruit puree
50g wheatbread	50g wheatbread	50g wheatbread
40ml saline	10ml saline	100g sprouted pulse
	100g sprouted pulses	100g banana (fresh)
		263g guava (tinned)
† Basic Mix		large teaspoon
250g quark		peanut butter
250g tofu		
90g hard-boiled egg		
1 level teaspoon SA37		
1 level teaspoon calcium lactate		

Table 2a. Superb Fruit Dove rearing chart

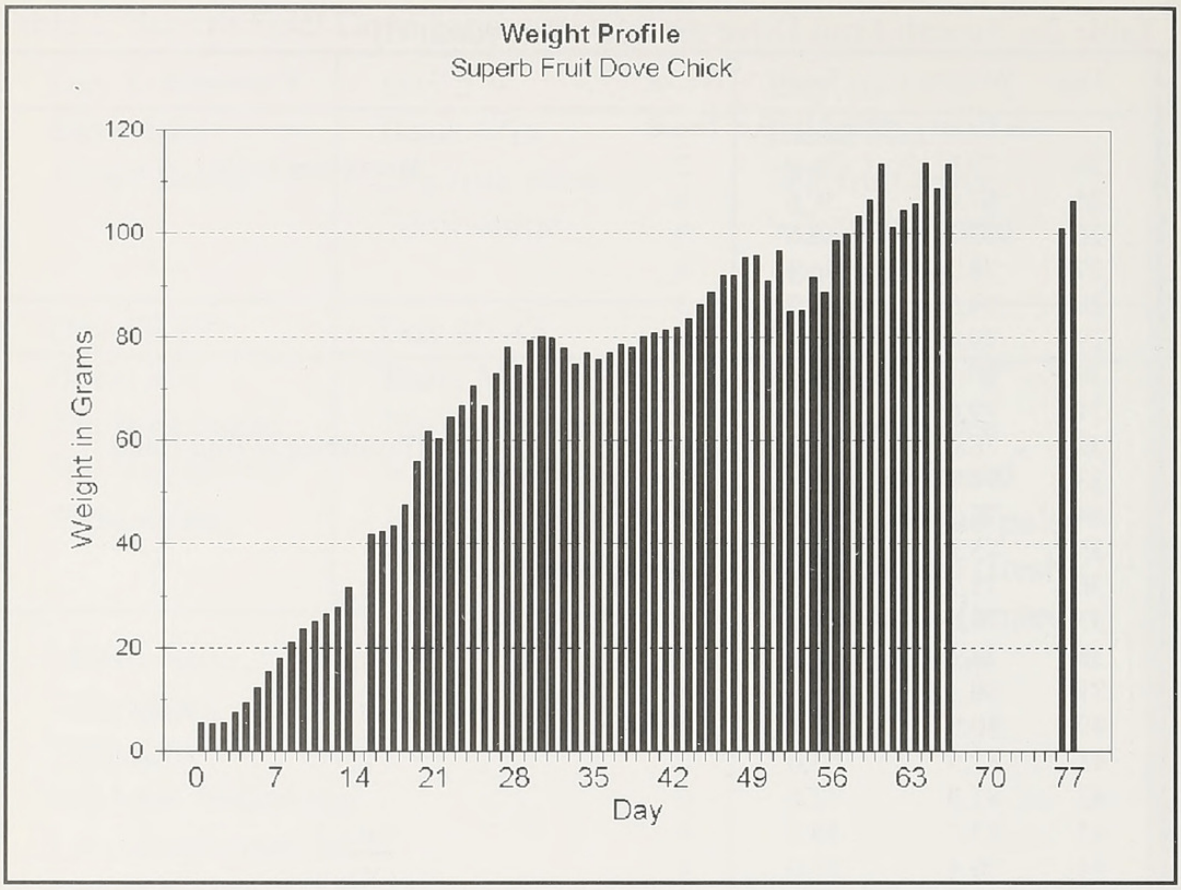
Day	Weight in Grams	Total Food Intake (g)	No. of Feeds	Brooder Temperature	Comments
0	5.7	0.1	3	36	
1	5.4	1.4	10	36	
2	5.6	3.2	8	36	Wing pin feathers showing
3	7.5	4.2	9	35	Eyes opening
4	9.3	6.7	8	35	Put onto twigs
5	12.5	9.9	9	33.5	
6	15.5	9.4	8	33.5	Puppet introduced
7	18.0	13.1	7	34.5	
8	21.0	13.7	7	34	
9	23.8	16.5	7	33	
10	25.0	16.8	7	32.5	
11	26.7	21.3	7	32.5	
12	27.9	24.4	7	32	
13	31.6	27.2	7	31	
15	42.0	26.2	6	30	Moved from brooder to small cage
16	42.6	29.7	5		Perching
17	43.6	34.3	4		
18	47.7	49.8	4		
19	56.0	46.7	4		
20	61.8	50.0	4		Took first drink
21	60.4	45.0	3		Slight weight loss
22	64.8	43.2	3		
23	67.0	45.9	3		

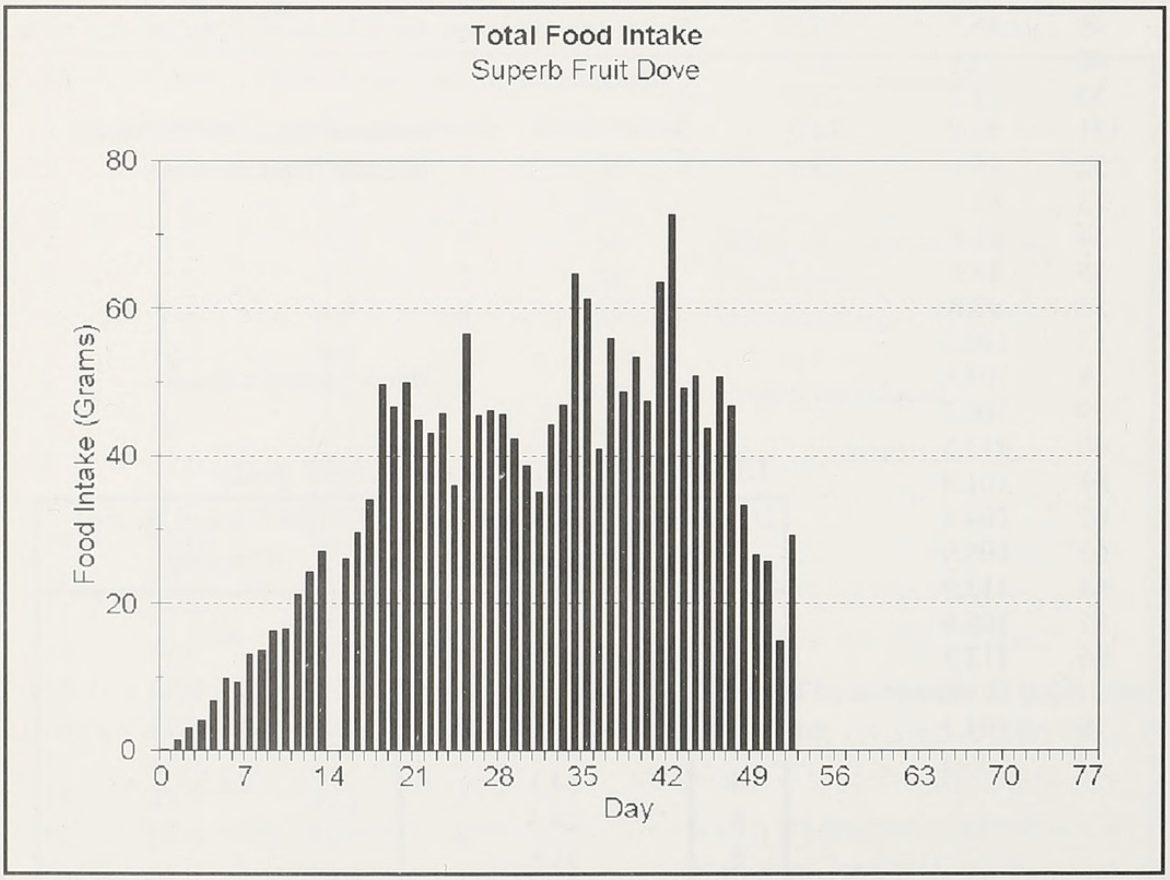
Table 2a. Superb Fruit Dove rearing chart (cont'd)

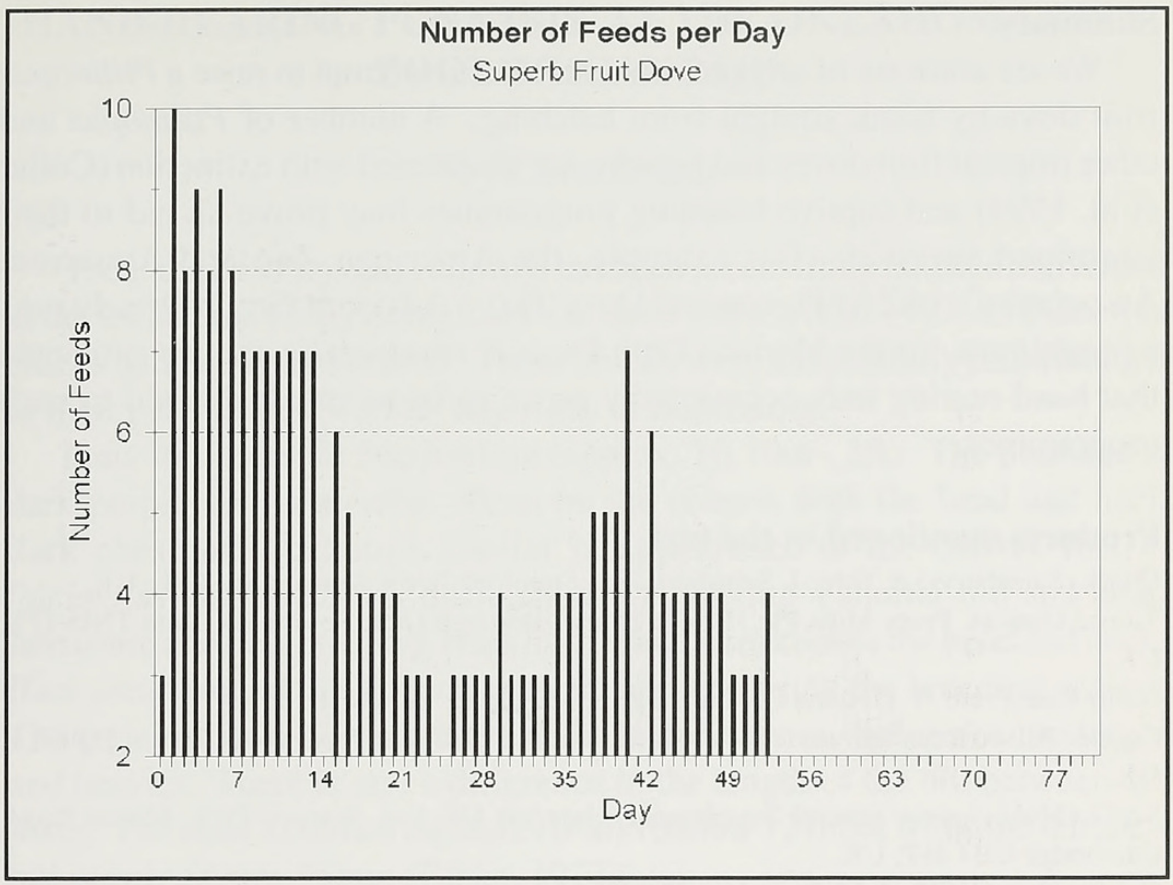
Day	Weight in Grams	Total Food Intake	No. of Feeds	Comments
24	70.6	36.0	2	Attempting to fly
25	67.0	56.6	3	
26	73.2	45.6	3	
27	78.2	46.1	3	
28	74.5	45.7	3	
29	79.4	42.4	4	
30	80.1	38.6	3	
31	79.6	35.2	3	
32	78.0	44.3	3	Transferred to Bird House
33	74.8	46.9	3	
34	77.2	64.8	4	
35	75.8	61.2	4	
36	77.2	41.0	4	
37	78.6	56.1	5	
38	78.1	48.8	5	
39	80.2	53.5	5	
40	80.9	47.4	7	
41	81.5	63.6		
42	81.9	72.8	6	
43	83.7	49.3	4	
44	86.4	51.0	4	
45	88.9	43.7	4	
46	92.0	50.9	4	Adult female added for company
47	92.0	46.8	4	
48	95.5	33.5	4	
49	95.9	26.7	3	
50	91.1	25.7	3	
51	96.7	14.9	3	Presume started to feed itself
52	85.1	29.3	4	Feeding from tweezers
53	85.3			
54	91.8			
55	88.8			
56	98.8			
57	100.0			
58	103.6			Hand feeding ceased
59	106.7			
60	113.5			
61	101.4			
62	104.8			
63	105.9			
64	113.9			
65	108.9			
66	113.5			
76	101.1			
77	106.4			

Table 2b. Comparable weight gains

Day	Weight Wild Reared *P. superbus*	Weight Captive Reared *P. regina*
0		6.7
1	8.3	
2	11.7	
3	18.3	
4	24.1	18.5
5	28.3	
6	31.6	
7	32.7	
8		24


Weight Profile
Superb Fruit Dove Chick
Weight in Grams
120
100
80
60
40
20
0
0
7
14
21
28
35
42
49
56
63
70
77
Day


Total Food Intake
Superb Fruit Dove
Food Intake (Grams)
80
60
40
20
0
0
7
14
21
28
35
42
49
56
63
70
77
Day



Imprinting

The sensitive phase for learning species specific visual characteristics occurs at an early stage in a pigeon's life (Baptista et al. 1997). A puppet modelled on a female Superb Fruit Dove was therefore introduced to the chick on the sixth day, three days after the chick eyes had begun to open. Ideally the puppet would have been introduced earlier. The chick's response to the puppet was to beg for food. This it did by calling and by biting the bill of the puppet. In experiments presenting the syringe and the puppet simultaneously to the chick, the puppet would always be selected in preference to the syringe, while only the former provided food. The chick would also attempt to be brooded by the puppet. As it was unable to get underneath the puppet it would snuggle as close as possible beside it. At a later developmental stage the chick would perch leaning against the puppet, which was attached to a perch, thus adopting the same behaviour as in parent reared chicks (pers. obs.).

The hand-reared chick, which is a male, has been housed with a female *P. superbus* partner since March 1998. The bird has not shown any apparent aberrant behaviour and while it is not afraid of its keepers it equally does not approach or like to be approached by them. The chick will sometimes utter a rapid two note 'peep-peep' call in response to the same call from the keeper. This call became evident mid-way during its development. The significance of this call being carried though into adulthood has yet to be evaluated. The two birds have been shown to be compatible cage mates and we await any future signs of pair bonding.

Summary

We are unaware of any previous successful attempt to raise a *Ptilinopus* fruit dove by hand, straight from hatching. A number of *Ptilinopus* and other tropical fruit doves and pigeons are threatened with extinction (Collar et al. 1994) and captive breeding programmes may prove an aid to their continued survival. For example, the American Zoo and Aquarium Association's (AZA) Pigeon and Dove Taxon Advisory Group already runs a programme for the Mariana Fruit Dove *P. roseicapilla* and we anticipate that hand-rearing may occasionally prove to be an invaluable aid to such programmes.

Products mentioned in the text

Quark (Sainsburys) & Tofu: J. Sainsbury Plc., Stamford Street, London SEI 9LL, UK.
Tinned Guavas: Peaty Mills Plc., Bridge House, Borough Grn., Sevenoaks, Kent TNI5 8PS, UK.
Heinz Pure Fruit: H. J. Heinz Co. Ltd., Hayes, Middlesex UB4 8AL, UK.
Organic Mixed Bean Sprouts (Aduki, Mung, Lentil, Chick Pea): Skysprouts, Totnes TQ9 7LP, UK.
SA37 (Multivitamin general Supplement): Intervet UK Ltd, Science Park, Milton Road, Cambridge CB4 4FP, UK.
Calcium Lactate BP: J. M. Loveridge Plc., Southbrook Road, Southampton SO15 1BH, UK.
Meridian Peanut Butter (Smooth, no salt): Meridian Foods, Corwen, Clwyd LL21 9RR, UK.
Organic Sprouted Wheat Loaf: Sunfood Ltd, Unit 10, Vanguard Trading Centre, 16 Marshgate Lane, El5 2NH.

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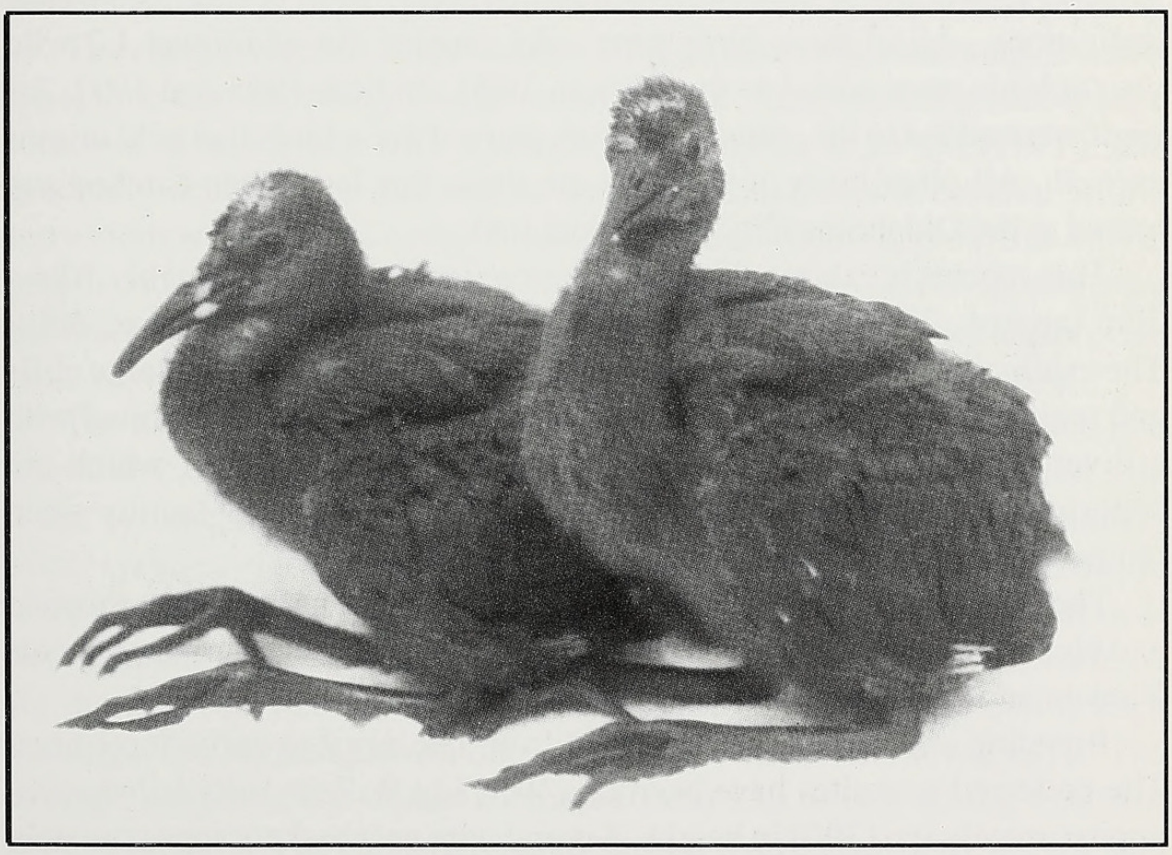
HAND-REARING PUNA IBIS AT THE OKLAHOMA CITY ZOOLOGICAL PARK

by Chris Smith

The Puna Ibis *Plegadis ridgwayi* has been successfully hatched and reared at the Oklahoma City Zoological Park since 1991. As of 1997, 15 Puna Ibis chicks had been hand-reared. These chicks were successfully reintroduced to their parent flock without any signs of imprinting.

Puna Ibis measure 56cm-61cm (approx. 1ft 10in - 2ft). The plumage is dark purple with a metallic sheen on the coverts with the head and neck dark chestnut. Although similar in appearance to the Glossy Ibis *P. falcinellus*, this species is distinguished by having a shorter bill and tarsi. Immature and non-breeding birds have white streaks over the head and neck. Bare areas around the bill and eyes are are red during the breeding season. The legs are black. Sexes are similar in appearance, but males are larger and heavier. There is also a difference in the length of the bill between the sexes. The male's culmen measures from 108mm-127mm, while the female's bill is only 86mm-95mm (Blake, 1977).



Puna Ibis *Plegadis ridgwayi* at three weeks old