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THE SUNBIRD

Volume 28 No. 3 September 1998

AN ASSESSMENT OF FAECES AS A RELIABLE INDICATOR OF THE OCCURRENCE OF BLACK-BREASTED BUTTON-QUAIL AND PAINTED BUTTON-QUAIL

NADYA LEES and GEOFFREY C. SMITH

ABSTRACT

This study investigated the potential of using faeces found within foraging scrapes (platelets) to distinguish between the occurrence of Black-breasted Button-quail *Turnix melanogaster* and Painted Button-quail *T. varia*. Both species create platelets that are similar in appearance. Two groups of captive Black-breasted and Painted Button-quail were fed different diets. Data were collected on the number, shape and dimensions of faecal pellets for each species. Both species produced globular (shape I), globular with an extended tube (shape II) and elongated faeces (shape III). Diet did not influence the frequency of the shape of faecal pellets produced, although birds fed a simple diet produced faeces with a greater globular width and length for shape I and a greater tube length for faeces of shape II. Diet did not affect Shape III faeces, even though the tube length was longer for Painted Button-quail. Black-breasted Button-quail consistently produced more globular shaped faeces with an extended tube (shape II), than Painted Button-quail which mainly produced globular shaped faeces (shape I). Despite the differences found, both species can produce faeces with similar characteristics.

INTRODUCTION

The Black-breasted Button-quail *Turnix melanogaster* is classed as an endangered species in the IUCN Red List (Collar *et al.* 1994) and is listed as vulnerable in the Queensland *Nature Conservation Legislation Amendment Regulations (No. 2) 1997*. Surveys of south-eastern Queensland have been conducted to map the present-day distribution of Black-breasted Button-quail (Hamley *et al.* 1997). These surveys relied on direct observations of the birds or detection of foraging scrapes, often called platelets, to ascertain species presence. Platelets are circular depressions in the leaf litter. They have a diameter of 150-200mm and are created as the button-quail pivot in a circle in either direction, scratching the leaf litter with their feet to reveal arthropods and seeds (Hughes & Hughes 1991). The construction of platelets, which are often found in clusters, appears to be unique to turnicids (del Hoyo *et al.* 1996).

Evidence of platelets was the initial approach used to survey for Black-breasted Button-quail (Flower *et al.* 1995). Other turnicids are also known to make platelets although these are not distinguishable among species (del Hoyo *et al.* 1996). In south-east Queensland, Painted Button-quail *T. varia* is the only turnicid species which is likely to forage in similar habitat to the Black-breasted Button-quail (Smyth 1997, Hamley *et al.* 1997). An alternative survey approach for Black-breasted Button-quail is to use differences in faecal pellets to distinguish between the presence of the two species.

Evidence of faeces, tracks and other traces, such as feeding marks, nests and burrows, are often used to indicate a species' occurrence (Triggs 1986). Faeces can be characteristic of a species but there can be considerable variation in the size and shape of scats produced by an individual. The age of an animal and seasonal changes in diet can also affect the shape of scats. McConnell & Hobson (1996) found a difference in the shape of faecal pellets between Black-breasted Button-quail and Painted Button-quail. They cautiously recommended the use of the shape of faecal pellets as a method for surveying for the presence of either species in an area.

In this paper, we conducted a manipulative experiment to examine whether there is an intrinsic difference in the shape of faecal pellets of Black-breasted Button-quail and Painted Button-quail, while controlling for differences in diet in captivity. An intrinsic difference in the shape of faecal pellets would indicate that examination of faeces found in platelets in the field would be a reliable method for surveying occurrences of either Black-breasted Button-quail or Painted Button-quail. We recognise, however, that environmental changes in diet attributable to variable seasons and between locations may affect the shape of faecal pellets of the two species.

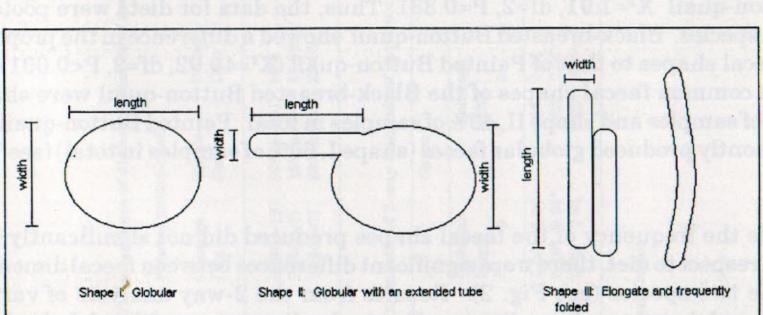
METHODS

Black-breasted Button-quail and Painted Button-quail were housed in captivity in separate aviaries at two different locations in south-east Queensland; viz. Currumbin Sanctuary, Gold Coast, and the Department of Natural Resources, Resource Sciences Centre, Indooroopilly, Brisbane. Studies were carried out between June 1996 and February 1997. The two aviaries at Indooroopilly were each $42m^2$ in area and 3.5m high, with a 3m by 1.5m covered area. They were planted with a variety of native woodland and rainforest species and had a thick layer of leaf mulch and bark chip spread over the floor of each enclosure. In these aviaries, a pair of Painted Button-quail were housed together. The Black-breasted Button-quail were housed initially as a single pair. After breeding, the female was removed and the adult male was kept in an aviary with four chicks, for females have been known to kill chicks in captivity (Mills 1985). The five aviaries at Currumbin Sanctuary were $10m^2$ in area and 2m high, with a 1.5m by 1.5m covered area. The aviaries were landscaped with native rainforest and woodland plants with tea tree and leaf litter mulch covering the floors. Currumbin Sanctuary housed four Painted Button-quail and four Black-breasted Button-quail as single pairs for the duration of the study.

Black-breasted Button-quail and Painted Button-quail at Currumbin Sanctuary were fed on a complex diet of finch seed, dotterel mix, greens, fine meat mix, madeira cake and mealworms *Tenebrio molitor* (Appendix 1), while the birds at Indooroopilly were supplied with a simple diet of commercially available finch seed and mealworms. The button-quail at both localities were frequently observed constructing platelets and consuming insects found in the leaf litter mulch in the aviaries.

Faecal samples were measured, described and photographed. Faeces were categorised into one of three distinct forms (Fig. 1). Shape I faeces were globular in shape with uric acid distributed throughout the whole pellet. Shape II faeces were globular in shape with an extended tubular section. Uric acid was present mainly in the globular region. Shape III faeces were tubular in shape and usually folded. Uric acid was restricted to one end of the tube. Measurements of the width and length were taken of both the globular and tubular sections.

Fig. 1. Common shapes of faeces



Two chi-squared tests of independence were applied separately for each species to test whether the proportions of pellet shapes produced by each species were independent of diet. When no statistically significant differences were found, the data on diets were pooled and a chi-squared test applied to determine if the proportions of faecal pellets of the three shapes were different between species. Differences in faecal dimensions for each shape were examined using a 2x2 factorial design: (1) two levels of species, Black-breasted Button-quail and Painted Button-quail; and (2) two levels of diet, complex and simple. Eight unbalanced, 2-way fixed effect analyses of variance were applied for each faecal shape to test whether each dimension measured for a particular faecal shape was influenced by differences between the species, their respective diets or a combination of diet and species. Where ANOVA's resulted in significant F ratios, a Tukey's multiple comparison test was used to determine which species or diet produced faeces of greatest dimensions. Statistica (StatSoft, 1995) software was used for the analysis.

RESULTS

Twenty-one Black-breasted Button-quail and thirty-three Painted Button-quail faecal pellets were collected from the Currumbin Sanctuary aviaries, while thirty-four Black-breasted Button-quail and forty-seven Painted Button-quail faeces were collected from the birds at Indooroopilly. All of the button-quail at Currumbin Sanctuary from which faecal samples were obtained were adults, whereas faeces were collected from adult Painted Button-quail and from both sub-adult and adult Black-breasted Button-quail at Indooroopilly.

Painted and Black-breasted Button-quail fed in captivity showed considerable variation in the shapes of faeces produced. The proportions of different faecal shapes produced by birds fed either of the two diets were not significantly different (Painted Button-quail X^2=0.54, df=2, P=0.76; Black-breasted Button-quail X^2=1.91, df=2, P=0.38). Thus, the data for diets were pooled for each species. Black-breasted Button-quail showed a difference in the proportion of faecal shapes to that of Painted Button-quail (X^2=40.92, df=2, P<0.001). The most common faecal shapes of the Black-breasted Button-quail were shape I, 43% of samples and shape II, 46% of samples in total. Painted Button-quail most frequently produced globular faeces (shape I, 60% of samples in total) (see Table 1).

While the frequency of the faecal shapes produced did not significantly differ with respect to diet, there were significant differences between faecal dimensions of the two species (see Fig. 2). Results from the 2-way analysis of variance indicated that there was a dietary effect in the dimensions of the globular length and width for shape I faeces and tube length for shape II faeces. Because of the interaction between species and diet for the globular width of shape II, little can be interpreted about diet (see Table 2). There was a difference in tube length

TABLE 1. Percentages of different shapes of faecal pellets produced by different diets for captive Black-breasted Button-quail and Painted Button-quail.

	Painted Button-quail			Black-breasted Button-quail		
Faecal Shapes	Complex Diet	Simple Diet	Pooled Data	Complex Diet	Simple Diet	Pooled Data
I	58%(n=19)	62%(n=29)	60%	52%(n=11)	38%(n=13)	43%
II	21%(n=7)	15%(n=7)	17.5%	43%(n=9)	50%(n=17)	46%
III	21%(n=7)	23%(n=11)	22.5%	5%(n=1)	12%(n=4)	11%

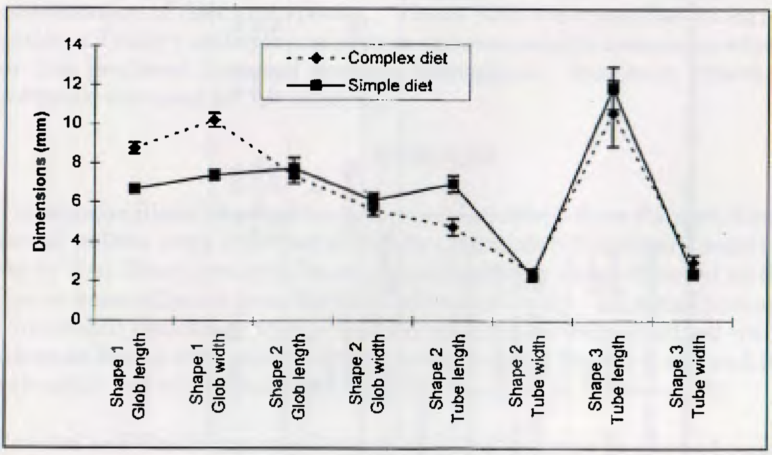
TABLE 2. Results of 2-way analysis of variance on faecal dimensions.

	Shape I				Shape II								Shape III			
	Globular length		Globular width		Globular length		Globular width		Tube length		Tube width		Tube length		Tube width	
	F	p	F	p	F	P	F	P	F	P	F	P	F	P	F	P
Species	0.00	1.00	0.37	0.54	0.32	0.57	-	-	2.28	0.14	1.34	0.25	8.06*	0.01*	2.11	0.16
Diet	6.46*	0.01*	4.33*	0.04*	2.65	0.11	-	-	11.83*	0.00*	1.52	0.26	0.40	0.54	0.26	0.61
Spp x diet	0.00	0.96	0.00	0.95	2.46	0.13	7.95*	0.01*	1.71	0.20	0.73	0.40	1.43	0.25	4.32	0.05

* significant result

between species for shape III faeces (see Fig. 3). Tukey multiple comparison tests indicated that the faecal dimensions of those button-quail fed the simple diet were significantly larger for the globular length (P=0.01) and globular width (P=0.03) of the shape I faeces and tube length (P<0.001) for shape II faeces. Black-breasted Button-quail had a larger tube length than Painted Button-quail for shape III faeces (P<0.001).

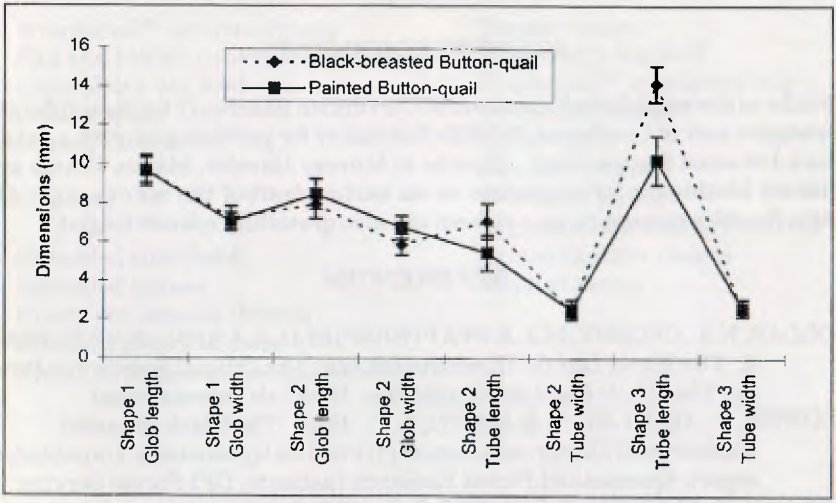
Fig. 2. Mean dimensions of faeces (+ standard error) produced in three different shapes by button-quail fed either a simple or complex diet.



DISCUSSION

Captive button-quail produced three shapes of faeces. Comparatively, globular shaped faeces with an extended tube (shape II) were more reliably attributed to Black-breasted Button-quail, whereas Painted Button-quail more frequently produced faeces of shapes I and III. Faeces of a linear, tubular shape (shape III) were considered to be the norm for Painted Button-quail by McConnell & Hobson (1996) although those faeces which were folded in two or strongly hooked were considered damaged and atypical. In our study, comparatively few Painted Button-quail faeces of an 'atypical' nature were found and there was a greater diversity in faecal structure. The diversity of faecal shapes produced by Black-breasted and Painted Button-quail may prevent accurate determination of which species is inhabiting an area unless a large number of faeces can be collected and examined. Even then, any identification would only be based on statistical probability. Because shape (cf. McConnell & Hobson 1996) is a poor characteristic by which to key out the faeces of the two button-quail species, we examined size of faeces.

Fig. 3. Mean dimensions of faeces (± standard error) produced in three different shapes by Black-breasted Button-quail and Painted Button-quail held in captivity.



Although shape III faeces were less frequently produced by both Black-breasted and Painted Button-quail, the tube length of faeces produced by Black-breasted button-quail was significantly larger in comparison with Painted Button-quail. With a simple diet, the globular section (both width and length) was larger for shape I faeces and the globular width and tube length were significantly larger for shape II. This suggests that there may be differences in faecal dimensions with respect to diet in the wild. Examination of faecal dimensions in the field may be difficult and would be dependent upon the 'freshness' of the pellet. Older, desiccated faeces may be prone to damage, especially if handled, resulting in inaccurate measurements. Rainfall and heavy dew may cause partial dissolution and also influence faecal dimensions. Therefore, faecal dimensions should not be used as a diagnostic characteristic in the field.

While McConnell & Hobson (1996) suggested that faecal pellets found in platelets may be used to determine the presence of either species in the field, the present study suggests that the shape and dimensions of the faeces are highly variable and should not be employed as an indirect method of distinguishing button-quail. There is no easily used diagnostic tool to help distinguish Painted and Black-breasted Button-quail platelets on the faeces they contain. Large numbers of faeces need to be collected and examined before any conclusions based in statistical probability could be reached. Finding large numbers of faeces within platelets can often be difficult, especially if the population density of button-quail is low (NL pers. obs.). Direct observations of birds, and in particular females, remain the only reliable method of ascertaining the presence of Black-breasted or Painted Button-quail.

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APPENDIX 1. Diet fed to captive birds at Currumbin Sanctuary.

Dotterell Mix:

Wombaroo™ insectivore mix
Egg and biscuit canary rearing mix
Ground dry dog food
Grated apple
Grated carrot

Greens:

Shredded silverbeet
Shredded lettuce
Finely cut broccoli flowers
Steamed peas and corn
Sprouted french millet and alfalfa

Fine meat mix:

Topside mince.
Blendeddry dog food
Wombaroo™ insectivore mix
Wholemeal bread
Boiled eggs
Balanced calcium
Vitamin E powder
Egg and biscuit canary rearing mix
Grated cheddar cheese
Blended carrot

NOTES ON THE BAR-BREASTED HONEYEATER IN THE SOUTHERNMOST PARTS OF ITS RANGE

KEN CHAN

A community-based research project on the effect of habitat fragmentation on migratory landbirds commenced in Central Queensland in June 1996 with initial funding from the Australian Nature Conservation Agency. The project, directed by myself, involved volunteer bird observers counting birds at twenty-five selected study sites in predominantly eucalypt woodland near Mackay, Rockhampton, Bundaberg, Gladstone, and Emerald, and at Carnarvon Gorge. Pairs of observers conducted two bird counts, each of 20 minutes duration, at each site prior to 0900 h on specified days of each month. Details of methodology and results are to be presented elsewhere; here I report observations made on the Bar-breasted Honeyeater *Ramsayornis fasciatus* within the first 12 months of the project. Other than reports of sightings, very little has been written about this species, particularly in these southernmost parts of its range.

The Bar-breasted Honeyeater is generally regarded as a bird of the northern tropics (e.g. Slater *et al.* 1990, Cayley 1991). The southernmost parts of its documented range are in eastern Central Queenland, where the species has been observed at Rockhampton (latitude 23°22'S), Rossmoya, Kinka Beach, Duaringa and Blackdown Tableland National Park (Blakers *et al.* 1984, Britton 1991); Longmore (1978) considered it to be a rare vagrant to the area and Schodde *et al.* (1992) considered it an uncommon resident at the Shoalwater Bay Training Area (the species was not recorded in a less intensive survey in 1971). There is also a single sighting of the species north of Goomeri (latitude 26°10'S) (Horsup *et al.* 1993).

The presence of the Bar-breasted Honeyeater in eastern Central Queensland has been confirmed by experienced volunteer bird observers as part of the above-mentioned research project, although this species was observed at only one of six study sites near Mackay and two of six study sites near Rockhampton (Table 1), and it was not recorded at all in the remaining thirteen study sites. At the Mackay M2 site, the Bar-breasted Honeyeater was observed in single pairs during April-May, while Glenn Jorgensen (pers. comm.) has noticed a pair of Bar-breasted Honeyeaters reappearing on his property near Mackay each September in the past 3-4 years. Regular project observers (Avis Gauld, Bill Gauld, Ann McHugh, Joyce Hill and Joy Williamson) at the R2 site west of Yeppoon have seen the species, usually 1-3 individuals, in most months of the year. This species is often associated with *Melaleuca quinquenervia*, but it is also observed among *Eucalyptus* spp., and, because of its close association with *Melaleuca* swamps, it is unlikely to be found far inland. Not much is known about the species' movement patterns and the limited information available

TABLE 1. Study sites where the Bar-breasted Honeyeater has been observed during monthly bird surveys conducted between June 1996 and May 1997.

Site	Nearest town	Latitude	Month
M2	Walkerston	21°09'S	Apr, May
R2	Yeppoon	23°05'S	Jun, Jul, Aug, Oct, Jan, May
R3	Yeppoon	23°05'S	Mar

suggests that it is a nomad and/or a partial migrant. All of these southern records are from sites within about 150 km of the coast. Crawford (1972) reported fluctuating numbers associated with flowering *Melaleuca* in mixed forest in the Northern Territory.

Breeding has been reported as far south as Duaringa (23°43'S) (Blakers *et al.* 1984) and various museum records for the Mackay area include one breeding record from around 1908 (David McFarland pers. comm.). Several project observers have witnessed breeding within and outside the city of Rockhampton, which confirms regular breeding in the southernmost parts of its geographic range.

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FLUCTUATIONS IN THE POPULATION OF THE SQUATTER PIGEON *GEOPHAPS SCRIPTA* AT COEN, CAPE YORK PENINSULA

STEPHEN GARNETT, GABRIEL CROWLEY, MICHAEL DELANEY and PADDY SHEPHARD

The Squatter Pigeon *Geophaps scripta* has declined in the southern part of its range in New South Wales and southern Queensland but the northern subspecies is generally considered secure (Garnett 1992). In the Coen region of Cape York Peninsula, however, there has been a marked fluctuation in the abundance of the species over the last 70 years.

In 1921-22 William McLennan undertook an egg-collecting expedition to central Cape York Peninsula for H.L.White. In his diary (held RAOU Archives, Latrobe Library) McLennan reports Squatter Pigeons on 41 occasions between 4 September 1921 and 29 April 1922. He found fourteen nests from September to November and a further seven in April. Several times he referred to them as numerous and he often "shot a brace for breakfast". In 1929 they were still numerous a little to the south of Coen in the headwaters of the Coen River (Thomson 1935), where a nest was found in August. They remained common round Coen until the late 1970s, when PS remembers large flocks trooping into waterholes to drink during the dry season. He also recalls moving carpets of the birds on areas covered with the annual pasture legume Townsville stylo *Stylosanthes humilis*.

In the late 1970s the species suffered a dramatic decline in the Coen district. Although there are five records on the Queensland Department of Environment and Heritage database from the vicinity of Coen in 1978 and 1979 (D. Storch pers.comm.), none were recorded from the Coen degree block during the RAOU Atlas (Blakers *et al.* 1984) and nor were they seen during a survey of McLennan's collecting sites by SG in April 1993. Small flocks of two or three are occasionally encountered during routine surveys of National Parks by MD or during mustering by PS but the birds have never been at the densities encountered before 1978.

The most likely reason for the population change is variation in food availability. Townsville stylo, which was introduced to the Coen area in the 1920s (E.Wassell pers.comm.) was the principal food of Squatter Pigeons collected on the Atherton Tableland in 1974 (Crome 1976). During the exceptionally wet year of 1974, however, the fungus anthracnose destroyed most Townsville stylo in northern Australia (Irwin & Cameron 1978). Coen itself was not exceptionally wet in 1974 and Townsville stylo remained abundant in the region for another 4 years. In 1978, however, anthracnose reached Coen and stylo pastures were devastated. Small pockets remained but it was no longer one of the dominant annuals.

It is not known how Squatter Pigeons in other parts of the species' range coped with the disappearance of their major food plant. No change in the historical distribution of the northern subspecies was noted by Blakers *et al.* (1984) so it must be assumed that other foods, such as the native pasture legume *Macrotyloma uniflorum* recorded in the diet by Crome (1976), were still available.

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A NOTE ON THE EASTERN RANGE OF THE NORTHERN ROSELLA *PLATYCERCUS VENUSTUS*

PHILIP BOURKE and PAT COMBEN

The standard field guides of Australian birds appear to understate the eastern extent of the occurrence of the Northern Rosella *Platycercus venustus*. Pizzey (1997) describes the bird's distribution as "...to Nicholson R., far nw Q." Slater et al.(1986) states that it is found "...from Nicholson R., Qld, to about Derby, W.A." Simpson & Day (1996) do not describe the range but illustrate its distribution as barely coming into Queensland. Storr (1984) has only a single record, "extreme north-west: four birds observed at Border Waterhole on the Northern Territory border." The two Queensland records in Blakers *et al.* (1984) are south and east of the Nicholson River, while Ingram & Raven (1991) has a single plot south of the Nicholson River.

During April 1997, two Northern Rosellas were observed by the second author on the bank of Musselbrook Creek, 60km south-south-east of the Nicholson River (18° 05'S, 137° 55'E). The birds were on the ground below large eucalypt trees. A further sighting of a single bird by the first author was made in a nearby location in September 1997. Above average rain had fallen in the area during February and March 1997, ensuring good local vegetation growth. Additionally, since 1981, Northern Rosellas have been recorded in all Department of Environment fauna surveys of Lawn Hill Gorge (18° 35'S, 138° 35'E), within Lawn Hill National Park, almost 100km to the south-east of the Nicholson River.

As the Northern Rosella is normally sedentary, and generally encountered in sparsely distributed family parties, it appears that the bird's normal eastern range should be extended further south-east than has been generally acknowledged.

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FRITH, H.J. (Ed.) 1976. Mallee fowl. In *Complete Book of Australian Birds*, pp. 136-137. Sydney: Reader's Digest.
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