

FORUM

## Ageing Dunnocks *Prunella modularis* using plumage characteristics

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Iris colour has long been regarded as the only reliable way of ageing Dunnocks *Prunella modularis*. There are limitations with this method, namely that it can only be used during late summer and autumn when a difference in iris colour exists between young (first-year) and adult birds. By late autumn, the method is no longer reliable and many Dunnocks are thus left unaged. Differences in plumage exist between young and adult birds. These differences have an advantage over iris colour since they are observable year-round. A number of differences between young and adult birds have been found, notably in the greater coverts and primary coverts. These features allow Dunnocks to be reliably aged when ageing by iris colour is not possible.

Correct ageing of individual birds in a study is essential for many aspects of population analysis; for example, immature versus adult survival rates or breeding success. Many European bird species retain traits through their first full year of life that enable ringers to age them confidently as first-/second-calendar year or older. However, ageing Dunnocks *Prunella modularis* often presents difficulties for ringers. Iris colour is regarded by many as the only reliable way to age this species – the iris is dull brown or greyish-brown in first-year birds to at least the end of August, often as late as October, while adults show a reddish-brown iris (Svensson 1992). Some young birds can still be aged using iris colour up to February of their second calendar year (pers obs) but most birds of both age classes show an iris colour sufficiently similar to each other (that is to say, adult-like) as to not allow confident ageing using this feature beyond late autumn. Indeed, the percentage of ringed Dunnocks given a precise age by British ringers (ie EURING 3 or 4 against EURING 2; see Redfern & Clark 2001) drops from 92.1% for birds ringed in October to 59.0% for birds ringed in January (EURING 5 or 6 against EURING 4) and to just 33.3% in April (Table 1). The data for birds ringed in Denmark are similar: 89.2%, 32.7% and 48.8% respectively (Natural History Museum of Denmark, University of Copenhagen).

Falsterbo Bird Observatory, in southern Sweden, catches a large number of migrant Dunnocks in both spring and

autumn. Birds in autumn can be aged reliably using iris colour (Svensson 1992). Using these individuals as a starting point, aged with confidence using the iris, ringers at Falsterbo Bird Observatory have been able to examine plumage to establish differences between that of birds aged as first-years and that of those aged as adults in autumn (EURING code 3 and 4 respectively). On examining the spread wing, differences in greater covert pattern were apparent between the two age classes, as were differences in the primary-covert pattern.

Jenni & Winkler (1994) showed that 0.7% of 1,806 first-year Dunnocks caught in Switzerland moulted all of their greater coverts during post-juvenile moult; a similar figure of 6 of 1,095 birds (0.5%) was found on birds examined at Falsterbo Bird Observatory during 1984–90 (Table 2). Whilst the extent of post-juvenile moult may vary geographically, most young Dunnocks in northern Europe should retain at least some juvenile greater coverts. Witherby *et al* (1948) state that in the British race *occidentalis* moult is the same as in the nominate Continental race, so the extent of post-juvenile moult in Dunnocks from continental Europe and mainland Britain should be similar. Since both age classes of Dunnock undergo just one moult each year, partial post-juvenile or complete adult post-breeding, respectively (Cramp 1988, Svensson 1992), plumage differences in autumn should still be evident in spring, although the effects of wear and bleaching must be taken into account. Indeed, birds ringed during the spring migration at Falsterbo Bird Observatory are routinely aged using plumage characteristics.

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**Table 1.** Age classification for fully grown Dunnocks ringed in October, January and April in UK (data from British Trust for Ornithology) and in Denmark (DK; data from Natural History Museum of Denmark, University of Copenhagen). Note that percentages do not quite total 100%; percentages for unexpected or unlikely age codes (eg EURING age 3 in January) are assumed to be errors during data input and have been excluded.

EURING age code	October		January		April	
	UK n = 31,003	DK n = 5,328	UK n = 14,539	DK n = 55	UK n = 12,428	DK n = 4,877
2	7.86%	10.66%	–	–	–	–
3/3J	83.00%	76.82%	–	–	–	–
4/4I	9.12%	12.35%	40.75%	67%	65.98%	49.95%
5/5J	–	–	47.84%	31%	25.34%	44.95%
6	–	–	11.16%	2%	7.97%	3.90%

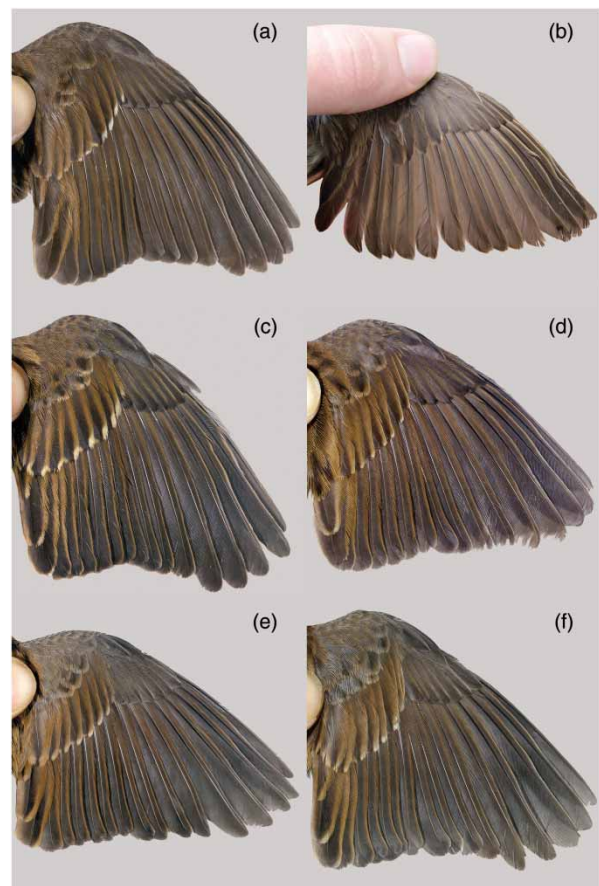
A moult limit in the greater coverts, detected using pattern and appearance or by examining feather shape and structure, is diagnostic of young birds (Fig 1a). Even on heavily worn or bleached second-year birds in early summer, the difference between juvenile and adult-type greater coverts is still apparent (Fig 1b).

Jenni & Winkler (1994) found that 60% of first-year Dunnocks moulted no greater coverts; data from Falsterbo Bird Observatory collected during 1984–90 gave a similar figure of 57.8% (Table 2). Thus, recognition of juvenile greater coverts and their visual differences from adult greater coverts is of great importance when attempting to age a Dunnock with no moult limit visible in the greater coverts.

Using plumage differences detected on birds ringed at Falsterbo Bird Observatory and with the addition of details from known-age Dunnocks (first-years fully in

**Table 2.** Extent of greater covert moult on first- and second-calendar-year Dunnocks ringed at Falsterbo Bird Observatory, Sweden, 1980–91.

Retained juvenile greater coverts	% of birds (n = 1,095)
0	0.5
1	0.6
2	1.5
3	1.8
4	1.9
5	1.8
6	4.2
7	5.8
8	10.3
9	13.6
10	57.8



**Figure 1.** Spread wings of Dunnock showing greater coverts and primary coverts: (a) second calendar year (2cy) with four retained juvenile greater coverts (Falsterbo Bird Observatory, Sweden, spring); (b) 2cy with four retained juvenile greater coverts; note that this bird is missing greater coverts 6 and 7 (Liverpool, UK, June); (c) 1cy with 10 retained juvenile greater coverts (Falsterbo Bird Observatory, autumn); (d) 2cy with no retained juvenile greater coverts (Falsterbo Bird Observatory, spring); (e) 2 + cy (Falsterbo Bird Observatory, autumn); (f) 3 + cy (Falsterbo Bird Observatory, spring).

juvenile plumage and retrapped fully grown birds) handled in northwest England, we hope that the following characteristics will prove useful for ringers when attempting to age Dunnocks accurately when ageing by iris colour is not possible.

## GREATER COVERTS

An overview of the difference between juvenile and adult-type greater coverts has been given by Jenni & Winkler (1994) and by the same authors in Glutz von Blotzheim & Bauer (1985). Their description agrees broadly with our findings, although may be difficult to interpret on a lone bird. Essentially, fresh juvenile greater coverts show yellowish-tinged spots at the feather tips compared to whitish spots (tinged gingery-brown on some when fresh) of the adults, and the black field around the shaft is better defined on juvenile greater coverts. However, the pattern of the greater coverts can be variable and a number of features were found that, when used in combination, make assigning age class more reliable.

### Feather shape and structure

Juvenile greater coverts are less densely barbed than adult feathers and this structural difference can be useful when determining a moult limit in the greater coverts. The juvenile greater coverts are generally narrower at their distal end than adult-type greater coverts; this is most noticeable on the outer web and gives the adult feathers a broader impression, less evenly rounded at the tip. With practice, this in itself can be helpful but is subjective in isolation. However, it does help to explain some of the quirks and differences in the greater-covert feather pattern between the two age categories. We strongly recommend the use of a jeweller's loupe when examining feather structure. A jeweller's loupe can also be useful in examining details of feather pattern.

### Outer-web spots

The spot on the tip of the outer web of the juvenile greater coverts is on average larger than that on adult-type greater coverts, extending further up the feather, though this is variable. It is yellowish- to whitish-cream on juvenile feathers in early autumn but soon fades to whitish-cream or whitish; on adults, it is whitish with a brownish tinge to the spots on the inner greater coverts, especially when fresh, bleaching to white by spring (contra C.S. Roselaar in Cramp 1988). The shape of the spot on juvenile feathers is best described as 'egg-shaped' (occasionally squarer). The inner edge of the spot roughly mirrors that of the outer edge along the feather

edge; that is to say, a gentle convex curve. The two edges meet at the feather tip, in some cases almost touching the feather shaft but more often with a small gap, and there is often a (very) small amount of black 'hooking' under the bottom edge of the spot. The spot is usually well defined though the outer proximal edge is often diffuse so that the spot gives the impression of bleeding up the edge of the feather.

In adults, the spot is squarer in shape and often rather ill defined along the proximal edge. The inner proximal corner of the spot can be almost right-angled as the edge turns to meet the feather tip. The inner edge of the spot is almost perpendicular to the tip of the feather, often with a (very) small amount of brown 'hooking' under the bottom edge. The broader feather serves to emphasise the squarer appearance of the spot. It is not unusual for the spot on the outermost greater coverts to be weak or even virtually absent, especially on the inner greater coverts.

Note that on the outer one or two greater coverts of some young birds, the spot remains rather cream- or yellow-tinged while the spot on a neighbouring juvenile feather has bleached to white; although the change can be abrupt and striking, care should be taken not to confuse this with a moult limit.

### Outer feather edge

The outer edge of the greater coverts is brown. There is a subtle difference in the shade of brown between the age classes, generally being a richer, more chestnut shade in juveniles compared to a duller slightly tan- or olive-tinge in adults. This difference, whilst obvious at times in direct comparison (between two birds or within a moult limit on a single bird) is unlikely to be detected in isolation.

On juveniles, the brown outer edge is more-or-less of even width along the length of the feather and shows a rather sharp border against the dark feather centre for much of its length. It is generally as wide as or slightly narrower than the width of the top edge of the spot on the outer web.

In adults, the brown outer edge broadens slightly as it nears the tip of the feather. The edge shows a variably diffuse border against the dark feather centre, especially so towards the base of the feather. The edge reaches its broadest and best-defined point as it meets the spot at the tip of the feather; it is as wide as the tip, and the outer edge to the dark feather centre often continues seamlessly along the brown edge onto the inner edge of the spot.

### Inner-web spot

Spots at the tip of the inner web are extremely variable. Juveniles can show anything from a wedge of yellow-cream to a conspicuous yellow-cream spot rivalling that

on the outer web in size and shape; examples of the latter are usually most evident on the inner greater coverts since spots generally become larger and more obvious from outer to inner along the greater coverts. Adults generally show a thin brownish wedge that follows the edge of the feather, though this can be relatively thick and conspicuous on some individuals. We have found that the inner-web spot is the least valuable feature when examining the greater coverts, although a large well-defined spot here should indicate a juvenile feather.

### Feather centre

On adult-type feathers, the feather centre and most of the (usually hidden) inner web is a uniform dark greyish-black. The gradual widening of the brown edge to the outer web, which meets cleanly with the white spot, gives the outer edge of the black a straight edge and the result is an evenly tapering 'wedge-shaped' feather centre. The dark centre extends towards the feather tip but usually terminates with a thin brown edge extending from the inner 'spot' to the brown that hooks under the bottom of the outer spot. Occasionally, especially after wear, this brown edge is not complete and the dark centre may reach the feather tip, though it never appears so solid and 'penetrating' as on juvenile feathers.

In juveniles, the feather centre is generally blacker than adult-type feathers, especially on the outer web and towards the tip. The black is at its darkest between the two spots (though beware the effects of the shaft from the secondary below showing through). As a result of the more even width of the brown outer edge and the bulging outer spot, the outer edge to the dark centre

curves as it reaches the feather tip giving a 'spike-shaped' dark centre. This effect is emphasised further on birds with large inner spots that cause the dark feather centre to taper even more towards the tip. The black centre reaches right to the edge of the feather tip.

Using a combination of these features, it is possible to assign greater coverts as juvenile or adult-type. Recognition of juvenile greater coverts allows immature birds that have moulted no greater coverts (Fig 1c) to be aged. Young birds that have moulted all greater coverts may be encountered (Fig 1d) and there is then a risk of confusion with adults (Fig 1e-f); in these cases, the primary coverts are useful in separating the two age classes.

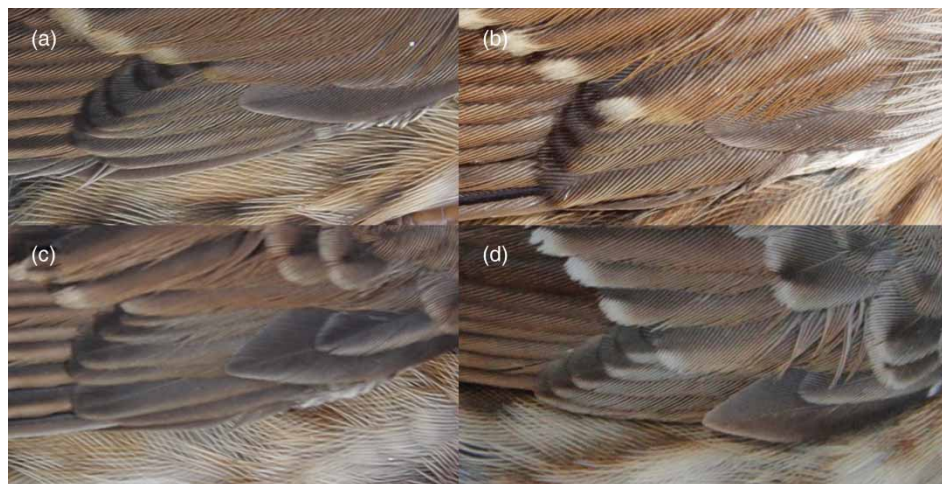
## PRIMARY COVERTS

### Primary covert shape

Adult primary coverts are broader and more square-ended than the narrower and more pointed juvenile primary coverts. Juvenile primary coverts often give a looser-textured appearance; they are generally more frayed in spring than those of adults.

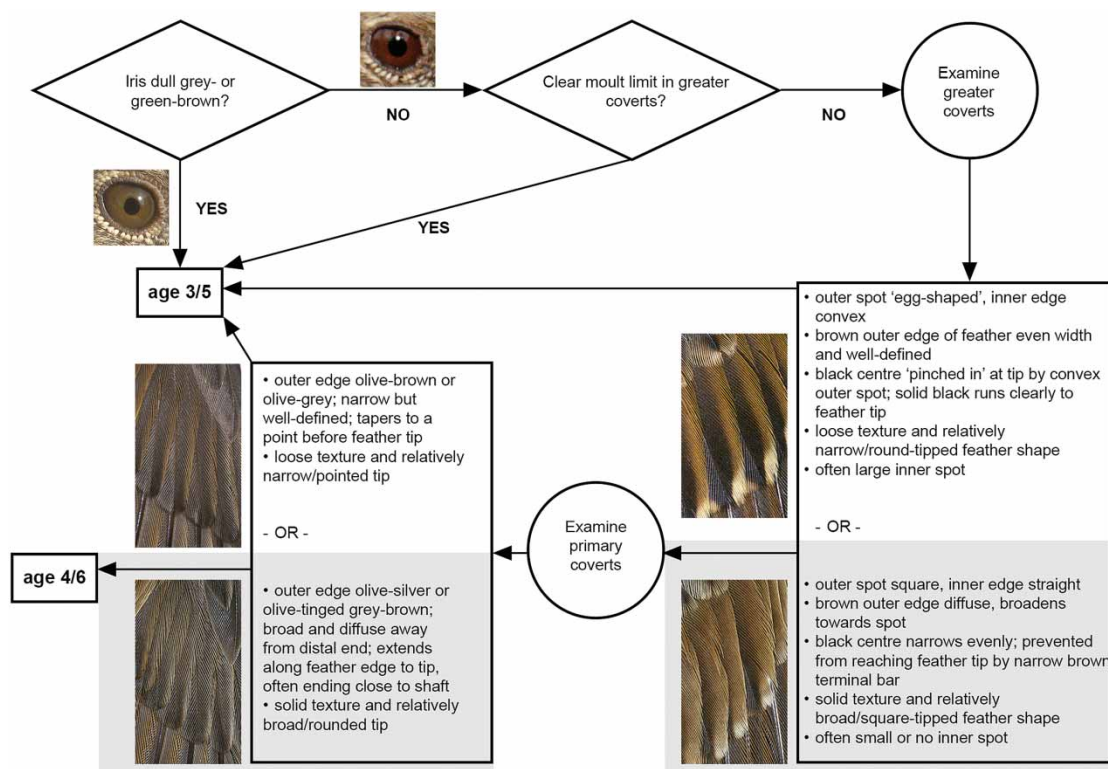
### Black bar

The presence of a black bar across the tips of the primary coverts on the closed wing is generally helpful in indicating young birds, though is hard to quantify. As with the greater coverts, the grey-black primary coverts often appear to have a blacker area towards the tip on young birds, especially at the very tip of the feather. However, this seems variable. More useful, and more



**Figure 2.** Primary coverts on closed wings of Dunnocks: (a) 1cy (Liverpool, UK, July); (b) 1cy (Falsterbo Bird Observatory, Sweden, August); (c) 2+cy (Cheshire, UK, October); (d) 3+cy (Falsterbo Bird Observatory, April).





**Figure 3.** Ageing Dunnocks: an overview.

quantifiable, is the coloured edge to the outer web of the primary coverts (which appears to influence the black bar on the closed wing).

### Outer feather edge

On juveniles, the outer edge to the feather varies between olive-brown (a similar tone to the edges of the primary) to olive-grey, often more brown-tinged toward the distal end. The edge is well defined across most of its length but is narrow, tapering quickly to a point before it reaches the feather tip. On adults, the outer edge is often an olive-silver colour, brighter and cleaner-looking than on juveniles, though can be olive-tinged grey-brown, similar to juveniles. The edge is broad and, away from the distal part, is diffuse with the colour spilling over onto the dark feather centre. It continues along the feather generally reaching the tip, sometimes hooking round the end and finishing close to the feather shaft.

The extent of the coloured edge influences the appearance of the primary coverts on the closed wing. On young birds, where the edge stops short of the feather tip, the dark feather centres at the tip of the primary coverts sit side-by-side uninterrupted by pale edges, thus appear as a dark bar (Fig 2a). On adults,

where the thick edge extends further towards the feather tip, the line of dark centres to the primary coverts is interrupted by the coloured feather edges and the impression of a continuous dark line is not given (Fig 2b).

Finally, it is worth noting that the tertials of adults and juveniles show a pattern and appearance that reflects the respective greater-covert pattern. Differences in *eg* outer-web spot, outer feather fringe and feather-centre shape appear to be a useful additional characteristic for ageing.

### CONCLUSION

First-year birds have rarely been recorded in wing moult during post-juvenile moult (*eg* Benson 2003) and are reported to show a brownish-orange iris as early as July. Moult of the primary coverts has been reported in one first-year Dunnock (C. Benson pers comm). A bird that has moulted primaries, secondaries and primary coverts and shows an adult-like iris would prove extremely difficult, perhaps impossible, for a ringer to age correctly. It is clear, though, that individuals like this are extremely rare and highly unlikely to be encountered; we consider them to be of negligible concern and they

should not alter the ageing criteria laid out in this paper, which are summarised in Fig 3.

There is no escaping the variability of the species; practice is needed. We recommend ringers pay close attention to birds of known age or to first-year birds in early autumn, ageing them first using iris colour then examining the plumage for the criteria laid out in this paper. With experience and by taking into account the effects of wear, we hope ringers will feel more confident in ageing many of the Dunnocks they catch using plumage characteristics, regardless of the time of year.

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