Pied Flycatcher

Ficedula hypoleuca

Hamid Rguibi-Idrissi

Range

The Pied Flycatcher's breeding range covers most of C and N Europe eastwards to W Siberia and scattered parts of NW Africa, Britain, France and Iberia (Glutz von Blotzheim & Baeur, 1991; Lundberg & Alatalo, 1992). Its wintering areas lie in western tropical Africa, mostly north of the Gulf of Guinea to *c.* 11°N, and from Guinea and Gambia eastwards to the Central African Republic (Moreau, 1972; Urban et al., 1997; Cramp, 1998). It does not breed in any of the study sites. Although two rather distinct subspecies do breed in Iberia and Morocco (*iberiae* and *speculigera*, respectively; Saetre et al., 2001), the vast majority of captures reported here refer to the nominate race.

Migratory route

Birds migrating though the area in spring originate from a wide area ranging from Britain and C Europe, north to Scandinavia and eastwards to the Baltic and W Russia (fig. 1). Passage through the study area takes place following a main SW-NE direction, except for birds originating from Britain, which move due N. These results agree with the well-known migratory route of this species through Europe and N Africa (Zink, 1985; Cramp, 1998; Rguibi-Idrissi, 2002; Spina & Volponi, 2009). Spring passage takes place distinctly further east than in autumn in a text-book example of loop migration (Zink, 1985; Newton, 2008). Accordingly, in Iberia most autumn recoveries take place in the centre and west of the Peninsula (Telleria et al., 1999), while in Morocco the main autumn passage occurs along the western Atlantic coast (Rguibi-Idrissi, 2002; Thévenot et al., 2003). In spring, on the contrary, the recovery and capture data presented here indicate that this species is very common along the Mediterranean Spanish coast and the Balearics (figs. 1, 2), and commoner along the Mediterranean coast of Morocco and inland than on the Atlantic coast (as also indicated by Rguibi-Idrissi, 2002; Thévenot et al., 2003).

The species seems to stop relative more frequently in NW Africa in spring than in autumn, increasingly so to the east. In Morocco, most recoveries are from spring (243 against 105 in autumn; Moroccan Bird Ringing Centre, unpubl. data), although observations are frequent in both seasons (Thévenot et al., 2003); in Algeria and Tunisia, however, the vast majority of recoveries take place in spring and the species is markedly more common then than in autumn (Dejonghe & Cournet, 1982; Isenmann & Moali, 2000; Isenmann et al., 2005). In SW Europe the reverse is observed, recoveries being much more common in autumn than in spring (Cramp, 1998; Telleria et al., 1999). The notable passage and abundance of recoveries along the entire Mediterranean coast of N Africa indicates that the species crosses the W and C Mediterranean along a broad front (*cf.* also Spina & Volponi, 2009).

Phenology

The first individuals migrate through the area in early April, with passage progressively reaching a peak in late April and early May, and then decreasing steadily afterwards (fig. 2). The pattern is very similar in Catalonia and the Balearics/Els Columbrets, but with a peak in mid-April in N Morocco. Birds on passage can still be seen in the area in early June, outside the study period (Telleria et al., 1999; Thévenot et al., 2003). Overall, the phenological pattern in the C Mediterranean is very similar to that shown here, with the median date of passage on Capri (1 May) being nearly identical (Pettersson et al., 1990; Spina et al., 1993). At Gibraltar and N Morocco passage can start in mid- or late March, although not usually until April (Finlayson, 1992; Thévenot et al., 2003), while in S Morocco it occasionally starts in early March, but mostly also occurs from early April onwards (Thévenot et al., 2003; Gargallo et al., unpubl.).

Males pass distinctly earlier than females (differences in median dates 10 and 9 days in adults and second-year birds, respectively), but adults only slightly earlier than second-year birds (3 and 2 days earlier in males and females, respectively). These sex and age-related phenological differences are well documented during both migration and on arrival at breeding grounds (Dornbusch, 1981; Dejonghe & Cornuet, 1982; Cramp, 1998; Messineo et al., 2001; Rguibi-Idrissi, 2002). However, sexual differences in passage may be less accentuated in the C Mediterranean, since medians differ only by 4 and 6 days in adults and second-year birds, respectively (Petterson et al., 1990). Recoveries show that the further north birds are ringed/recovered, the later they pass through the study area, indicating that northern populations tend to delay their passage.

Biometry and physical condition

Mean values for third primary lengths range from 60.4 in N Morocco to 61.5 in the wet Balearics and S Morocco, figures that are very similar to those reported in the C Mediterranean (Messineo et al., 2001; table 1). Mean values for wing length vary from 78.2 in N Morocco to 79.7 in the wet Balearics, also similar to those obtained in other sites in the C Mediterranean (Rubolini et al., 2004, Waldenström et al. 2004) and C and N Europe (Cramp, 1998). Wing length clearly decreases over time, which probably reflects the later passage of shorter-winged females (Cramp, 1998) (fig. 6). The same trend can be seen on the Tyrrhenian islands (Spina et al., 1993). Interestingly, birds trapped in the wet Balearics have significantly longer third primaries than in the dry Balearics (also when considering only males).

Fat reserves are significantly lowest in the dry Balearics and, especially, Els Columbrets, and highest in Catalonia, S Morocco and the wet Balearics (table 1, fig. 8).

Physical condition, on the other hand, is distinctly higher in N Morocco and the wet Balearics; in the dry Balearics and Catalonia figures are similar and are clearly better than in Els Columbrets. Fat tends to increase with time in the Balearics and N Morocco and physical condition in the Balearics and Catalonia (figs. 7, 9). These increasing trends suggest that later arriving birds (more females) migrate in slightly better condition, possibly due to being in less of a hurry to migrate faster or to the better environmental conditions encountered as the season progresses en route and/or at wintering/fattening grounds. Mean body mass varies from 10.6 in Els Columbrets to 12.3 in S Morocco, but with no clear overall trend (fig. 9). It decreases significantly with time in S Morocco, but in the dry Balearics it increases, albeit only slightly. Averages are highest in S and N Morocco, and lowest in the dry Balearics and, above all, on Els Columbrets. Birds from the wet Balearics are significantly heavier than on the other islands. Body mass on Els Columbrets and the dry Balearics is similar to that reported from the Tyrrhenian islands (10.8, n = 1,172; Spina et al., 1993), while the average from Catalonia is very similar to that obtained at Gibraltar (11.5, n = 28; Finlayson, 1981) and further north in Switzerland (11.9, n = 42; Cramp, 1992). Birds from N Morocco have a similar average to N Tunisia (mean 12.3, n = 67; Waldenström et al., 2004), but those from S Morocco are slightly heavier than those reported at the nearby sites of Defilia (11.6, n = 60; Ash, 1969) and Merzouga (11.6, n = 101; Gargallo et al., unpubl.).

As birds trapped in N Morocco are at most only slightly heavier than in the south, mass gain in the area seems to be globally rather limited. In Catalonia birds are only in slightly poorer body condition than in N Morocco and show similar mass to those from S Iberia and C Europe, suggesting that once in continental Europe the species migrates in short bouts that do not require long stopovers or significant new gains in mass. Only birds passing through Els Columbrets and the Balearics show markedly poorer body condition, a sign of the efforts undertaken while crossing the sea. In the wet Balearics, however, birds are significantly heavier, have larger fat reserves and longer wings than on the other islands, where apparently a higher proportion of birds in poor body condition are attracted to land. The fact that these birds also have on average shorter wings suggests that smaller size may make them more prone to suffer from unfavourable meteorological circumstances (particularly strong head winds; *cf.* Newton, 2008; Saino et al., 2010) and thus be more inclined to stop at any available site. Birds stopping at wetlands on larger islands may also gain mass faster and include a larger proportion of birds that have been at the site for a few days (either at the site itself or other surrounding areas), which may also contribute to the overall better average body condition in these places.

Stopover

The percentage of retraps is low in all areas except N Morocco, where totals attain *c.* 18% of birds (fig. 5, table 2). Mean stopover lengths are in the range 2-4 days and are not markedly different in any area in particular. Birds staying in the dry Balearics are in poorer condition when first captured than those not trapped again, indicating that a higher proportion of birds in poor condition end up staying at these sites. When considering all the retraps, bird tend to show negative fuel deposition rates (although only significantly so on Els Columbrets) and nearly so in the dry Balearics. If one-day retraps are excluded, rates become positive at all sites except Els Columbrets, although never significantly so. The high number of retraps in N Morocco coincides with its expected role as a relevant stopover area; however, as shown by biometrical data no clear pattern of mass gain is observed.

Table 1. Mean (± SD), range and sample size of main biometric parameters according to area.

	n	Wing	Third primary	Body mass	Fat score
Catalonia	1,729	79.6 ± 1.8 (72.0-87.0)	61.4 ± 1.6 (54.5-66.5)	11.9 ± 1.1 (8.8-16.4)	2.0 ± 1.1 (0-5)
Columbrets	468	79.8 ± 2.3 (72.0-85.0)	60.9 ± 1.7 (54.5-68.0)	10.6 ± 1.1 (7.3-15.3)	0.7 ± 0.8 (0-5)
Balearics (dry)	4,356	78.9 ± 2.0 (72.0-87.0)	60.7 ± 1.8 (54.5-68.0)	11.5 ± 1.2 (6.2-16.5)	1.6 ± 1.1 (0-6)
Balearics (wet)	100	79.7 ± 1.6 (76.0-83.0)	61.5 ± 1.5 (57.0-65.0)	12.2 ± 1.5 (8.0-16.0)	2.4 ± 1.1 (0-5)
Chafarinas	9		60.5 ± 1.5 (58.5-62.5)	11.1 ± 1.1 (10.0-13.5)	1.2 ± 1.0 (0-3)
N Morocco	90	78.2 ± 1.9 (74.0-82.5)	60.4 ± 1.6 (56.0-64.5)	12.2 ± 1.3 (8.5-16.5)	2.0 ± 1.3 (0-5)
S Morocco	88	79.6 ± 1.9 (76.0-84.0)	61.5 ± 1.5 (58.5-64.5)	12.3 ± 1.1 (10.0-15.1)	2.2 ± 1.0 (1-4)

Table 2. Variation in fuel deposition rate (g/day) according to area and type of retraps involved (mean ± 95% CI and sample size are given).

	Catalonia	Columbrets	Balearics (dry)	Balearics (wet)	Chafarinas	N Morocco
All retraps	-0.08 ± 0.10 (97)	-0.29 ± 0.18 (18)	-0.06 ± 0.06 (277)			-0.07 ± 0.33 (16)
Retraps > 1 day	0.05 ± 0.10 (46)	-0.03 ± 0.21 (8)	0.04 ± 0.06 (165)			0.14 ± 0.26 (8)

Figure 1. Map of recoveries of birds captured in the study area during the study period (March to May).

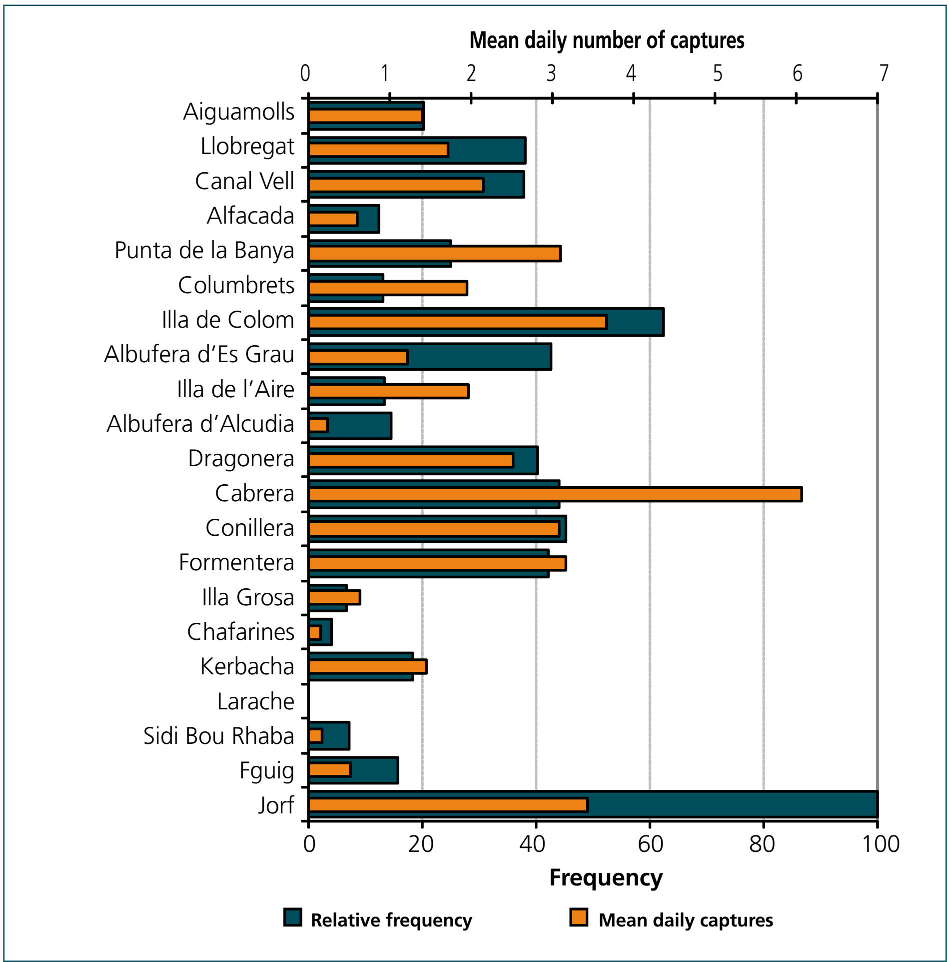


Figure 2. Relative frequency of captures and mean daily numbers according to site during the standard period (16 April to 15 May).

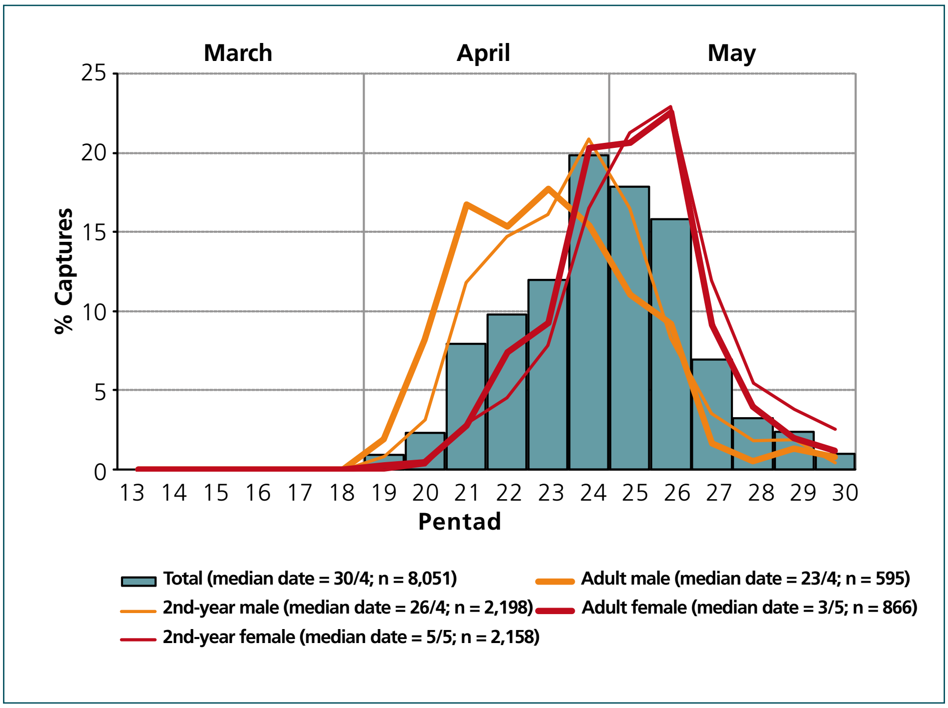


Figure 3. Frequency of captures during the study period.

Figure 4. Variation in body mass and fat score according to site during the standard period (16 April to 15 May).

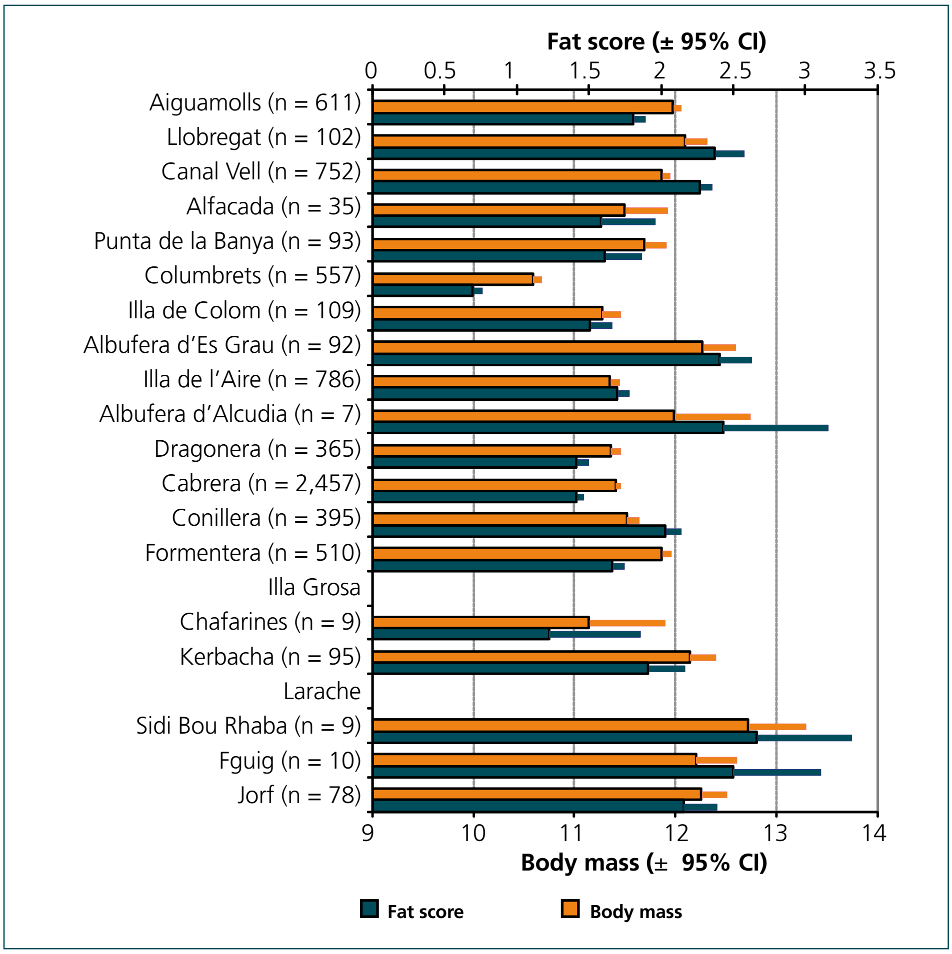
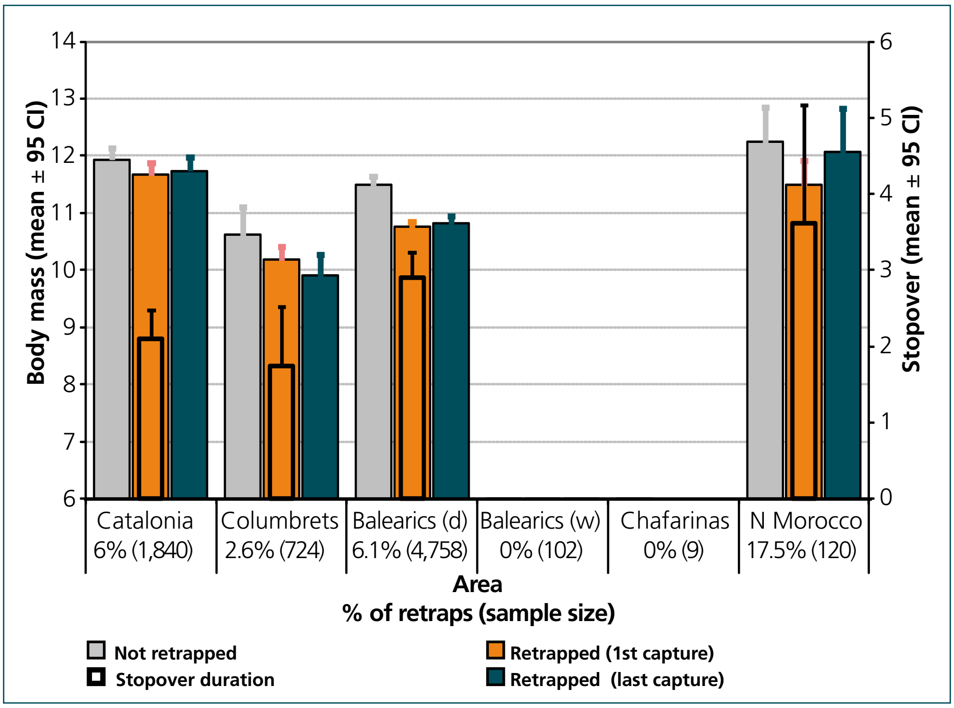


Figure 5. Variation in body mass by trapping status, minimum stopover length and frequency of retraps according to area.



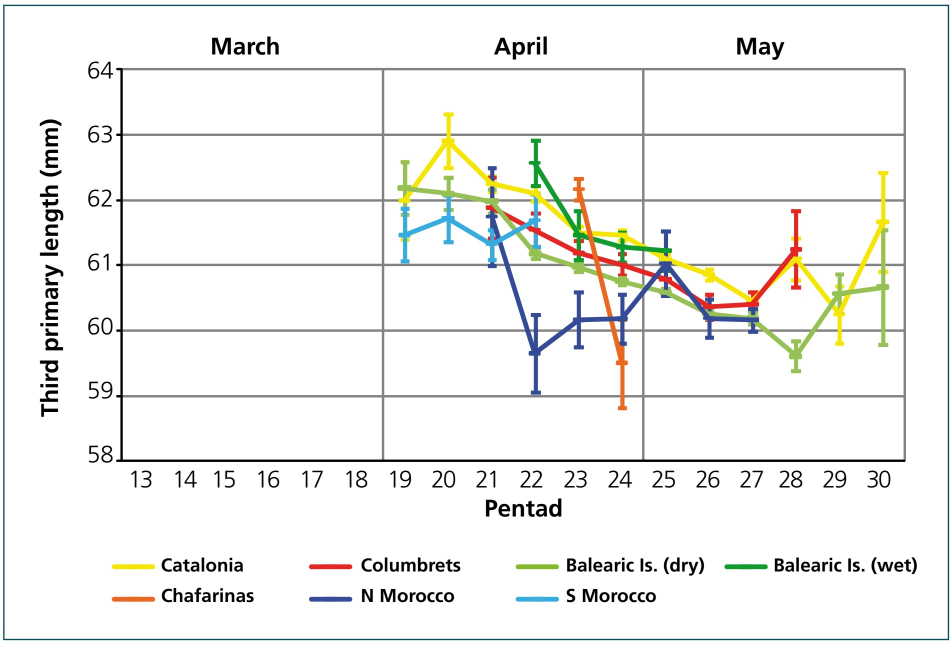


Figure 6. Temporal variation of third primary length according to area.

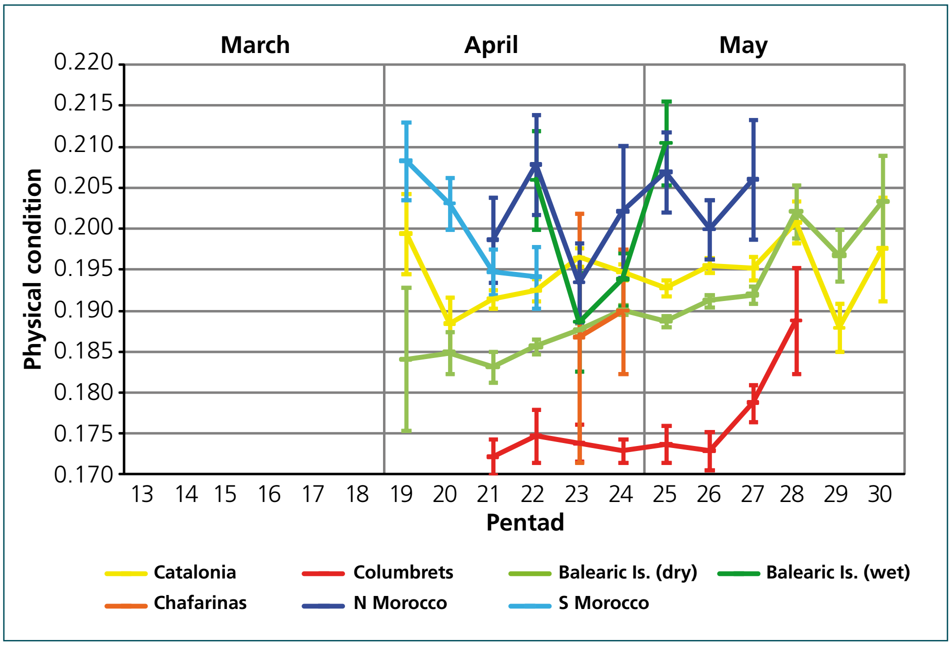


Figure 7. Temporal variation of physical condition according to area.

Figure 8. Temporal variation in body mass according to area.

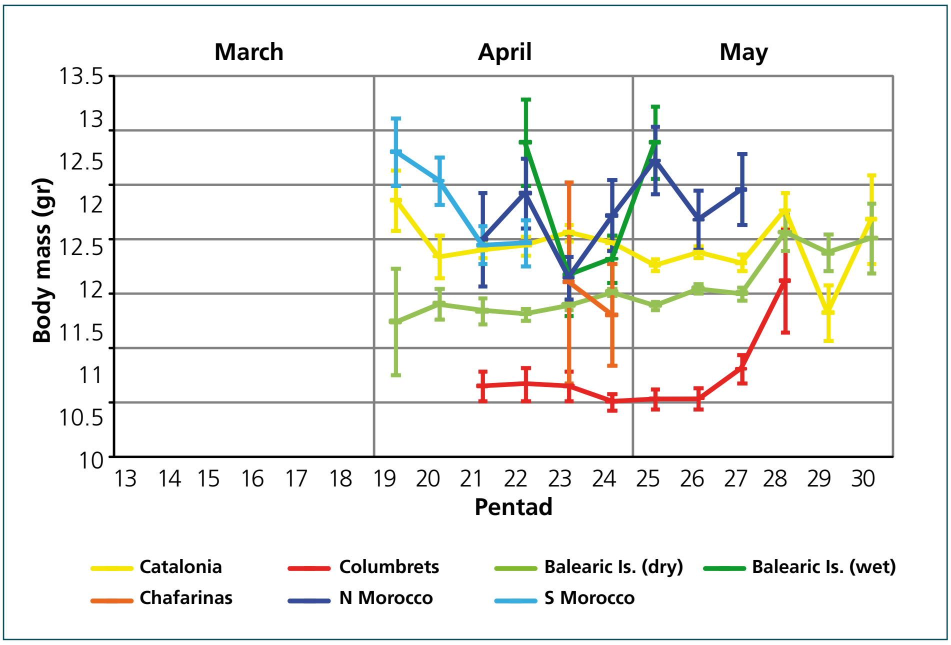


Figure 9. Temporal variation in fat score according to area.