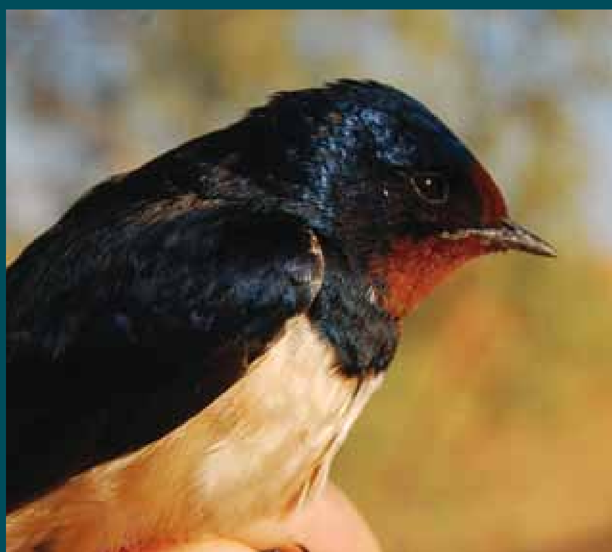
Barn Swallow
Hirundo rustica

Carles Barriocanal & David Robson



Range

The Barn Swallow breeds throughout most of the Palearctic and the winter quarters of C and S European Swallows are presumed to be in W and C Africa (Van den Brink et al., 1998; Moller et al., 2003; Saino et al., 2004; Gordo et al., 2007). Swallows from N and NW Europe appear to migrate further S, with recoveries from South Africa, Botswana and Namibia, while birds from E Europe and the Baltic tend to winter in the eastern part of C and S Africa; some birds winter regularly in S Spain (Cramp, 1988; Telleria et al., 1999). It breeds throughout the study area except on the small islands. However, even where it breeds the vast majority of birds trapped are migrants.

Migratory route

Ringing recoveries show that the main migration route follows a SW-NE axis of movement, although good numbers also move in a more E or N to N-NW direction (fig. 1). The overall pattern reveals the importance of the E coast of the Iberian Peninsula for migratory birds, and some direct recoveries have been made between Gibraltar and NE Spain. The high frequency of N to N-NW movements suggests the birds use a more eastern route in spring than in autumn, as observed in Italy and N Africa (Cramp, 1988; Spina & Volponi, 2008). There is also some passage across the sea (Balearic Islands), and the birds captured on the most western islands tend to move in a more N-NW direction than those from the eastern islands.

Our data supports the view that western populations of Barn Swallow use the western flyway in both autumn and spring (Szep et al., 2006). Gibraltar is apparently the main entry point into Europe for this species (Moreau, 1953; Bernis, 1962). Gordo et al. (2007) have shown that the bulk of birds enter the Iberian Peninsula through its south western corner and then follow the main river basins north-eastwards; just a few birds take a direct route across the sea. The latitudinal increase in body mass throughout sites in mainland Spain (Catalonia; fig. 8) also suggests that most birds arrive after crossing favourable areas. Wetlands have the greatest frequency of captures (fig. 2), probably because they constitute good feeding and roosting areas.

Phenology

Passage occurs from early March onwards, but mostly from April to mid-May (fig. 3). The beginning and the peak of passage in the W Mediterranean seems to occur, however, earlier than suggested by the ringing data presented here. In Spain arrivals begin in February and main passage occurs in March-April in the south and from mid-March to mid-April in the NE (Telleria et al., 1999; ICO, 2010). In Morocco, passage begins from December to mid-January, but mostly March-May (Thévenot et al., 2003). The overall timing in NE Spain rather similar to that reported in the C Mediterranean (Spina et al., 1993; Morgan & Shirihai, 1997). In accordance with published data (Cramp, 1988), males pass some days earlier than females (fig. 3), but in both cases two peaks are observed. This may be related to age groups since second-year birds return later than older birds (Moller & De Lope, 1999). The passage of two distinct populations (see below) might also play a part since recoveries show that birds of northern origin tend to pass later.

This species shows strong phenotypic responses to short-term changes in weather patterns during migration (Robson & Barriocanal, 2008) and arrival dates are strongly correlated to climatic fluctuations and environmental conditions in their passage and wintering areas. Thus, arrival dates vary between years and have been related to variables such as spring temperatures in Europe (Huin & Sparks, 1998; Sparks et al., 2001), precipitation levels in the Sahel (Gordo et al., 2005) and the density of plant growth in winter and passage areas (Moller, 2004; Saino et al., 2004; Gordo & Sanz, 2008).

Biometry and physical condition

Average third primary length ranges between 93.9 in S Morocco to 96.3 in the wet Balearics (table 1). Average wing length ranges from 122.1 to 123.8 in the same sites, within the range of values found in N Africa and N Europe (Cramp, 1988). Third primary lengths tend to decrease with time, particularly in Catalonia and the dry Balearics, which would seen to reflect the differential passage of sexes mentioned above, with larger males (Cramp, 1988) passing earlier.

The mean values for fat scores lie between 0.6 on Els Columbrets and 3.7 in N Morocco; the mean body mass varies from 15.6 to 20.2 at the same sites. Fat, body mass and the condition index increase significantly during the season in most areas except on Els Columbrets, where the opposite is observed (figs. 7-9). Body mass, fat and physical condition are greatest in N Morocco and intermediate in Catalonia and the wet Balearics, and have the lowest averages in the dry Balearics and, above all, on Els Columbrets (figs. 7-9). Body mass in the dry Balearics is similar to that reported from the Tyrrhenian islands (16.7, n = 426; Spina et al., 1993). Figures from S Morocco are remarkably high. Available data on body mass from nearby sites but in different years, however, show much lower values: mean 16.0 at Defilia (n = 2,357; Ash, 1969) and 16.2 in Merzouga (n = 86; Gargallo et al., unpubl.). This important difference probably reflects year- or habitat-specific differences that require further research. Indeed the mean mass for Defilia in 1966 was 19.0 (n = 126), *c.* 25% higher than in the other years for which data is available (1963-1965; Moreau, 1969).

Overall, mean body mass in N Morocco is *c.* 6-20% higher than in the south of the country, indicating that this area plays an important role as a refuelling site for birds that have crossed the Sahara. Body mass in SW Spain (*e.g.* mean at Illa Grossa 18.0, n = 21) and Catalonia are *c.* 10% lower than in N Morocco. The lower figures for the dry Balearics and on Els Columbrets show that the energetic demands on birds crossing over the sea are higher, although data from the wet Balearics indicate that at insular sites with more suitable feeding areas birds are in similar condition to in continental Spain.

Stopover

The lack of recaptures may be indicative of high turnover or methodological drawbacks that reflect the difficulty in recapturing aerial foragers. Barn Swallows are diurnal migrants that forage on the wing and are therefore less tied to a particular stopover site (Turner, 2006). The few retrapped birds tend to lose mass (significantly so in the dry Balearics when considering all retraps) and have lower mass than those not retrapped (again only significantly so in the dry Balearics). Sample sizes are too small, however, to allow for a more conclusive analysis.

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

	n	Wing	Third primary	Body mass	Fat score
Catalonia	5,563	123.6 ± 3.1 (110.0-135.0)	95.8 ± 2.7 (85.0-104.5)	18.5 ± 1.8 (10.4-25.0)	2.4 ± 1.3 (0-6)
Columbrets	333	123.6 ± 3.4 (112.0-134.0)	95.6 ± 2.8 (85.5-104.0)	15.6 ± 1.6 (10.1-21.4)	0.6 ± 0.8 (0-4)
Balearics (dry)	1,557	123.4 ± 3.3 (112.0-133.5)	95.7 ± 2.9 (85.5-104.0)	17.1 ± 1.9 (10.3-24.4)	1.7 ± 1.2 (0-7)
Balearics (wet)	312	123.8 ± 3.4 (112.5-134.0)	96.3 ± 2.8 (89.0-104.0)	18.5 ± 1.8 (13.9-23.4)	2.3 ± 1.0 (0-6)
Chafarinas	9		95.1 ± 1.6 (92.5-97.0)	17.2 ± 1.7 (13.9-19.2)	1.4 ± 1.4 (0-4)
N Morocco	108	122.7 ± 3.2 (113.0-130.0)	95.1 ± 2.5 (89.0-102.0)	20.2 ± 2.3 (15.5-24.7)	3.7 ± 1.6 (0-6)
S Morocco	203	122.1 ± 3.5 (113.0-130.0)	93.9 ± 2.6 (88.0-100.0)	19.0 ± 1.9 (13.5-23.5)	2.5 ± 1.0 (1-5)

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	-0.71 ± 0.90 (14)	-1.15 ± 0.31 (5)	-0.42 ± 0.26 (19)			
Retraps >1 day	-0.08 ± 0.46 (8)		-0.33 ± 0.42 (6)			

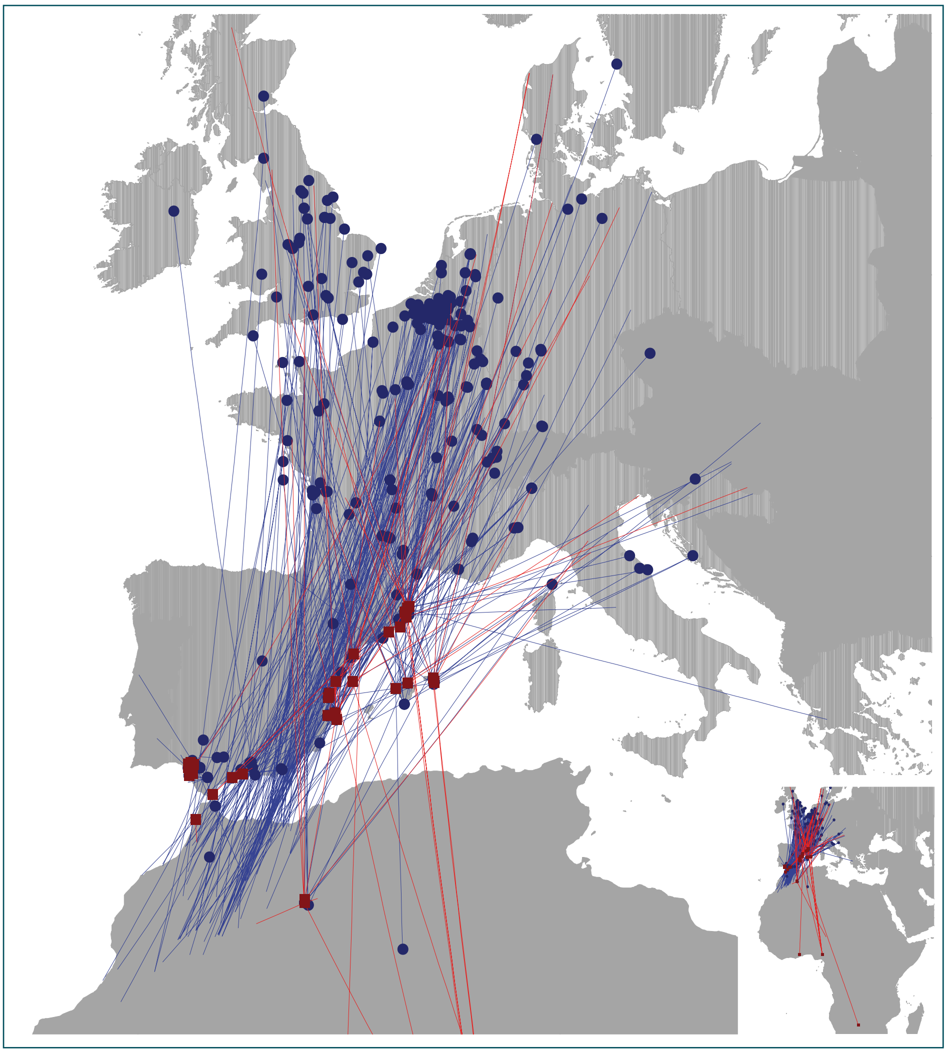


Figure 1. Map of recoveries of birds captured in the study area during the study period (March to May).

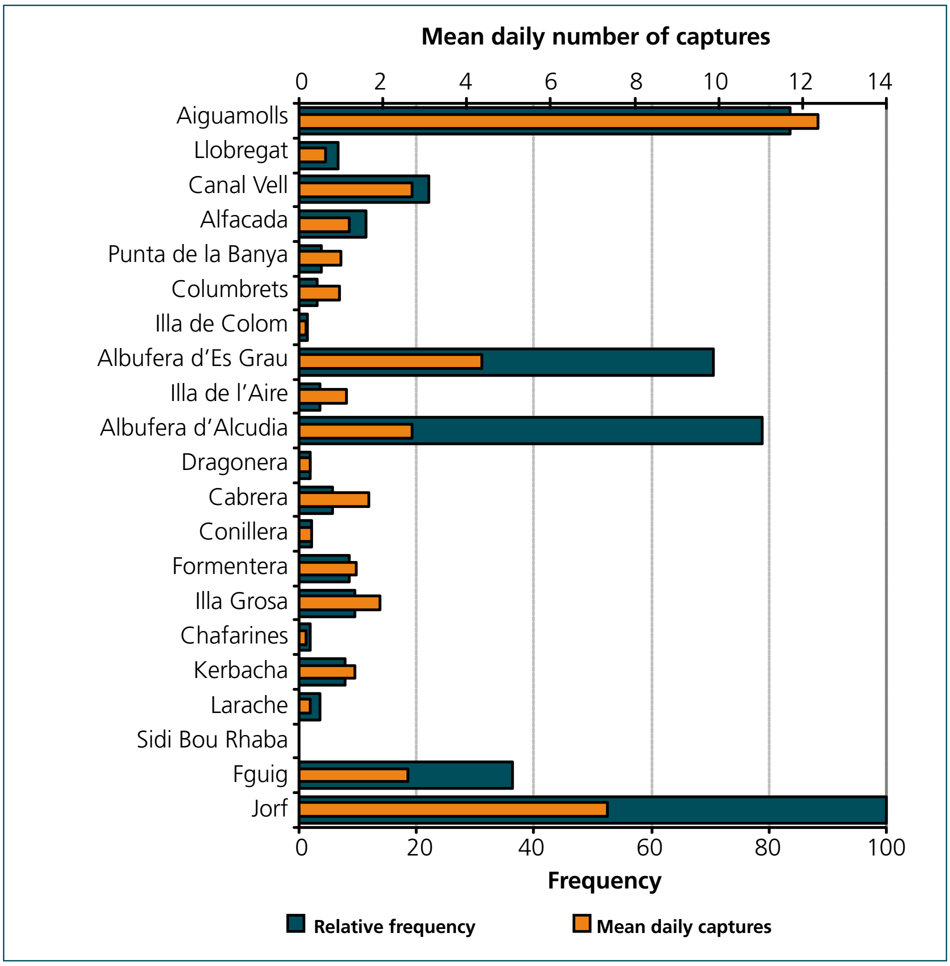


Figure 2. Relative frequency of captures and mean daily numbers according to site during the standard period (16 April to 15 May).

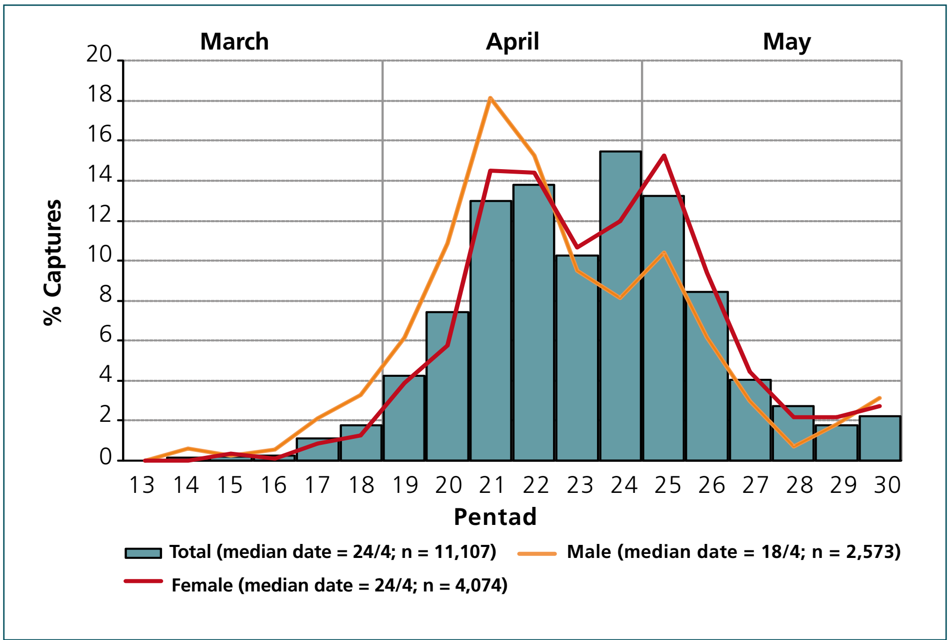


Figure 3. Frequency of captures during the study period.

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

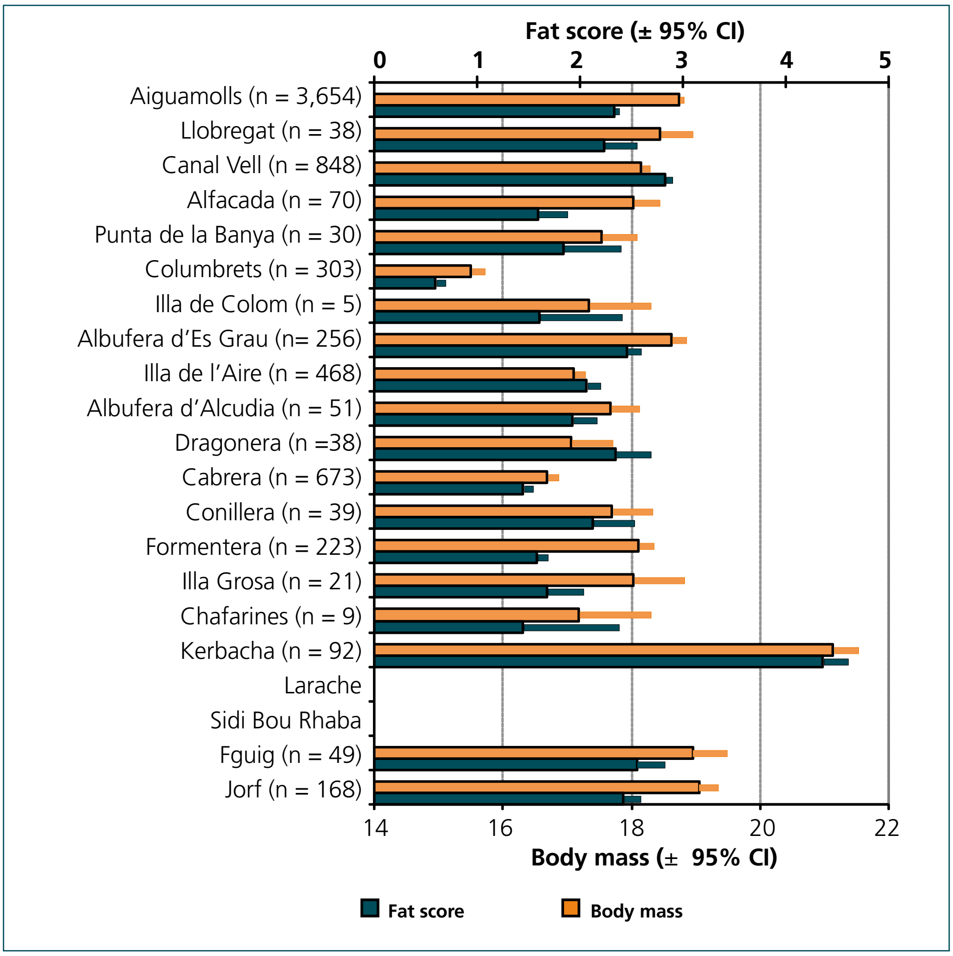
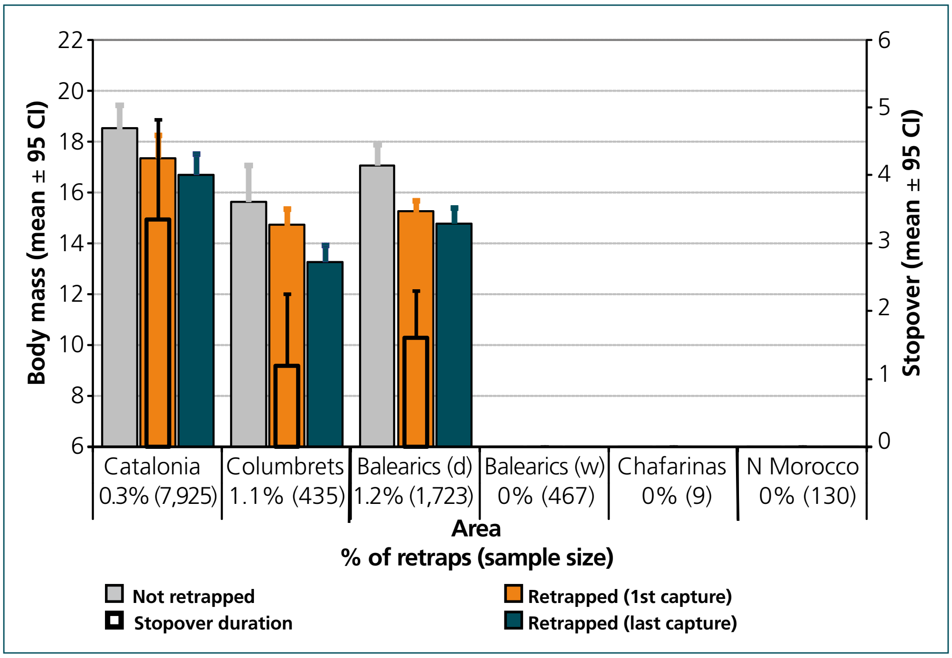


Figure 5. Variation in body mass by trapping status, minimum stopover length and frequency of retraps according to area.



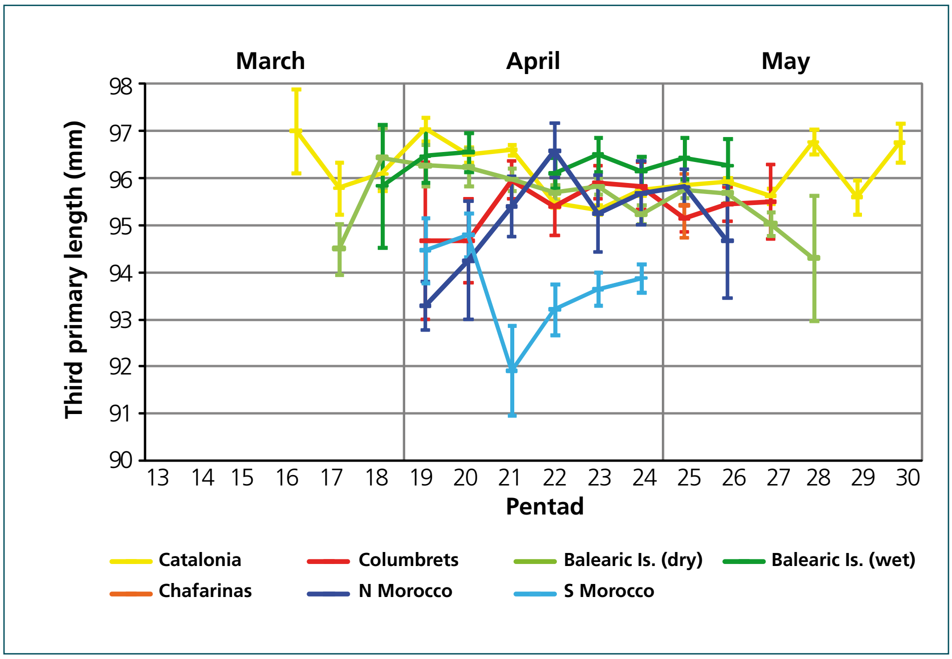


Figure 6. Temporal variation of third primary length according to area.

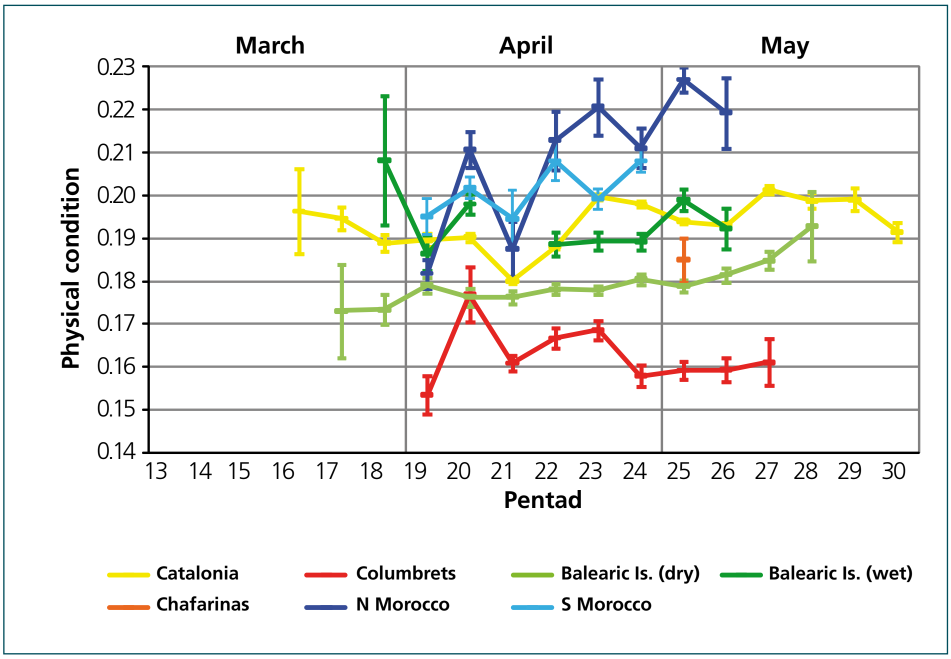


Figure 7. Temporal variation of physical condition according to area.

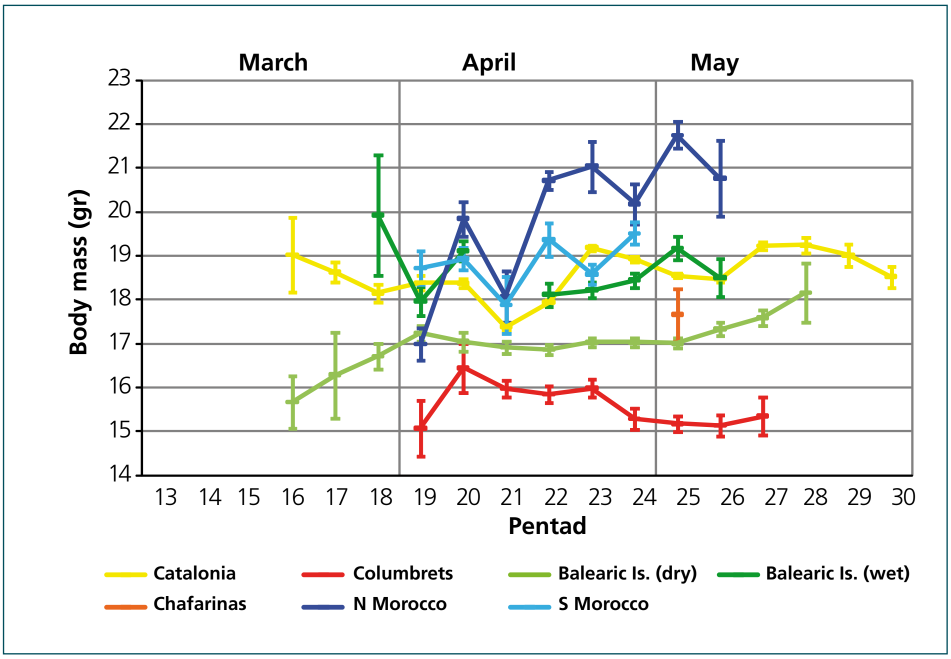


Figure 8. Temporal variation in body mass according to area.

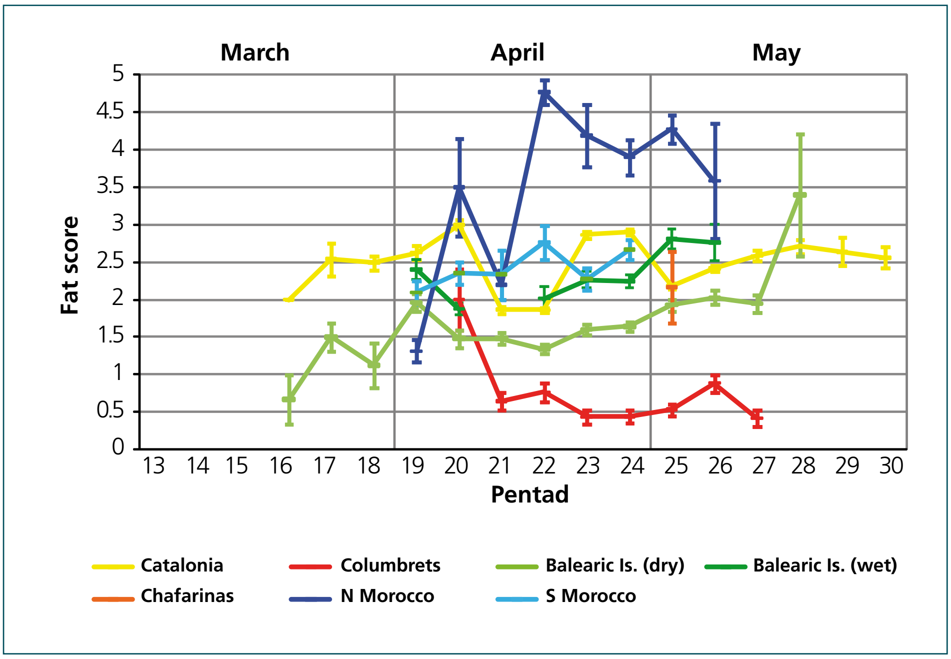


Figure 9. Temporal variation in fat score according to area.