Introduction: Theoretical framework

The introduction of captive-breeding programs in maintaining or producing viable self-sustaining wild populations depends on a variety of parameters dealing with the biology of the species, the availability of habitat, the control of usually anthropogenic threats and socio-political factors (12). Captive-breeding and release programs applied to migratory species pose additional problems, for instance the possible inability of captive-breeding birds to migrate, the potentially low survival on migration and simply the difficulty in monitoring released individuals that can move across countries and continents (3, 4, 5). Migratory behaviour, encompassing aspects such as the timing of migration, migratory routes and distances, is thought to be predominantly under genetic control in many species and particularly in passerine birds (6, 7, 8) with some authors even referring to this genetic determinism as an endogenous autopilot (8, 9). In other species however, the extent of genetic control is much less clear and migratory behaviour is at least in part culturally determined (10, 11). Not only must the captive breeding and release (CBR) programme produce birds that are able to survive in the wild but these must also migrate along the known flyways in order to preserve the population substructure (12). Here we report on the release of West-Kazakhstan of seven captive-breeding birds of West-Kazakhstan descent, our main aims being the assessment of their migratory movements and survival, and a comparison with those of wild juveniles tracked from the same area.

Main results

Out of 17 individuals equipped, one CBR and two wild birds died on the breeding grounds. All the others left West-Kazakhstan between late September and early November (see Table): they either travelled in a south or south-south-easterly (SSE) direction and down the coast of the Caspian Sea, or flew towards the SE and travelled more inland (Figure 1). Upon reaching latitudes corresponding to the southern part of the Caspian Sea and having crossed the Elburz Mountains of Northern Iran, birds rapidly changed their movements to a SW or WSW direction. Two birds stopped and wintered in Central Iran but the majority crossed the Zagros Mountains (at altitudes reaching above 1500 and even 2000m) and wandered around the Iran-Iraq border or further SW into Iraq and even Saudi Arabia.

Distances travelled during the autumn migration averaged 2008 ± 210 km (mean ± SE) for wild birds and 1959 ± 210 km for CBR birds. The difference was largely due to one CBR juvenile spending the winter in Turkmenistan. Birds caught in the same brood or CBR individuals released at the same site did not travel together. Two CBR birds survived the winter and left the wintering grounds on 26 and 27 March, returning within 30km of their release site around 12 April and 30 March respectively. Only one survived his second Autumn migration and spent the winter in Iraq, breeding the following Spring in Turkmenistan in 2009.

Material and methods

Seven juvenile captive-breeding Houbara, descendants of eggs collected in 2005-6 in the Mangyshlak region of West-Kazakhstan on the coast of the Caspian Sea (Combreau et al., 2005), were released on the breeding grounds in West-Kazakhstan in September 2009 following 4 to 5 months of rearing in captivity. All seven were equipped with 30g solar-powered GPS transmitters (Microwave Telemetry) fitted to the birds in backpack configuration. In spring 2010, we caught 10 wild juvenile Houbara in the same area of West-Kazakhstan and also equipped them with the same type of transmitter. This was done by capturing the birds by hand at ca. 30-40 days of age when they still have limited flight capabilities. Siblings were released together at the site of capture and in relative proximity to their mother who generally remains in the vicinity during the process.

Conclusion

This study clearly demonstrates that Houbara born and bred in captivity and subsequently released to the wild can migrate and that they do so along the known migratory route. CBR birds left the release area in Autumn and migrated south towards Western Iran and Iraq, as did wild juveniles in this study and as is known from wild adults captured in West-Kazakhstan (13, 14). None of these birds migrated to Eastern Iran and Pakistan, the known wintering areas of birds travelling down the Eastern flyway from Eastern Kazakhstan and China (14).

Five of seven CBR birds completed their migration and two survived the winter. This is comparable to seven of ten wild birds reaching Iran or Iraq and three of these ten surviving until the end of February. The timing and ability to migrate, migration routes (Fig. 1) and survival were thus similar for wild and CBR birds from this region. Survival was low however with at least five birds known to have been killed by man.

CBR birds released together or wild juveniles from the same brood did not migrate or winter together. Unlike geese or cranes (15, 16), young Houbara part ways with their mother a few months after hatching and thus do not rely on parental guidance for their first migration. Although it is known that houbara form groups in Autumn and Winter, and that other bustards migrate in groups (17), the relative influence of genetically inherited information versus social interactions on migratory pathways can only be really assessed by resorting to displacement experiments (18).

Released birds that survived the winter returned to West-Kazakhstan the following Spring (Fig. 1). Houbara are sexually mature at one year of age (19) but it is difficult to know with certainty whether or not these birds bred there because both were males: they did not settle on fixed display sites (20) but young males in leksing species may be more mobile on the breeding grounds and manage to breed nevertheless (21). In any case, we can conclude here that the release of captive-breeding birds was successful in terms of migratory ability, return to the breeding grounds and survival, despite many birds having succumbed to anthropogenic deaths.

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References:
