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Summary: Red fox reproduction in north-eastern Spain was studied by analysing the reproductive tracts of 84 females. Mean litter size was estimated to be 3.32 cubs per female, most of the births occurring from mid-March to mid-April.

KEYWORDS: Reproduction – Spain – *Vulpes vulpes*.

INTRODUCTION

The ecology and pathology of the red fox (*Vulpes vulpes* Linnaeus, 1758) in the Mid Ebro Valley has been studied since 1988. This preliminary report is the first publication on reproduction of the species in Spain.

MATERIALS AND METHODS

Red foxes were collected from hunters between January 1989 and March 1991 over a 15,000 km² area in the Aragon region of north-eastern Spain.

To determine reproductive success in red foxes, 84 females were examined by means of placental scar counts, ovary histology and weight. Only dark placental scars were considered in the estimation of litter size at birth; pale scars may be caused by post-implantation losses or may be from the previous reproductive season.

Only first-year vixens were considered in the estimation of post-implantation losses in this study. If the number of placental scars was found to be higher than the number of corpora lutea in the same female, this was attributed to polyovulation. If there were less placental scars than corpora lutea, this was considered as pre-implantation loss. The age of adult vixens was estimated by counting annular structures in the tooth cementum.

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RESULTS AND DISCUSSION

Maximum ovary weight occurs in February (Fig. 1).

Estimated whelping dates are shown in Figure 2. The first birth was recorded on 28 February and the latest on 1 May.

Most births occur between 15 March and 10 April, and mean mating time is therefore estimated to be between 20 January and 15 February.

Whelping dates were estimated using one of the following methods:

a) Hind foot length of cubs (n = 15 litters) captured or found dead from March to June

b) Weight of cubs (n = 10 litters) captured over the same period

c) Weight of embryos (n = 8 litters).

These estimates were obtained using the table given by Sargeant and colleagues (2) for a) and using tables shown by Lloyd (1) for b) and c).

**FIG. 1**

Mean monthly ovary pair weight of eighty female red foxes examined in north-eastern Spain
Litter size at birth is estimated to be 3.32 \( \pm \) 1.14 cubs per female; differences in litter size between age classes were not significant at the 5\% level (chi-square test). Barren vixens represent 21\% of first-year females and 16.7\% of older females.

The rate of polyovulation over the entire sample is 8.73\%.

In first-year vixens, pre-implantation losses are 27.7\% of the ova (1.17 ova lost per female) and post-implantation losses about 31\% of the embryos (1.29 embryos per female).

Average reproductivity is therefore 2.43 cubs per female per year for the entire population.

Fox carcasses will continue to be collected for at least one year, with the aim of constituting a more representative sample for future studies.

ACKNOWLEDGEMENTS

The present research was financed by the Wildlife Conservation Service of the Regional Authority (\textit{Diputación General}) in Aragon (Plan 533-1 de Protección y Conservación de la Fauna Silvestre, Proyecto R-167/89). The Administrative Director of the Programme is J. Giral Pelegrin.

Résumé : Les auteurs ont étudié la reproduction du renard roux dans le nord-est de l’Espagne en examinant le tractus génital de 84 femelles. Le nombre moyen de renardeaux par portée a été estimé à 3,32 par femelle. La majorité des naissances ont lieu entre la mi-mars et la mi-avril.


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Resumen: La reproducción del zorro rojo en el noreste de España fue estudiada mediante examen del aparato reproductor de 84 hembras. La camada media se estima a 3,32 zorrillos por hembra. La mayoría de los partos ocurren entre el 15 de marzo y el 15 de abril.


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REFERENCES
