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TIMING AND SYNCHRONY OF BIRTHS IN THE WILD BOAR (*Sus scrofa* LINNAEUS, 1758) IN A MEDITERRANEAN HABITAT: THE EFFECT OF FOOD AVAILABILITY

DANIEL MAILLARD[1] AND PASCAL FOURNIER[2]

1. Office National de la Chasse et de la Faune Sauvage, Direction des Etudes et de la Recherche, 95, rue Pierre Flourens, 34098 Montpellier cedex 05, France. (d.maillard@oncfs.gouv.fr)
2. 1, la Peyrère, Route de Préchac, 33730 Villandraut, France.

ABSTRACT

Birth chronology and food availability in wild boar populations from Montpellier garrigue area in southern France were studied between 1989 and 1994. We found a relationship between the holly oak mast crop and the peak of births. When acorn mast was abundant, births were early and synchronized, with the peak occurring in February or March. Conversely, when food production was low, the birth peak was less intense and occurred later (April-May-June) and there were few births in autumn. There was no bimodal distribution of births in the wild boar populations.

Key words: acorns, food availability, France, reproduction, *Sus scrofa*.

INTRODUCTION

Reproduction is an important factor to consider in wild boar management because it directly affects the dynamics of the population. Many authors have reported births ranging from February to September, with a marked peak in spring (Aumaître et al. 1982, Mauget et al. 1984). A bimodal distribution of births has been noted, however, in some exceptional years in the Chizé forest (Mauget 1972, Teillaud 1986) and in the Cévennes National Park (Jauvert 1985). If in the former, this variation might be attributed to the influence of food on the growth of young sows; in the latter, this variation might be linked to some level of hybridization with domestic pigs released by local hunters.

Numerous studies have shown the influence of mast crops on the date of births. The greater the production of acorns, the earlier births occur (Henry 1966, Mauget 1980, Aumaître et al. 1982, Aumaître et al. 1984, Pépin et al. 1987). The peak occurs within a 2-months period, and the timing can vary according to the year (in March in years with a good mast crop and in May otherwise). That pattern can be explained by

the shortening of anoestrus caused by an exceptional abundance of food in September and October (Mauget and Pépin 1985).

Boar hunting is practised in southern France from September to December, at which time the hunters regularly observe piglets. That has lead to two common beliefs: i) in southern France births are distributed throughout the year, and ii) there are two birth peaks, one in spring and one in autumn. In this paper we tested: i) whether the timing and synchrony of births changed during the 6-year study period, and ii) whether mast availability affected the timing and synchrony of reproduction.

MATERIALS AND METHODS

Study area

The study area was situated in the Montpellier garrigue area in southern France. The vegetation in the study site is typical of the upper mesomediterranean stratum (*Phillirea latifolia* L., *Pistacia lentiscus* L., *Pistacia terebinthus* L., *Buxus sempervirens* L., *Juniperus oxycedrus* L., *Quercus coccifera* L.). The main woodland community in the garrigue is holly oak (*Quercus ilex* L.), associated with pubescent oak (*Quercus pubescens* Willd.) and conifer-mixed hardwood, with some Aleppo pines (*Pinus halepensis* Mill.). The remainder of the vegetation cover consists of riparian hardwood, fallow land, and vineyards.

Hunting

Wild boar hunting is mostly a group sport that involves pursuit with packs of large hounds. An average of twenty hunters participated in drive hunts on Wednesdays, Saturdays, Sundays, and public holidays, from September to December.

The beaters cover some 200 to 400 ha of ground per outing. The hunters are posted at strategic points, such as ridges at cross-roads. There is no selective hunting according to age, sex, or body mass of animals, except that piglets are protected.

The mast year

The production of acorns was monitored from 1988/89 to 1993/94, in holly oak plots representative of most of the woodland in the study area (7,600 trees per ha) and, from 1990/91 to 1993/94, in three new plots with different densities of trees per ha (4,147; 3,037; 766). In each plot, 26 seed traps (75 cm diameter), separated by 25 m, were positioned in a systematic way to obtain a representative sample of mast production. We removed the acorns from the traps every week during the mast crop period, i.e. from September to August, with the maximum production occurring between October and March (Maillard 1996), and calculated the production per ha.

Data collection

The body mass of the wild boars killed was recorded and the eyes collected (n = 175). To estimate the age of boars and their month of birth, both lenses (right and left) were oven-dried (48 h at 80°C) and weighed. To this purpose, Spitz's calibration curve (Spitz 1984) was used, after being tested on known-age animals (i.e., animals we had first captured in traps as piglets). The accuracy of those estimates decreased with age, so accuracy was low after the second hunting season. Therefore, the analysis only considered wild boars less than two years old (n = 154). The annual sample (animals < 2 years) represented from 74% to 93% of the annual hunting bags (Maillard 1996).

Statistical analyses

To test the effect of mast production on early versus late births, we used a Chi-square test. The median birth month was calculated by grouping data from six years, from November to October, with anoestrus being in August (Mauget 1980). Then, for each year, we calculated the number of wild boar born before and after April.

We used logistic regression to determine whether the quality of mast years could have an influence on the precocity of births.

To test the relationship between mast abundance and the distribution of birth dates, we used linear regression. Dates of birth were restricted to the period during which 50% of the wild boar were born each year. Limit quartiles of 25 and 50% were set.

RESULTS

The production of acorns varied annually and with tree density (Figure 1). The median birth month for all years combined (1989 to 1994) was April (Figure 2), but the median date and the distribution of births varied according to year (Figure 3). The Chi-square test of the precocity of births (Table 1) showed a significant effect of year, which was essentially due to year 1989 (too late), and 1993 and 1994 (too early) ($\chi^2 = 27.07$; df = 5; $P < 0.0001$). During those years, most births occurred before April. The logistic regression showed that the greater the production of acorns, the earlier the births (Figure 4). For production of less than 300 kg acorns/ha, the proportion of wild boar born before April was between 25 and 55%. When production was greater, the proportion of wild boar born before April was over 80%. The linear regression showed that the synchrony of births increased with higher acorn production (Figure 5, $R^2 = 0.664$; F [df = 1.4] = 7.887; P = 0.048).

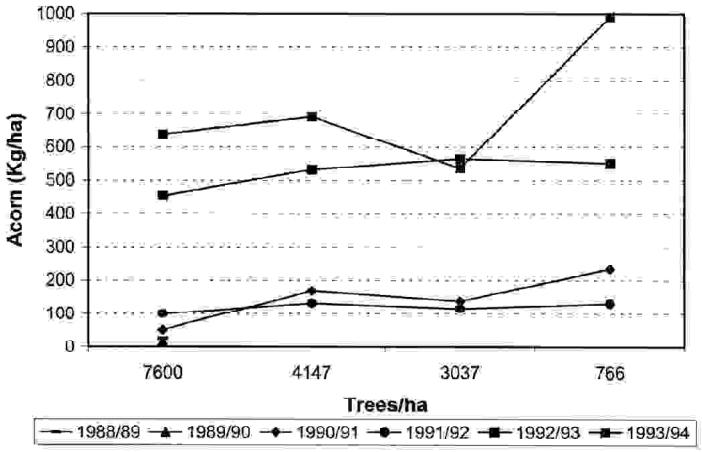

Figure 1. Annual production of acorns (kg/ha) in the study area from 1988-89 to 1993-94 (from September to March; Maillard 1996) in the plots of different tree density (trees/ha).

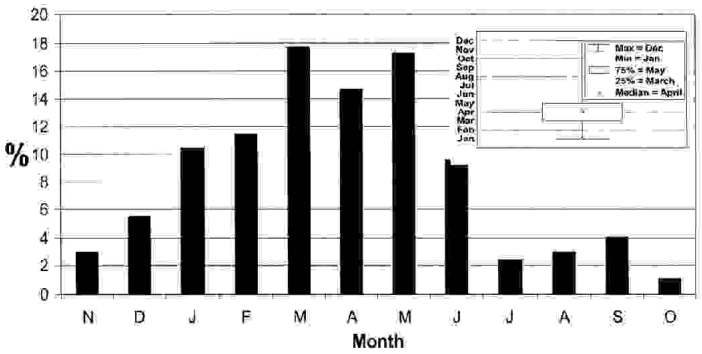

Figure 2. The frequency of months of birth for all years combined (1989 to 1994). The median is April.

Figure 3. Median date of wild boar births in poor mast years (mast season 1988-89 to 1991-92) and good years (1992-93 to 1993-94).

TABLE 1
Number of wild boars born before and after April (the median birth date, all years combined). Gray cells indicate the main source of significance of the Chi-square test ($\chi^2 = 27.07$; df = 5; P < 0.0001).

	1989	1990	1991	1992	1993	1994
Before	10	13	19	9	26	22
After	20	9	10	9	4	3

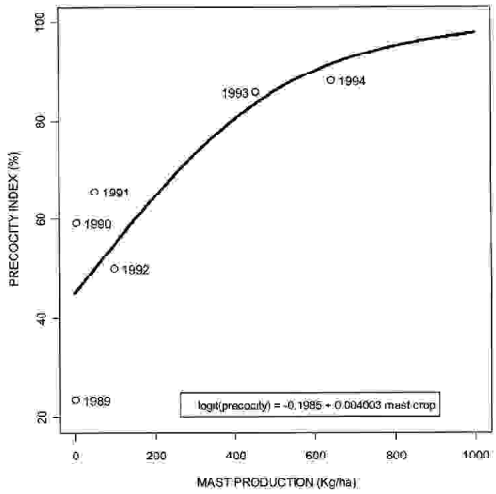

Figure 4. Regression logistic between birth precocity (% of births before the median month of birth for all years combined: 1989 to 1994) and mast production ($\chi^2 = 37.429$; df = 5; .0001).

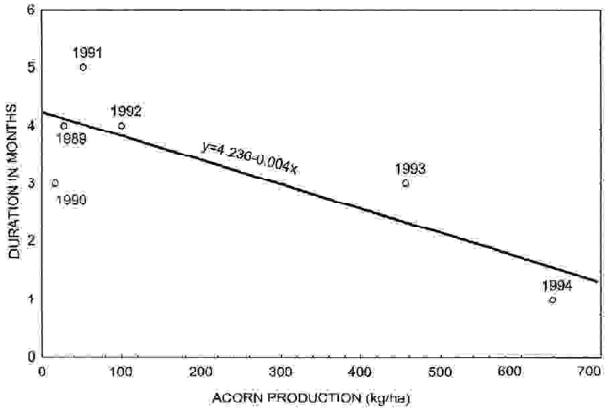

Figure 5. Duration of births (number of months during which 50% of the wild boar were born) in relation to mast crop (linear fitting: $R^2 = 0.664$; P = 0.048).

DISCUSSION

Our results on date of births are similar to those of other studies conducted in northern France (Chambord, Dhuits, Arc en Barrois and Chizé, Mauget et al. 1984), in Tuscany (Boitani et al. 1995), in the Italian Piémont (Durio et al. 1995), and in central Spain (Sáez-Royuela and Tellería 1987). Only data obtained in 1989 (a year with no acorn production) are identical to those of studies conducted in southern France (Dardaillon 1985 in the Camargue and Pépin et al. 1987 in the Grésigne). Those studies found a later birth peak (from April to July), which was attributed to the scarcity of food resources.

Acorns are often the main food item of wild boars (Genard and Lescouret 1985, Palata et al. 1987, Vassant 1994, Fournier-Chambrillon et al. 1995, Fournier-Chambrillon et al. 1996). Numerous studies have noted their effect on growth and reproduction of animals (Bouldoire and Vassant 1989, Fruzinski and Naparty 1992, Abaigar 1993). Mauget and Pépin (1985) reported that altering the consumption of acorns in animals raised in captivity can influence the start of the oestrus period and the number of embryos in future litters. Matschke (1964) noted that the number of females participating in reproduction increases during good mast years. Aumaître et al. (1984) emphasized that, in exceptionally good years, the date of the birth peak can be two months earlier than usual, with the increase in weight of the individuals with abundance of food the determining factor (Aumaître et al. 1982, Aumaître et al. 1984, Massei et al. 1996).

Our results confirm that the abundance of mast has a marked effect on the mean date of birth and birth synchrony. In good mast years, births are earlier and more synchronized than in poor mast years. Boitani et al. (1995) studied wild boars in an environment similar to ours, and observed similar variations. They were unable to establish a direct relationship with this variable, however, because they lacked reliable quantitative data on food resources.

We conclude that, in our region, births are well synchronized in a single peak, generally between March and June, and the exact date depends on the abundance of mast in the year before the birth period. The presence of piglets in the hunting season might be explained by the odd birth in summer or autumn. In fact, those piglets represent only a very small proportion of the population, and often arise from young sows, which had not reached the necessary weight at the time of the rutting season.

REFERENCES

ABÁIGAR, T. (1993). Regimen alimentario del jabali (*Sus scrofa* L., 1758) en el sureste iberico. *Doñana, Acta Vertebrata*, 20: 35-48.

AUMAÎTRE, A., C. MORVAN, J. P. QUÉRÉ, J. PEINIAU AND G. VALET (1982). Productivité potentielle et reproduction hivernale chez la laie (*Sus scrofa scrofa*) en milieu sauvage. *Journées de Recherche Porcine en France*, 14: 109-124.

AUMAÎTRE, A., J. P. QUÉRÉ AND J. PEINIAU (1984). Influence du milieu sur la reproduction hivernale et la prolificité de la laie. Pp. 69-78 In: F. Spitz and D. Pépin (eds.). *Symposium International sur le Sanglier. Les Colloques de l'INRA 22*.

BOITANI, L., P. TRAPANEZE, L. MATTEI AND D. NONIS (1995). Demography of a wild boar (*Sus scrofa* L.) population in Tuscany, Italy. *Gibier Faune Sauvage, Game and Wildlife Science*, 12: 109-132.

BOULDOIRE, J. L. AND J. VASSANT (1989). *Le Sanglier*. Collection Faune Sauvage, Hatier, Paris, France. 228 pp.

DARDAILLON, M. (1985). Cycle annuel de l'organisation sociale chez le sanglier (*Sus scrofa*) en Camargue. Pp. 29-38. In: R. Campan and F. Spitz (eds.). *Colloque de la Société française pour l'étude du comportement animal, Toulouse, France. Les Colloques de l'INRA 38*.

DURIO, P., U. GALLO-ORSI, E. MACCHI AND A. PERRONE (1995). Structure and monthly birth distribution of a wild boar population living in mountainous environment. *IBEX Journal of Mountain Ecology*, 3: 202-203.

FOURNIER-CHAMBRILLON, C., D. MAILLARD AND P. FOURNIER (1995). Diet of the wild boar (*Sus scrofa*) inhabiting the Montpellier garrigue. *IBEX Journal of Mountain Ecology*, 3: 174-179.

FOURNIER-CHAMBRILLON, C., D. MAILLARD AND P. FOURNIER (1996). Variabilité du régime alimentaire du sanglier (*Sus scrofa* L.) dans les garrigues de Montpellier. *Gibier Faune Sauvage, Game Wildlife Science*, 13: 1457-1476.

FRUZINSKI, B. AND K. NAPARTY (1992). Chronologie des Frischens bei Wildschweinen. *Zeitschrift Jagdwissenschaft*, 38: 262-264.

GENARD, M. AND F. LESCOURRET (1985). Le sanglier (*Sus scrofa scrofa* L.) et les diaspores dans le Sud de la France. *Rev. Ecol. (Terre Vie)*, 40: 343-353.

HENRY, V. G. (1966). European wild hog hunting season recommendations based on reproductive data. Pp. 139-145. In: *Proceedings 20Th Annual Conference Southeastern Association Game and Fish Commissioners.*

JAUVERT, F. (1985). *Vers une meilleure connaissance du sanglier en Cévennes.* Rapport de stage, Parc National des Cévennes, France. 49 pp.

MAILLARD, D. (1996). *Occupation et utilisation de la garrigue et du vignoble méditerranéens par le sanglier (*Sus scrofa*)*. Doctoral thesis, Université d'Aix-Marseille, France. 235pp.

MASSEI, G., P. GENOV AND B.W. STAINES (1996). Diet, food availability and reproduction of wild boar in a Mediterranean coastal area. *Acta Theriol*., 41: 307-320.

MATSCHKE, G. H. (1964). The influence of oak mast on European wild hog reproduction. Pp. 35-39. In: *Proceedings 18Th Annual Conference Southeastern Association Game and Fish Commissioners.*

MAUGET, R. AND D. PÉPIN (1985). La puberté chez le sanglier: étude préliminaire du rôle de l'alimentation. Pp. 191-197. In: *Proceedings XVIIth. Congress of the International Union of Game Biologists, Brussels.*

MAUGET, R. (1972). Observations sur la reproduction du sanglier (*Sus scrofa* L.) à l'état sauvage. *Annales de Biologie Animale, Biochimie, Biophysique,* 12: 195-202.

MAUGET, R. (1980). *Régulations écologiques, comportementales et physiologiques (fonction de reproduction), de l'adaptation du sanglier,* Sus scrofa *L., au milieu.* Doctoral thesis, Université de Tours, France. 299 pp.

MAUGET, R., R. CAMPAN, F. SPITZ, M. DARDAILLON, G. JANEAU AND D. PÉPIN (1984). Synthèse des connaissances actuelles sur la biologie du sanglier, perspectives de recherche. Pp. 15-50. In: F. Spitz and D. Pépin (eds.). *Symposium International sur le Sanglier. Les Colloques de l'INRA 22.*

PALATA, K., S. FETTER, R. M. LIBOIS, R. SCHUMACKER AND J. C. RUWET (1987). Etude du régime alimentaire du sanglier (*Sus scrofa* L.) dans les Ardennes Belges. *Cahiers d'Ethologie Appliquée*, 7: 223-246.

PÉPIN, D., F. SPITZ, G. JANEAU AND G. VALET (1987). Dynamics of reproduction and development of weight in the wild boar (*Sus scrofa*) in South-West France. *Zeitschrift für Säugetierkunde,* 52: 21-30.

SÁEZ-ROYUELA, C. AND J. L. TELLERÍA (1987). Reproductive trends of the wild boar (*Sus scrofa*) in Spain. *Folia Zoologica*, 36: 21-25.

SPITZ, F. (1984). Démographie du sanglier en Grésigne (Sud-Ouest de la France). Pp. 151-157. In: F. Spitz and D. Pépin (eds.). *Symposium International sur le Sanglier. Les Colloques de l'INRA 22.*

TEILLAUD, P. (1986). La vie sociale chez le sanglier: co-émergence collectivité-individualité. *Cahiers d'Ethologie Appliquée*, 6: 157-184.

VASSANT, J. (1994). Les techniques de prévention des dégâts de sangliers. *Bulletin Mensuel de l'Office National de la Chasse, Spécial Colloque «Gestion du Sanglier»*, 191: 90-93.