
Keywords: 8CH/age-class/age determination/demography/hunting/hunting (by humans)/hunting bag/hunting statistics/population dynamics/Sus scrofa/wild boar

Abstract: Wild boars killed during the hunting seasons 1988-1992 were aged from tooth-eruption and tooth-wear. A monthly birth distribution and an age and sex pyramid were built. Births take place throughout the year, though about 83% are concentrated between February and August. The remaining 17% occurs between September and January. The pyramid of the age classes of the population typically agrees with that of a hunted population, so that the first two age classes (0-1 and 1-2 years) depict 82% of the population. On the grounds of these results and according to other studies, a few conclusions are inferred regarding the demographic increase of hunted populations.
BIRTH DISTRIBUTION, STRUCTURE AND DYNAMICS OF A HUNTED MOUNTAIN POPULATION OF WILD BOARS (Sus scrofa L.), TICINO, SWITZERLAND

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Keywords: Wild boar, Sus scrofa, Suidae, Population dynamics.

IBEX J.M.E. 3:192-196

1. Introduction
The population of wild boars in Ticino (Swiss Canton, south of the Alps) is very recent. The first animal was recorded at the beginning of the 80's in a region called Malcantone, on the border with the Lombard Alps region (Italy). In subsequent years the population quickly spread northwardly and increased significantly (Baettig, 1985; Moretti, 1991; Moretti, 1992). After the appearance of this species in the study area eight years ago and from the first hunting season in 1988, a study was accomplished based on hunted animals in order to analyse some important aspects of the population's structure and dynamics.

2. Study area
The Malcantone region (Southern Switzerland) covers an area of 7,000 ha with a southern orientation; altitudes range from 200 to 1,800 m u.s.l. (Fig. 1). The annual rainfall is 1,700 mm (mean for the last 30 years). The environment is as follows: wood 60%; urbanised area 15.5%; agricultural area 10.5%; alpine meadows 10%; uncultivated land 4%. The chestnut (Castanea sativa) predominates between 200 and 1,000 m u.s.l., pure or mixed with beech (Fagus sylvatica) or with oaks (Quercus sp.). In the study area, the species has found optimal environmental conditions (Moretti, 1991).

3. Methods
3.1. Sex and age ratio
During the hunting season of 1990-91, 521 wild boars were killed and examined. All animals were shot in the Malcantone region (Ticino, Switzerland) between 200 and 1,600 m above sea level. The hunting code did not provide any special restriction and all age classes were therefore present in the analysed samples. Some animals were aged from tooth-eruption and tooth-wear according to Iff (1978), whose age classes were adapted from the recent works of Boitani & Martini (1992) and Genov et al. (1992) in accordance with Marischke (1965). The sex ratios were compared with the theoretical distribution 1:1 (Chi-square test).

3.2. Natality, birth distribution and static life table
The uteri of 17 females were analysed and the number of foetuses were counted. The monthly birth distribution of 320 wild boars between 6 and 18 months of age was calculated.

The life table distributed into age classes was established in accordance with Blant (1987) and Henry and Conley (1978). Even if hunting is considered the main cause of mortality of hunted populations (Baettig, 1988), the limits of the hunting techniques are unknown. Nevertheless it is worth a discussion and a comparison with the results of other studies.

IBEX J.M.E. 3:1995
Different parameters have been considered as follows:

\[ x \]: age class
\[ l_x \]: number of animals of \( x \) age from the hunted sample
\[ d_x \]: number of animals of \( x \) age from an initial population of 1,000 individuals
\[ d_{x+1} \]: number of dead animals between \( x \) and \( x+1 \) and thus: \[ d_x = l_x - l_{x+1} \]
\[ q_x \]: mortality rate; \( d_x / l_x \)
\[ p_x \]: survival rate \( (1 - q_x) \)
\[ c_x \]: mean expectation of life remaining.

4. Results
4.1. Sex and age ratio
Figure 2 indicates the percentage distribution of the different age classes for both sexes. The result is a symmetric pyramid whose base consists of 46% of animals aged 0-1 years (class 1) and of 36% of animals aged 1-2 years (class 2). If added, these two classes (from 0 to 2 years) represent 82% of the population. Animals older than 2 years only represent the 18%. In the sample the sex ratio is balanced in all age classes (mean: 0.98).

4.2. Natality, birth distribution and static life table
The results of the analysis of 17 uteri appear in Table 1. The mean number of foetuses is 4.8 per pregnant female. In this sample, five out of eight females in the age class 0-1 year (class 1) and all females in other classes take part to the reproduction. The births occur throughout the year, though about 83% are concentrated between February and August (Fig. 3). During this period it
Table 1: Number of foetuses per female (n=17) per age class.

<table>
<thead>
<tr>
<th>Age classes (years)</th>
<th>Number of foetuses per female</th>
<th>Pregnant females (%)</th>
<th>Mean of foetuses per pregnant female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>3 4 1</td>
<td>63%</td>
<td>MORETTI BRIEDEMANN BAETTIG</td>
</tr>
<tr>
<td>1-2</td>
<td>1 1 2 1</td>
<td>100%</td>
<td>(n = 17) (n = 251) (n = 39)</td>
</tr>
<tr>
<td>&gt; 2</td>
<td>1 1 1 1</td>
<td>100%</td>
<td>3.8 4.0 4.7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3 5 1 2 3 2 1</td>
<td>4.9 5.3 5.6</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2: Composition in age classes and sex of shoot population of Wild boar (n = 521). Black = real age-rate of the studied population; Grey = theoretical age-rate.

Figure 3: Monthly birth distribution (in %) according to the age at the killing (n = 320).
Table 2: Static life table based on 521 wild boars shot in study area between 1990 and 1991. \( x \): age classes; \( l_x \): number of animals in \( x \) age class from the hunted sample; \( d_x \): number of animals of \( x \) age from an initial population of 1,000 individuals; \( q_x \): number of animals shot between \( x \) and \( x+1 \) and thus \( l_x / (l_x + d_x) \); \( p_x \): survival rate \( (1 - q_x) \); \( e_x \): survival chance \( (T_x / l_x) \), where \( T_x = (l_{x+1}/l_x) / 2 \) and \( T_x = \sum T_{x} \).

<table>
<thead>
<tr>
<th>Survival table</th>
<th>Static life table</th>
</tr>
</thead>
<tbody>
<tr>
<td>( x )</td>
<td>( l_x )</td>
</tr>
<tr>
<td>0-1</td>
<td>241</td>
</tr>
<tr>
<td>1-2</td>
<td>188</td>
</tr>
<tr>
<td>2-3</td>
<td>40</td>
</tr>
<tr>
<td>3-4</td>
<td>20</td>
</tr>
<tr>
<td>4-5</td>
<td>18</td>
</tr>
<tr>
<td>5-6</td>
<td>11</td>
</tr>
<tr>
<td>6-7</td>
<td>3</td>
</tr>
</tbody>
</table>

seems that the number of births follows a bimodal distribution with a peak in March and one other between June and July. The remaining 17% are distributed, more or less regularly, between September and January, with minimal values between December and January.

Table 2 shows some important parameters of the population dynamics of a sample of 521 shot wild boars. The mortality rate per class follows an alternate movement with minimum values at 0-1 and 3-4 years (10-22%), and maximal values at 1-2 and 5-6 years (73-79%). The mean expectation of life remaining in the single classes of the analysed population is higher in the classes between 2 and 4 years \( (e_x = 20-21 \text{ months}) \) compared to the younger and to the older ones \( (e_x = 12-18 \text{ months}) \). These values never go over two years, which represents the mean value of the turn-over of the population.

5. Conclusions

5.1. Birth distribution

The birth distribution agrees with that presented by other authors (Briedermann, 1986; Baertig, 1988; Gerard et al., 1991; Durio et al., 1992) and also agrees with the hypothesis on the females’ winter estrus, which in this case happens between November and March. The long period of births and the bimodal movement between February and July suggest, nevertheless, that the female oestrus is barely synchronized (Meriggi et al., 1988; Gerard et al., op. cit.; Mauget et al., 1984). The favoura-
females (0-1 years) take part in the reproduction, with an average of 4 offspring (Briedermann, op. cit.). The ecological-environmental conditions in the study area are good, especially the trophic ones (Moretti, 1992). From the climatic point of view, the situation is mostly good, although it is not known how much particularly rainy springs affect the natural mortality of younger animals. If hunting is the most significant reason of mortality among Wild boar (83%, Baettig, 1988) then it is possible to predict that the population will increase in the next few years. In case of massive migration towards the neighboring Italian regions, local hunting statistics would not be able to show this fact directly. Therefore the coordination of studies and the management of populations between neighboring confined regions (in the studied case between north-Italian regions and southern parts of Switzerland) should be improved.

REFERENCES


