Exploitation Dynamics Analysis of Deer Hunting in Prehistoric Japan

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Exploitation dynamics analysis is based on the interaction between human populations and their food resources. Under abundant food conditions, the human population increases until it reaches the carrying capacity (K-level) of a given environment. A growing population is one of low density below the carrying capacity. While, a saturated population is almost at equilibrium with, or sometimes slightly over, the carrying capacity. Such a human population states influenced many aspects of their exploitation activities. For example, food selection by the Jomon people changed from the primary foods to the secondary and occasional foods with increasing human populations.

Hunting and collecting pressures, estimated from age compositions of faunal assemblage are good indicators of human population conditions. As a first step in this process, age determination methods were reinvestigated, using deer skeleton collected at Nikko after a mass mortality event in 1984. Tooth wear of the younger individuals in the Nikko population was almost the same as for the Kinki population examined by Ohtaishi (1986), however teeth wear for older Nikko individuals seems to precede faster than in the Kinki population. Consequently, ages for deer excavated in the Kanto District should be determined using the Nikko population as a wear standard, because teeth size of the excavated materials is similar with the Nikko population.

To compile a life table applicable to the excavated deer remains, \( dx \) (the number of deaths for each age) and \( lx \) (number of living for each age) were calculated from the age composition data. The survival rate was calculated as the total number of survivors after 1 year divided by the total number of living individuals for that year, that is, subtract total number of death (1000 individuals in the life table) from the number of living individuals for that year divided the same total number of living individuals for that year in the life table.

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S = \frac{\Sigma l_{x-1}}{\Sigma l_x} = \frac{(\Sigma l_x - 1000)}{\Sigma l_x}
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Hunting rate is calculated as the difference between the survival rate of a hunted population and simulated survival rate of a non-hunted population with only natural death. The survival curves for the non-hunted populations were also required consideration of the relatively small \( qx \) (death rate for each age) for fawns and juveniles under high hunting pressure conditions.

The ages of excavated deer remains from 19 sites of the Paleolithic, Jomon and Yayoi Periods, and from prehistoric Hokkaido, were determined by the wear index method, using the Nikko standard. Survival rates and hunting rate were also calculated from their life tables. Sites where survival rates were 0.8, and hunting rates about 5%, belong mainly to the Earliest and Early Jomon Periods, while sites with survival rates of 0.75, or hunting rate of 10%, are from only the Late and Latest Jomon periods in central Japan.