Present Status and Conservation of the Endangered Amami Rabbit *Pentalagus furnessi*

Fumio YAMADA & Ken SUGIMURA  
Forestry and Forest Products Research Institute, PO Box 16, Tsukuba Norin, Ibaraki 305-8687, Japan

Shintaro ABE & Yukari HANDA  
Mammalogical Society of Amami, Tatsugo, Ohshima, Kagoshima 894-0105, Japan

**ABSTRACT**  
The Amami rabbit *Pentalagus furnessi* is an endemic species of the central Ryukyus, Japan, and occurs only on two islands, Amami Oshima I. and Tokunoshima I. For the conservation of this species, some research programs to reveal the population size, spatial and temporal patterns of activity, and impacts of introduced predators were carried out. The habitat available to the rabbit has obviously been reducing with considerable fragmentation on each island, and size of each population also seems to have been decreasing as well (2700-6500 in total of the two islands in 1995). The estimated home range size was relatively small (1.3 ha for males and 1.2 ha for females), and the rabbits moved 100-200 m from their burrows mainly during the night. The negative impact of the introduced mongoose on the rabbit was quite serious on Amami Oshima I., and effective control of this exotic predator is an urgent necessity for the conservation of the rabbit, as well as the whole ecosystem, of this island.

**Key word:** Amami rabbit / conservation / population size / home range / impact of introduced predator

The Amami rabbit *Pentalagus furnessi* is one of the most primitive lagomorphs, and occurs only on two islands, Amami Oshima I. (710 km²) and Tokunoshima I. (250 km²) in the central part of the Ryukyu Island Chain, southern Japan (Figs. 1, 2). The rabbit was designated as a Natural Monument by the National Government in 1921 and was raised to a Special Natural Monument by the National Government in 1963. The species was also classified to the endangered category of the IUCN Red List in 1996. However, little attention has been paid to the conservation of the rabbit, and relatively few relevant studies have been conducted so far. In 1990, the Lagomorph Specialist Group (LSG) of the Species Survival Commission (SSC) of IUCN prepared an Action Plan for the endangered lagomorph taxa including the monotypic *Pentalagus*. Since 1992, we have been conducting some *Pentalagus* research programs that focus on the population size, spatial and temporal patterns of activities, and impacts of introduced predators.

**GEOGRAPHIC RANGE OF HABITATS AND POPULATION SIZE**

Areas of habitats estimated by the pellet census were approximately 370km² on Amami Oshima I. and 33km² on Tokunoshima I. (Fig. 3; Sugimura et al., 2000). These values are smaller than those estimated in previous studies (Kagoshima Prefecture, 1977; Hayashi & Suzuki, 1984). Moreover, the...
Fig. 1. Distributions of the endangered and monotypic genera of the Leporidae.

habitats seem to be more fragmented than they were previously. The numbers of rabbits on Amami Oshima I. and Tokunoshima I., estimated on the basis of our pellet counts, range from 2600 to 6200 and from 120 to 300, respectively (Sugimura, 1998). Thus, the total number of rabbits supposedly ranges from 2700 to 6500. On each of those islands, the number of rabbits seems to have been decreasing. Especially on Tokunoshima I., the population may possibly be on the brink of extinction. We also found that the rabbits on Amami Oshima I. constitute three small populations completely isolated from each other.

RADIO TELEMETRY STUDY

The aim of this study is to reveal the home range size and the pattern of habitat utilization of the Amami rabbit. Seven rabbits caught by traps were weighed and fitted with radio collars during the period from 1995 to 1998 (Yamada, in prep.). The average body weight of the rabbits was 2226g (range: 2030-2675g) for males and 2477g (2550 - 2880g) for females. The body weight and the head and body length are, respectively, similar to the corresponding values of the Japanese hare Lepus brachyrurus. Nevertheless, lengths of ear, hind foot and limbs were approximately half of those in the latter. Our examinations confirmed the previous account that the Amami rabbit has a number of apparently primitive characters among the leporid species (Corbet, 1983): small to medium sized ear (45mm); thick and woolly fur, dark brown or black in color; and extraordinarily long (10-20mm), heavy and curved claws.

The average size of home range (90% minimum convex polygons) of the Amami rabbit, 1.3ha for four males and 1.0 ha for three females, was almost equivalent to those of the European rabbit Oryctolagus cuniculus (Gibb & Williams, 1994) and the cottontails Sylvilagus aquaticus and S. palustris (Chapman & Ceballos, 1990; Forys & Humphrey, 1996), but was distinctly smaller than those of Hidp hare Caprolagus hispidus (8.2ha for the male and 2.8ha for the female: Bell et al., 1990) and Riverine rabbit Bunolagus monticulasis (20 ha for the male and 13ha for the female: Duthie & Robinson, 1990).

All of the seven Amami rabbits tracked lived in 30 ha in the forest. Home ranges of the three
Status and conservation of the endangered Amami rabbit

Nesolagus
Brachylagus
Romerolagus
Bunolagus
Oryctolagus
Caprolagus
Lepus
Sylvilagus
Poelagus
Pronolagus
Pentalagus

Fig. 2. Phylogeny of the genera of Leporidae based on Dawson (1981) and Chapman & Flux (1990).

females did not overlap with each other. By contrast, home ranges of the four males overlapped with each other, as well as with those of females. Therefore, the mating system of the Amami rabbit seems to be promiscuous like those of other leporid species.

The Amami rabbit became active mainly during the nighttime, moving for feeding and dropping their pellets in open places 100-200m away from their burrows. Burrows were usually located in small valleys covered by dense forests.

IMPACTS OF INTRODUCED PREDATORS, ESPECIALLY THE MONGOOSE

Besides the habitat reduction, introduced predators also have harmful effects on the Amami rabbit. Obviously the rabbit has been suffering greatly from the nonnative predators, such as feral dogs, cats, and mongooses. As a result, the rabbit tends to disappear from the vicinity of human settlements.

On Amami Oshima I., several individuals of the small mongoose *Herpestes javanicus* were released in 1979 for the purpose of controlling the venomous snake, habu *Trimeresurus flavoviridis*, and rats in Naze City. Since then, the mongoose has been expanding its distribution from the released place: by 10km in 1989 and by more than 20km, covering most of the island but the northern part, in 1997. The rate of range extension was estimated as one km per year. Approximately 100 mongooses were captured so far in our project (Yamada, in prep.). The capture ratio has increased rapidly after 1995. According to the results of our analysis, eight of 100 pellets from mongooses contained the rabbit. The mongoose chiefly preyed on insects and birds in all seasons. Nevertheless, it tended to prey more frequently on amphibians and reptiles in summer and on mammals in winter. Most endemic
animals on the island, including the Amami rabbit, seem to be vulnerable to this exotic predator because of their long isolation in the insular environment that lacked such a large active predator as the mongoose. For the conservation of the Amami rabbit and the whole ecosystem of Amami Oshima I., it is strongly needed to take effective measures to control this exotic predator so urgently.

CONCLUSION

1. Results of pellet surveys suggested that the total number of rabbits on Amami Oshima I. and Tokunoshima I. ranges from 2700 to 6500, and that there are three small populations completely isolated from each other on the former island. The population size of the rabbit seems to have been decreasing on each island.
2. Home range of the rabbit was relatively small. The rabbit became active mainly during the nighttime, and it moved to eat food and to drop pellets in open places 100-200 m away from their burrows. The burrows were usually located in small valleys covered by dense forests.
3. The influence of the introduced mongoose on the Amami rabbit seemed quite serious on Amami Oshima I. Effective measures are urgently needed to control the mongoose on this island.

ACKNOWLEDGMENTS We thank Drs. S. Hattori of Tokyo University and S. Miura of Forestry and Forest Products Research Institute for their help during the present research and members of the
Mammalogical Society of Amami for their encouragement. We also thank Drs. H. Otsuka of Kagoshima University and H. Ota of University of the Ryukyus for reviewing this paper and for providing useful suggestions for its improvement. This research was partly supported by the Fund of Japan Environment Agency (Global Environment Research Program, F-1-4-2 [FY1996-1998]), Hino Green Fund, and WWFJ Fund.

REFERENCES


山田文雄，杉村乾，阿部慎太郎，半田ゆかり

希少種アマミノクロウサギ *Pentalagus furnessi* の現状と保全

アマミノクロウサギ *Pentalagus furnessi* は琉球列島の中部の奄美大島と徳之島だけに生息する固有種である。本種の保護を目的に、現存個体数の推定、活動性の時間的・空間的パターンの解明、及び本種の生存を脅かす移入種（とくに移入マンス）の影響の解明について研究を行った。アマミノクロウサギの生息域は縮小化と断片化が進み、生息数も減少傾向にあり、1995年現在の生息数は両島で2700～6500頭と推定された。本種の行動面積は比較的狭く（雄1.3 ha，雌1.0 ha），夜間，森林に覆われた谷などにある巣穴から出て100 - 200 m 移動し、林縁部で採食と脱糞を行っていた。奄美大島では，移入捕食者であるマンスがアマミノクロウサギや生態系に及ぼす影響の大きいことが明らかになり，その対策が緊急に求められている。