

## THE DEMOGRAPHIC PARAMETERS AND BEHAVIOURS OF SULAWESI WARTY PIG (*Sus celebensis* Muller and Schlegel 1843) IN TANJUNG PEROPA WILDLIFE RESERVE, SOUTHEAST SULAWESI

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### Introduction

Sulawesi warty pigs are endemic to Sulawesi Island, and the adjacent islands of Buton, Muna, Kabeana, Peleng, Lembeh and on some of the Togian Islands (Burton & Macdonald 2006). The population of Sulawesi warty pigs has dramatically decreased, caused by many factors. They have been hunted since they are considered as a garden/agricultural pest and to obtain meat for consumption, making this animal commercially valuable (Lee, 2000). Also forest converted to agriculture, has led to a decline in the distribution of this species (Burton & Macdonald 2006). Although this species cannot be regarded as seriously threatened throughout its range at the present time; it is now scarce in south and north-east Sulawesi. This study aims to reveal population size, population density, sex ratio, age structure, litter size, and social group composition of the Sulawesi warty pig in Tanjung Peropa Wildlife Reserve (total area 389.37 sq. kilometers) Southeast Sulawesi.

### Materials and Methods

This research was conducted from June to November 2006 in Kalobo Forest, in the southern part of Tanjung Peropa. Population density of Sulawesi Warty Pig was estimated using Line Transect Method (Buckland et al, 1993). The transects covered many habitat types, including riverine, bamboo, and lowland forests. The transects were placed more than 100m apart and at least 50m from roads and avoiding major forest trails. Transects were walked at about 1-2 km per hour, though this was difficult to control due to variation in terrain. Locations of endpoints and some midpoints from transects were recorded using a GPS, where possible. All transect distances were measured using a 50m measuring tape.

Attempts were made not to lay these transects along linear features (such as ridge tops, valley floors, traversing valley sides). These geographical features tend to cause clustering of signs due to animal's preference to follow the easiest path. The data recorded included number of animal, age structure, sex ratio, and general behaviours.

The age structure is a composition of the number of individuals in a population based on the age distribution. The structure of the Sulawesi warty pig was classed into 4 age groups (Huffman, 1999), which are:

1. Baby: 0 until 1 year old with strips on the body, small body size, and without warts on the face.
2. Juvenile: > 1 year old to sexual maturity, without strips on the body. The hair color is starting to darken and body size increases. Warts are starting to grow but still largely unclear.
3. Adult: Sexual maturity to 8 years old, the adults have three pairs of warts on the face but not fully grown.
4. Old: > 8 years old, with bright colored hair, often larger than adult, and has three pairs of fully developed warts.

### Results and Discussion

#### Population Size and Density

During 83.7 km of transects surveyed eighty eight Sulawesi warty pig individuals were observed. Therefore, the estimated population density of Sulawesi warty pigs in Kalobo Forest was 34 individuals /km<sup>2</sup>. The highest estimated population density occurred in bamboo forest with 65 individuals /km<sup>2</sup> (n=19) while the calculated densities in riverine forest and lowland rain forest were 52 (n=22) and 23 individuals /km<sup>2</sup> (n=19), respectively. Mustari (2003) reported that during 372 km of

transect walked in Kalobo Forest, population density of Sulawesi warty pig was 5.6 individuals /km<sup>2</sup>.

The estimated population size in Kalobo Forest (20 sq. km) was 698 individuals. The total estimated population within the 389.37 sq. km of Tanjung Peropa Wildlife Reserve area is 73,594 individuals, assuming a similar proportion of habitat types exists across the Park. The high number of Sulawesi warty pig in riparian forest may be related to the available food, water, shelter, cover and mud wallows that can be found in this forest type.

**Group Size and Density.** During this study 16 groups were observed; giving an estimated density of 6.14 groups /km<sup>2</sup>. Eight groups were observed in riverine forest; with a density of 8.86 groups /km<sup>2</sup>. However, the highest group density of 14.29 groups /km<sup>2</sup>, were found in bamboo forest (n=4). In lowland rain forest 4 groups were also recorded at a density of 3.29 groups /km<sup>2</sup>.

The number of individuals per group varied between 2 and 9, with an average of 5 individuals. Groups generally consisted of 1 old or adult male, 1-2 adult females, 1-2 juvenile males, 1-2 male babies, , 1-3 juvenile females, and 1-3 female babies.

**Age Structure.** At the juvenile Sulawesi Warty Pig, the strips fade gradually and replaced by the uniform hair colour, yet the black hairs on the upper head and neck are still absent. An adult pig is characterized by the appearance of thick-black hairs along the upper head and neck and as the pigs reach old stage, the warts reach maximum size. Observation in the field revealed that the numbers of baby, young, adult and old pigs were 34 (39%), 29 (33%), 23 (26%), and 2 (2%), respectively, indicating progressive growth of population.

**Sex ratio.** The combined sex ratio of all age classes was 1:1.44 and the reproductive (adult) sex ratio was 1:1.25. Sex ratios based an age classes were 1:1.83; 1:1.64 and 1:1.09 for baby, young and adult classes, respectively.

**Litter size.** Observations revealed that the litter size ranged from 1 to 3 young per female. Noel and Yahnke (2004) reported that litter size of wild pig ranged from 1 to 8 young (average 2-3) and young will be weaned after 1 year. This study showed, however, that young individuals (more than 1 year old) were still with their mothers.

**Feeding behavior.** In the morning, around 06.00 – 11.00 hours, Sulawesi warty pig starts to be active in searching food. At this time, Sulawesi wild boar tends to prefer searching food around the river. Around Amolengo river, Sulawesi warty pig is often found searching shrimps, crab, worms, tadpoles and small fishes. Food items of Sulawesi warty pig are roots, foliage, fruits, plant shoots, corpses, and insects (Huffman 1999). At 14.00 – 10.00 hours, Sulawesi warty pig starts search food again after wallowing. At this time, Sulawesi warty pigs search food in riverine forest, and sometimes are found in lowland forest and bamboo forest. At 21.00 – 04.00, Sulawesi warty pig discharges faeces or urine in locations where this animal eat and drinks. This behavior is intended for marking the locations as the area for searching food by this animal.

In general, the eating behaviors of Sulawesi warty pigs are categorized into two kinds, namely by using snout (rooting up the soil) and by using the legs (digging). Rooting up behavior of males and females could be distinguished from the traces left from this behavior. Traces left by rooting up males are more Sulawesi warty pigs are found to be active searching food in local people's garden. This activity is conducted by the Sulawesi warty pig for avoiding contacts with human beings.

Irregular than those left by females. This is due to the use of teeth by the males for scouring the soil.

**Wallowing behavior.** During day time, around 11.00 – 14.00, Sulawesi warty pig, starts to wallow. This is for regulating temperature of the body which is overheated due to activity in high air temperature. Measurement results show that the maximum air temperature reach 34° C. Beside that, wallowing is conducted also for cleaning the body from the attacking wild boar lice which cause itchiness.

Sulawesi warty pigs create mudhole (place for wallowing) by digging soil with their snouts. After the digging is rather deep, the head of Sulawesi warty pig is inserted to the small hole. Afterwards, the head of Sulawesi warty pig which is partly inserted, is lifted, and this create hole which is rather deep. After that, the Sulawesi warty pig lay down its body while sometimes shakes its body to seek convenient position.

After finishing the wallowing, **sulawesi warty pigs** clear up their bodies by rubbing the bodies to stems of trees, shrub, and **other tree parts**.

**Resting behavior.** **Sulawesi warty pigs** need rest to restore their body **condition** after **fatigue due** to activities. During feeding, **sulawesi warty pigs sometimes take shelter** from the heat of sun light, under **seedlings** which are dense enough. Resting behavior of **sulawesi warty pig** is in the form of staying motionless while breathing and **sniffing** the air, or **laying down** in areas covered by grasses which are not too tall.

**Sleeping behavior of sulawesi warty pig** is carried out in **slope notches** and in horizontal caves. Sleeping behavior of **sulawesi warty pig** is at 18.00 - 06.00 hours. However, during this time or at this same time, there were found some **sulawesi warty pigs** which searched food, mainly in local people's farmland, around 22.00 - 04.00 hours. Complete data on individual behavior of **sulawesi warty pig** are **presented in Table 1**.

Table 1. Time allocation of **sulawesi warty pig** activity

Time	Duration (hours)	Activity	Location	Frequency
06.00-11.00	5	Feeding (eating)	Riparian, bamboo, lowland	Riparian
11.00-14.00	3	wallowing	Bamboo, lowland, riparian	bamboo
14.00-18.00	4	eating	Riparian, bamboo, lowland	Riparian
18.00-06.00	12	resting	Bamboo, lowland	lowland

**Grouping behaviour.** **Sulawesi warty pig** is **gregarious** animal (forming groups) which create random familial relationship (Huffman 1999). In each group, there are **individuals** which usually constitute one **family**. This animal is polygamous, where the number of **male individuals** is less than number of female individuals. Group behavior of **sulawesi warty pig** comprises eating (feeding) behavior, wallowing behavior, sexual behavior, and predator avoidance behavior.

**Sexual behaviour.** Leader of **sulawesi warty pig** group often sniffs his nose while sometimes kissing the genitals of adult female

individuals. Sometimes this adult male individual follows the female individual desired by him. The female individual who feels that she was followed, sometimes turn back her body or run away.

**Predator avoidance behavior**

Predator avoidance behavior could be **conducted** by **sulawesi warty pigs** by detecting the condition of its surrounding area. This detecting behavior is conducted by adult individuals, either the males or females, by **sniffing** and smelling the air around them. After they feel secure, **sulawesi warty pig** will afterwards continue their activities.

When there is threat of danger, **sulawesi warty pig babies** tend to choose to follow where their mother is going, rather than following their father. Therefore, familial relationship within **sulawesi warty pigs** could be categorized as matrilineal relation, where the mother has more influence on the young. However, in general, the animal group is led by dominant male. If one member of the group is **threatened by danger** such as being tied up and choked by python snake, the **sulawesi warty pigs**, led by the dominant male try to free the victim from the snake grip. If members of the group are unable to free it, they will ask the help of other **sulawesi warty pig** group occurring nearby.

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