AGE CLASSIFICATION OF BEARDED PIGS (SUS BARBATUS) FROM BARIO, KELABIT HIGHLANDS

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ABSTRACT

Sixteen lower mandibles of bearded pig (Sus barbatus) were examined to determine their age. Eruption pattern and surface wear were used to classify specimens into infant, juvenile, subadult, adult and old adult. Teeth sizes were used to differentiate between temporary and permanent teeth. Based on these criteria, four of the specimens were classified as juvenile, one as subadult, seven as adults and four as old adults.

INTRODUCTION

Bearded pigs (Sus barbatus) are culturally and economically important wildlife to the rural communities in Borneo (Caldecott, 1988). The meat is preferred by the natives and is therefore the most frequently hunted wildlife species (Bennett et al, 1995; Caldecott, 1988). Improved access into the forests and destruction of their natural habitats by logging and agricultural activities have increased hunting pressure on the bearded pigs leading to fear among conservationist that the wild populations may be declining (Caldecott et al. 1993). This is supported by statements from bunters that encounters with wild pigs are becoming less frequent.

Age estimation is important to understand many aspects of the natural history of wild animals. Very little information is available on the age of the pigs killed by hunters. In order to gain some insight into the age range of bearded pigs killed by the natives in Bario, we examined and estimated the age of 16 lower mandibles of bearded pigs.

METHODS

Sixteen lower mandibles of bearded pigs were collected from the Kelabit community of Bario Lama. The mandibles were of various sizes and most of the teeth were still intact. We used three criteria to estimate the age. These were (i) eruption pattern of temporary and permanent teeth (ii) surface wear on crown of permanent teeth (iii) size of teeth to differentiate between temporary and permanent teeth.

Table 1. Age group classification in bearded pigs

Age groups	Dentition pattern and surface wear	Age in months
Infant	only deciduous teeth are present; these are not worn out; cusp are prominent on premolars	Less than 4 months, probably still suckling

Juvenile	some deciduous teeth and 2-4 permanent teeth, usually 13; Cl; P1; Ml with sharp cusp	4-12 months
Subadult	full set of permanent teeth, cusps are blunt due to some wear but dentine not visible	12-24 months
Adult	full set of permanent teeth with some wear on the cusp, dentine visible where the cusp have worn out; 11,2,3; Cl; P1,2,3,4; M1,2.3	24-48 months
Old adult	Full set of permanent teeth with significant surface wear on crown, complete bridging of dentine between cusp	>48 months

Note: deciduous teeth are indicated with small letters (e.g., i3) while permanent teeth are indicated by capital letters (e.g., I3).

Eruption patterns of temporary and permanent teeth in European wildhogs (Sus scrofa) described by Matschke (1967) were used to estimate the age of bearded pigs in this study. According to Matschke (1967), the first deciduous teeth to erupt are the canine and i3 when the pigs are about one-week old while permanent teeth (P1 and M1) are first seen in pigs which are 20-33-week old. In order to differentiate between deciduous and permanent teeth, the width and length of incisors, width and height of canine as well as height of premolars and molars were measured. Incisor width were measured half way along its length from the jaw line while the length were measured from the gum line to the tip of the crown. In the case of premolars and molars, the height was measured from the gum line to the top of the cusp. Measurements were made on the left side of the jaw except when this side was missing a tooth; in this case measurement would be made on the corresponding tooth on the other side of the jaw. These measurements are shown in Figure 1. Based on these data, the pigs were further classified as infant, juvenile, sub-adult, adult and old adult (Table 1).

RESULTS

In generals deciduous teeth were smaller than permanent teeth. The widths of the teeth were useful in distinguishing between the two types of teeth. Teeth heights could vary depending on the extent of grinding action that had occurred on the top surfaces and therefore were not very useful as an aging criteria. Other characteristics of deciduous teeth were the lack of stains on the teeth and the roots were more exposed compared to the permanent teeth.

The average width of deciduous incisors was 2.5mm (ranged from 2.0-4.0mm) compared to 7.4mm (ranged from 5.0-10.0mm) for permanent incisors. The total width of the first deciduous incisors (ii) at midpoint averaged 6.6mm (ranged from 8.0-9.0mm) while it was 12mm (ranged from 10-14mm) in permanent teeth.

Deciduous premolars gave an average height of 5.5mm (range 4.5-6.5mm) while permanent premolars showed an average height of 8.1mm (range 2.0-12mm). Permanent premolars gave a tremendous height range due to different stages of development and surface wear. For example in jaw #1 (juvenile), P1 had just erupted and was only 2 mm high. In jaw #6 and 7 (adult) the

premolars P2,3,4 were probably at its highest of 11-12mm with cusp still prominent and showing little wear while in jaws #15 and 16 (old adult), premolars P2,3,4 had been worn down to 5.0-10mm. Molars ranged from 4-17mm high; lower values were found in juvenile where the teeth were still growing and in old adults where the had been worn down. The measurements of incisors, canines, premolars and molars for the 16 jaws are shown in Tables 2 and 3

Based on the criteria mentioned above, four specimens (#1-4) were classified as belonging to juveniles, one subadult (#5), seven as adults (#6-12) and four old adults (#13-16). Figure 2 and 3 shows the dentition pattern in an adult and old adult category.

Table 2. Heights and widths (mm) *of incisors and canines on the lower jaws of Sus barbatus*

Jaw #	Incisor 1	Incisor 1	Incisor 2	Incisor 2	Incisor 3	Incisor 3	Canine	Canine
1	-	-	-	-	-	-	c=7.5	c=3.0
2	i=14.0	i=3.0	i=14.5	i=3.0	i=2.4	i=2.0	c=7.5	c=2.5
3	i=14.0	i=3.0	i=16.5	i=2.0	i=3.0	i=3.0	c=7.0	c=3.0
4	i=17.0	i=4.0	i=18.0	i=3.0	I=5.0	I=3.0	-	-
5	-	-	i=19.0	i=4.0	I=8.5	I=6.0	C=18.5	C=8.0
6	I=17.0	I=5.0	I=17.0	I=6.0	I=6.0	I=5.0	C=24.0	C=11.0
7	I=21.0	I=5.0	I=21.0	I=6.0	I=7.0	I=6.0	C=44.0	C=16.0
8	I=21.0	I=6.0	I=25.0	I=6.0	I=10.0	I=7.0	C=45.0	C=16.0
9	I=18.0	I=6.0	I=25.0	I=6.0	I=10.0	I=7.0	C=52.0	C=18.0
10	I=21.0	I=6.0	I=25.0	I=6.0	I=13.0	I=6.0	C=62.0	C=20.0
11	I=17.0	I=6.0	I=21.0	I=6.0	I=10.0	I=6.0	C=26.0	C=13.0
12	I=21.0	I=7.0	I=18.0	I=7.0	I=12.0	I=7.0	C=40.0	C=17.0
13	I=21.0	I=7.0	I=24.0	I=6.0	I=8.0	I=7.0	C=30.0	C=16.0
14	I=21.0	I=6.0	I=23.0	I=8.0	I=10.0	I=7.0	C=61.0	C=22.0
15	I=13.0	I=8.0	I=21.0	I=10.0	I=10.0	I=6.0	C=72.0	C=25.0
16	I=22.0	I=6.0	I=26.0	I=6.0	I=9.0	I=9.0	C=76.0	C=21.0

Table 3. Height (mm) of premolars and molars on the lower jaw of Sus barbatus

Jaw #	Premolar 1	Premolar 2	Premolar 3	Premolar 4	Molar 1	Molar 2	Molar 3
1	P=2.0	-	P=6.0	P=6.0	5.5	-	-
2	-	-	P=5.5	P=5.5	-	-	-
3	P=5.0	-	P=5.0	P=5.0	4.5	-	-
4	-	-	P=6.5	P=6.5	5.0	-	-
5	P=5.5	-	P=5.5	P=5.5	4.5	-	-
6	P=4.0	P=9.0	P=12.0	P=12.0	7.0	8.0	-
7	P=4.0	P=11.0	P=12.0	P=12.0	9.0	15.0	14.0
8	P=6.0	P=6.0	P=10.0	P=10.0	8.0	12.0	14.0
9	P=6.0	P=11.0	P=12.0	P=12.0	10.0	14.0	17.0
10	P=5.0	P=9.0	P=10.0	P=10.0	7.0	7.0	8.0
11	P=6.0	P=8.0	P=7.0	P=7.0	7.0	7.0	12.0
12	P=7.0	P=11.0	P=9.0	P=9.0	7.0	8.0	8.0
13	P=5.0	P=7.0	P=6.0	P=6.0	8.0	8.0	7.0
14	P=6.0	P=11.0	P=11.0	P=11.0	12.0	10.0	10.0

15	P=5.0	P=10.0	P=10.0	P=10.0	6.0	6.0	7.0
16	P6.0	P=7.0	P=7.0	P=5.0	4.0	4.0	5.0

Molars are present as permanent teeth only

DISCUSSION

Teeth eruption and wear pattern have been used to estimate the age of cervids (Quimby and Gaab, 1957; Lowe, 1967), serow (Miura and Yasui, 1985) and swine (Matschke, 1967). The usefulness of the technique depends on the ability of the researcher to differentiate between deciduous and permanent teeth. Apart from their smaller size, deciduous teeth appear whiter. The technique is reasonably accurate in estimating age up to adult stage; that is until the eruption of the last molar tooth.

The biggest limitation to this technique is in estimating the age of older animals whose full set of permanent teeth has been worn down to a size similar to that of deciduous teeth. The usefulness of surface wear as an aging technique is further complicated by the fact that the rate of wear depends very much on the diet and feeding habits (Morris, 1972). For surface wear to be a reliable indicator of age there must be a linear relationship between surface wear and age. Researchers at Tennessee Wildlife Resource Agency (Wildlife Research Report - European hog research, 1971) found that surface wear on canine teeth was not a reliable indicator of age. Miura and Yasui (1985) reported that the height of molars in serow increased until the animals were 4-6 years old and then declined steadily until death.

The obvious difference between our result with Sus barbatus and that of Matschke (1967) with Sus scrofa is the width of the first incisors. Matschke (1967) reported that permanent first incisors are 10mm or more in width while deciduous first are less than 10mm. In this paper, we report the average width of first incisors from Sus barbatus (Table 2) as 2.5mm for deciduous and 7.4mm for permanent teeth. This difference may be genetic or dietary in origin.

Dietary factors affecting teeth eruption and wear pattern can give some indication of the condition of the habitat, ecology and behaviour of the pig. Habitat degradation and fragmentation may reduce the availability of food resources. For example, loss of trees that normally yield edible fruits and nuts to the pigs will cause the pig to forage deeper into the soil and involuntarily ingest sand and dirt with food items. The presence of such contaminants will not only wear down teeth surfaces at faster rate but also compromise the nutrient intake of the animal. This may ultimately result in slow growth and therefore smaller size and poor reproductive rate. When coupled with increased hunting pressure due to fragmentation and increased accessibility into the forest, this may eventually lead to the extinction of the bearded pigs.

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