

## Teeth eruption as a means of age determination in captive Arabian oryx, *Oryx leucoryx* (Bovidae, Hippotraginae)

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A widespread method used for age determination in wild mammals involves the study of teeth eruption times (Morris 1978). The work presented in this note aims to determine different age classes on the basis of tooth eruption pattern in Arabian oryx, *Oryx leucoryx*. This study was conducted from September 1993 to December 1994 at the National Wildlife Research Center, near Taif, Saudi Arabia (Abuzinada *et al.* 1988 ; Greth and Schwede 1993).

The dental formula of seven (2.5) bottle-fed and three (2.1) mother-fed calves was recorded on a weekly basis on manually restraint animals during the first six months of life. These records provided the eruption times of deciduous teeth. All the dental formulae included in the study of permanent teeth eruption were recorded on tranquilized oryx (Ancrenaz 1994). Seventy-five examinations were carried out with twenty-eight (15.13) bottle-fed and 16 (10.6) dam-fed oryx aged from six months to 3.5 years.

We defined three successive stages in the teeth eruption process (Miller 1972). An eruption tooth (stage 1) was one that had a stained portion on one or more cusps just above the gum. A growing incisiform tooth (stage 2) was one that had come into permanent orientation without reaching its final size, and a growing molariform tooth was one that had a continuous stain between each cusp and was properly oriented in the mandible or the maxillar. An erupted tooth (stage 3) was one that had its final size (uniformity in the level of the tooth with the adjacent teeth) with no sign of attrition.

The mean eruption time of a given tooth type does not differ statistically (t-tests, n.s. in all cases) according to the gender nor to the type of alimentation (bottle-fed/mother-fed). All the results recorded in our study have been treated and presented together.

The dental formula of the Arabian oryx follows the typical bovid pattern and has been described in Harrisson (1968) :

Deciduous teeth : Di 0/3 Dc 0/1 Dpm 3/3

Permanent teeth : I 0/3 C 0/1 Pm 3/3 M 3/3

At birth, the calves had 8 incisiform teeth in a growing stage (stage 2). Dpm 2 and Dpm 3 were in an erupting stage and Dpm 4 was still not visible (Table 1). By the end of the first week, Di 1, Di 3 and Dc were fully erupted (stage 3), Di 2 and Dpm 2-3 were still growing (stage 2), and Dpm 4 was in an erupting stage (Stage 1). Eruption was fully achieved (stage 3) for Di 2, Dpm 2-3, Dpm<sub>4</sub> and Dpm<sup>4</sup> respectively 2, 6, 8 and 10 weeks following birth.

M1 was the first adult tooth to erupt (Table 1). The eruption process began by 3 months of age for the M<sub>1</sub> and between 3.5 and 4 months for the M<sup>1</sup>. Lower and upper







M1 were fully erupted between 6 and 8 months of age. The M<sub>2</sub> started eruption between 11 and 14 months, the M<sup>2</sup> between 12 and 15 months. The total eruption process of M2 lasted approximately 8 months. I<sub>1</sub> started eruption (stage 1) at 19-20 months and was fully erupted (stage 3) when I<sub>2</sub> and M<sup>3</sup> started eruption, at two years of age. I<sup>2</sup> started eruption before M3 in all but 3 animals, and reached its final size in 4 months. The M<sup>3</sup> started eruption one month later than its lower counterpart. The growth of M3 was completed by 34-42 months of age.

With inter-individual variation, the upper or the lower Pm 2 were the first permanent premolars to erupt by 25-26 months. These teeth were fully erupted at 32 months. Dpm 2 was still present, concurrently with Pm 2 by 36 months of age in two animals. I 3 and Pm 3 started eruption between 27 and 30 months. The last permanent tooth to erupt was usually Pm 4, between 30 and 33 months. The eruption process of C began between 26 and 32 months depending on individuals. By 42 months (3.5 years) the permanent dentition was fully in place in all the oryx included in the study.

In the captive Arabian oryx, the upper teeth eruption was generally slightly delayed (from 2 weeks to 4 months) compared to the eruption of the lower counterparts. Similar findings have already been made in the topi, *Damaliscus korrigum* (Mertens 1984) and the blue wildebeest, *Connochaetes taurinus* (Attwell 1980). However, the maxillar teeth started eruption before the mandibular teeth in the Grant's gazella, *Gazella granti serengetae* (Spinage 1976) and in the African buffalo, *Syncerus caffer* (Grimsdell 1973).

According to eruption times and replacement patterns of the different teeth, nine age classes have been differentiated in captive Arabian oryx during the first 3.5 years of life (Table 1). Eruption times, but also sequences of eruption differ according to the species of ungulates, and as a result, a different number of age classes have been determined in other species: 11 classes in the blue wildebeest up to 3.5 years (Attwell 1980); 6 classes in African buffalo up to 6 years (Grimsdell 1973; Taylor 1988); 6 classes in the topi up to 3 years (Mertens 1984); 4 classes in the impala, *Aepyceros melampus*, up to 2 years (Spinage 1976). Because of the difficulties involved in recording accurate and sufficient data on teeth eruption times in the wild, it is frequently necessary to refer to data collected on animals bred or maintained in captivity. However, it could be asserted that the use of animals raised in captivity as a basis for determining age of wild mammals may be flawed (Spinage 1973; Attwell 1980). But previous studies with Bovids showed that the teeth eruption sequence was consistent within a species, and that the replacement times of the teeth showed some constancy

TABLE 1. — Teeth eruption and age class determination up to 3.5 years in captive Arabian oryx (*Oryx leucoryx*): 150 examinations. Erratum: in "Upper Teeth" read PM<sup>2</sup>, PM<sup>1</sup>, PM<sup>1</sup>, M<sup>1</sup>, M<sup>1</sup>, M<sup>1</sup>.

	Stage 1: erupting tooth (tooth with a stained portion on one or more cusps just above the gum).
	Stage 2: growing tooth (tooth that came into a permanent orientation without reaching its final size).
	Stage 3: erupted tooth (tooth that had its final size with no signs of attrition).
	Stage 4: tooth in wear.
D: Deciduous tooth.	
P: Permanent tooth.	

within different populations of a same species, and between captive and wild born animals : barren ground caribou, *Rangifer tarandus* (Miller 1972), African buffalo (Grimsdell 1973). Since populations of reintroduced oryx in Saudi Arabia are mostly originating from the same captive population bred in Taif, we may assume that teeth eruption times will occur with a reasonable consistency between the oryx born in captivity and those from the wild. Nevertheless, it would be of prime importance to investigate teeth eruption times in wild born Arabian oryx to validate the different age classes described in our study.

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