

# Radiological Examination of Incisor Teeth in Rabbit (*Oryctolagus Cuniculus*)

Mitrović Marko Jumake\*, Todorović Anastasija and Lazarević Macanović Mirjana

Department of Radiology and Radiation Hygiene, Serbia

ISSN: 2770-6729



**\*Corresponding author:** Mitrović Marko Jumake, Department of Radiology and Radiation Hygiene, Faculty of Veterinary Medicine, University of Belgrade, Bulevar oslobođenja 18, 11000 Belgrade, Serbia

**Submission:** 📅 March 03, 2023

**Published:** 📅 April 13, 2023

Volume 2 - Issue 5

**How to cite this article:** Mitrović Marko Jumake\*, Todorović Anastasija and Lazarević Macanović Mirjana. Radiological Examination of Incisor Teeth in Rabbit (*Oryctolagus Cuniculus*). Clin Res AnimSci. 2(5). CRAS. 000548. 2023. DOI: [10.31031/CRAS.2023.02.000548](https://doi.org/10.31031/CRAS.2023.02.000548)

**Copyright@** Mitrović Marko Jumake, This article is distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use and redistribution provided that the original author and source are credited.

## Abstract

Pathological conditions of rabbit teeth are very common in clinical practice and may also lead to death due to serious complications. Therefore, special attention should be paid to early diagnosis to allow timely therapy. Radiographic diagnosis is a simple, quick and inevitable procedure to assess the condition of the teeth. Nevertheless, radiological examination of rabbit teeth has some peculiarities that are reflected in the imaging procedures and interpretation of radiographs in comparison with other mammalian species.

**Keywords:** Incisors; Rabbit; Radiology

## Introduction

The teeth of rabbits are a radicular and hypsodont and can grow continuously throughout the life of the animal. For this reason, it is necessary to establish a dynamic between growth and wear of the teeth to achieve proper occlusion [1]. On average, the incisors of rabbits grow by 1.3 to 3mm in one month. Although the regulatory mechanisms for the intensity of tooth growth are still poorly understood, diet and diet composition represent the main factor for tooth wear in domestic animals [2]. Kaiser et al. [3] indicate that phytoliths from plants and sand or dust particles available to animals in their natural habitat have an abrasive effect on the occlusal surfaces of the teeth [3]. Therefore, an inadequate diet with an insufficient proportion of solid food often leads to the occurrence of different pathological conditions in the teeth of rabbits kept as pets [2].

The oral cavity of the rabbit has limited accessibility for clinical examination, primarily due to its specific anatomical structure and size. According to the data presented by Gracis [4], only 30 to 50% of pathological conditions of the oral cavity and teeth can be diagnosed during a clinical examination. Therefore, it is necessary to perform a detailed assessment of the intraosseous parts of the teeth and the surrounding bone structures by radiological examination [4].

## Methodology of Radiological Examination

### Preparation of the patient

In order to obtain images of optimal quality, it is recommended that the rabbit be anesthetized prior to radiological examination, which involves injection of ketamine hydrochloride at a dose of 35mg/kg body weight with premedication of xylazine hydrochloride at a dose of 5ml/kg body weight [5]. It is important to point out that withholding food before anesthesia is not necessary because rabbits have a highly developed cardiac sphincter and due to this fact, there is no possibility of vomiting [6]. It is important to point out that withholding food before anesthesia is not necessary because rabbits have a strong and well-developed cardiac sphincter, due to which they do not have the possibility of vomiting [6].

### Radiological parameters

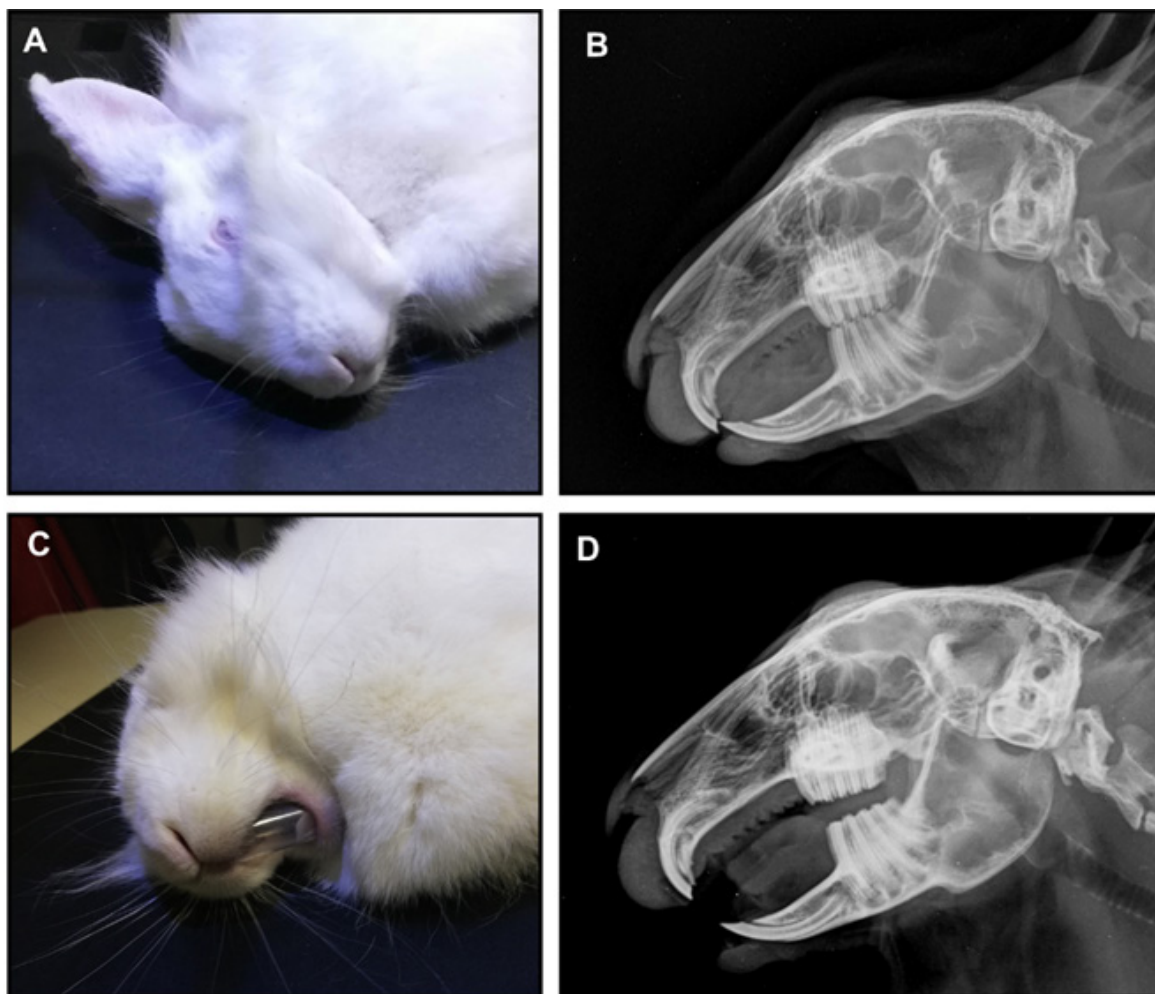
To obtain images of optimal quality, the focus-film distance (FFD) should be set at 102cm, while the recommended values for voltage (kVp) and current (mAs) are listed in Table 1 [7]. In young rabbits, voltage values should be reduced by 5 to 10% to avoid overexposure, which disables adequate contrast between bone and soft tissues [8].

**Table 1:** Voltage and current values for radiological examination of adult rabbit teeth [7].

Body Mass (g)	Current (mAs)	Voltage (kVp)
1200	7,5	54
2200	6	55
4000	6	56-58

### Radiological projections

In daily clinical practice, radiological examination of incisors of rabbits is performed in latero-lateral projection with closed and open mouth (Figure 1). To perform the latero-lateral projection, the animal should be placed in a lateral recumbency position so that the rostral part of the head is slightly raised from the table and the sagittal plane is parallel to the cassette (Figure 1). The center of the X-ray beam should be directed at the level of the premolars and molars. It is very important that the left and right sides of the head are symmetrical on the radiograph. Symmetry is estimated based on the summation of the rostral margins of the orbit, optic foramina, mandibular coronoid and angular processes of the left and right sides, as well as the ventral contours of the left and right ramus of the mandible [7,9,10].



**Figure 1:** Latero-lateral projection of the rabbit head with closed mouth: positioning of the animal (A) and radiograph; latero-lateral projection of the rabbit head with open mouth: positioning of the animal (C) and radiograph (D).

### Interpretation of the X-ray images

Rabbits belong to duplicidentata and have a second pair of small maxillary incisors which are placed immediately behind the larger, first pair (Figure 2). This peculiarity was also the main

reason for distinguishing ordo lagomorphs from ordo rodents [11]. The decidual and permanent formula of incisors is shown in Table 2. The decidual dentition is already formed during the gestation period and completely disappears by the 30th day of life [12].



**Figure 2:** Radiograph of a rabbit head in latero-lateral projection: first incisor of the maxilla (a); second incisor of the maxilla (a’); incisor of the mandible (b) and diastema (c).

**Table 2:** Formula of deciduous and permanent incisors in rabbits.

		<b>Incisor Teeth</b>
<b>Deciduous dentition</b>	Mandible	2/2
	Maxilla	1/1
<b>Permanent dentition</b>	Mandible	2/2
	Maxilla	1/1

**Dental terminology**

Hypsodont teeth do not have a well-defined crown and root, but the supragingival part of the tooth that protrudes into the oral cavity represents the clinical crown, while its subgingival distal extension implanted in the alveolar bone represents the reserve crown [10]. In order to localize the pathological processes on the teeth of these animals in the most precise way, the following terms are used [4]:

- A. Occlusal surface - the contact (masticatory) surface of the teeth of the upper and lower jaws.
- B. Apical part of the tooth - the most distal part of the reserve crown.
- C. Mesial surface - the side of the tooth facing the medial plane.
- D. Distal surface - the side of the tooth that faces the lateral plane.
- E. Labial surface - the side of the tooth facing the lips.
- F. Palatal surface - the side of the tooth facing the hard palate.

**Radiograph of the rabbit incisors**

The mandibular incisors of rabbits occlude between the first and second maxillary incisors. Their occlusal surfaces are obliquely incised, with the maxillary incisors having a very sharp labio-palatal inclination. The occlusal surfaces of the mandibular incisors are characterized by a gentler slope in the labio-lingual direction. The reserve crowns of the incisors are deeply embedded, so that the reserve crown of the maxillary first incisor ends in the middle of the diastema and that of the mandibular incisor ends at the level of the mesial side of the first premolar [4].

**Conclusion**

Radiography may facilitate early diagnosis, which allows early intervention and improving the patient’s prognosis. Due to this fact it is important to understand dental morphology and dynamic of incisive growth and wear.

**References**

1. Schmidh-Kittler N (2002) Feeding specializations in rodents. *Senck Leth* 82: 141-152.
2. Wolf P, Kampheus J (1996) Studies on the influence of feeding on the development of the incisors in rabbits, chinchillas and rats. *Small Animal Practice* 10: 723-732.
3. Kaiser TM, Müller DWH, Fortellius M, Schulz E, Cordon D, et al. (2013) Hypsodonty and tooth facet development in relation to diet and habitat in herbivorous ungulate: implications for understanding tooth wear. *Mammal Rev* 43(1): 34-46.
4. Gracis M (2008) Clinical Techique: Normal Dental Radiography of Rabbits, Guinea Pigs, and Chinchillas. *J Exot Pet Med* 17(2): 78-86.
5. Lipman NS, Marini RP, Erdman SE (1990) A comparison of ketamine/xylazine and ketamine/xylazine/acepromazine anesthesia in the rabbit. *Lab Anim Sci* 40(4): 395-398.

6. Van Calenberg AL, De Rycke K, Hermans K, Verhaert L, Vanbree H, et al. (2008) Diagnosis of dental problems in pet rabbits (*Oryctolagus cuniculus*). *Vlaams Diergen Tijds* 77: 386-94.
7. Silverman S, Tell LA (2005) Radiology equipment and positioning techniques. In: Silverman S, Tell LA (Eds.), *Radiology of Rodents, Rabbits and Ferrets*, Elsevier Saunders, Missouri, pp. 2-8.
8. Jekl V (2016) The dental examination. Harcourt-Brown F, Chitty J (Eds.), *BSAVA Manual of Rabbit Surgery, Dentistry and Imaging*. BSAVA, England, pp. 337-345.
9. Capello V, Gracis M (2005) Radiology of the skull and teeth. In: Capello V (Ed.), *Rabbit and Rodent Dentistry Handbook*, Wiley-Blackwell, Hoboken, New Jersey, USA, pp. 65-99.
10. Harcourt-Brown F (2016) Normal rabbit dentation and pathogenesis of dental disease. In: Harcourt-Brown F, Chitty J (Eds.), *BSAVA Manual of Rabbit Surgery, Dentistry and Imaging*. BSAVA, England, pp. 319-336.
11. Kraatz BP, Meng J, Weksler M, Li C (2010) Evolutionary in the dentition of *duplicidentata* (mammalia) and a novel trend in the molarization of premolars. *Plos One* 5(9): e18238.
12. Horowitz SL, Weisborth SH, Scher S (1973) Decidual dentation in the rabbit (*Oryctolagus cuniculus*): A roentgenographic study. *Arch Oral Biol* 18(4): 517-523.