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THE INFLUENCE OF AGE, SEX AND DIET ON THE OCCURRENCE OF DENTAL PROBLEMS IN RABBITS AND CHINCHILLAS IN AMATEUR BREEDING

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Abstract

This study aimed to establish the scale of dental problems occurring in rabbits and chinchillas kept in amateur breeding. Data used in the manuscript was sourced from 129 respondents who participated in a questionnaire survey. Two age groups were distinguished in each of the studied species: in the case of rabbits - animals under 2 years of age (I) and animals over 2 years of age (II), and in the case of chinchillas - animals under 3 years of age (I) and older animals (II). Health issues were reported in 46.7% of the rabbits and 34.3% of the chinchillas. Regardless of the species, the most frequently occurring ailments induced molar hypertrophy and incisor overgrowth. The group of sick animals was predominated by older males. None of the feed types used by the respondents (hay + herbs, loose feed, pellet, and loose feed + pellet) eliminated the incidence of dental problems. In most of the feed models, the contribution of animals with dysfunctions was smaller in the population of chinchillas. The statistical analysis of the incidence of dental problems demonstrated significant differences between male and female rabbits ($p=0.011$) and no significant correlations between feed type and disease incidence ($p=0.457$). In the case of chinchillas, the incidence of dental problems was significantly differentiated by the affiliation to an age group ($p<0.01$) and feed type ($p=0.136$).

Key words: rabbits, chinchillas, dental diseases.

Introduction

Due to the life-long tooth growth, any irregularities in the uniform abrasion of tooth crowns in lagomorphs and rodents underlay dental and orthodontic problems. The causes of emerging dental diseases can include both genetic factors and an improper diet often characterized by a too low fiber content and also contributing to metabolic disorders that lead to the loss of the supporting structures of the teeth. Dental diseases are one of the most common health disorders in the domestic rabbit. Böhmer (2015) reported that 90% of the rabbits being patients of veterinary clinics suffered from a malocclusion caused by pathological lesions in the dentition. The underlying causes of ailments may include deficiency-related, dietary, infectious, and traumatic factors, but more often than in the case of rodents, they are of a congenital nature (Jekl and Redrobe, 2013). Rabbits differ from other vertebrates in the level of pain expression mechanisms, despite the identical perception of pain (Weaver et al., 2010). Not manifesting pain is not the same as not feeling pain, but it can make it difficult for the owner to perceive the symptoms of the disease early. Böhmer and Böhmer (2017) observed the effect of diet on the morphology of rabbit skull, which was preserved by the phenotypic plasticity phenomenon. These authors demonstrated the maladaptive variability of the skull morphology in domestic rabbits due to the selection carried out by breeders. Wild rabbits usually have a long and flat skull with the nasal bone protruding forward above the incisors, while domestic rabbits have a short and more square skull. The phenotypic lesions in domestic rabbits affect their chewing ability and, consequently, their oral health. The way the wild lagomorphs feed ensures that their teeth are properly loaded by carrying out physiological lateral sliding movements and avoiding direct axial loads. The tendency to develop dental defects in chinchillas is determined, just like

in rabbits, by genetic predisposition, as well as by the specific skull and teeth morphology. Breeding mistakes are a factor that accelerates their development (Crossley, 2001). Although initially focused on the dentition, over time dental problems become the cause of disorders in other organs and systems. For this reason, it seems reasonable to define them with the notion of a syndrome. Treatment of dental diseases is aimed at restoring the proper functioning and anatomy of the dentition. The pain associated with the disease makes it necessary to provide the animal with effective analgesia until the optimal chewing function is restored (Lennox, 2008). The owner's education in the correctness of feeding and rearing plays a major role in the prevention and control of dental diseases in the herein discussed species.

The aim of this study was to illustrate the scale of occurrence of dental problems in rabbits and chinchillas kept by amateurs, and to analyze the collected data in terms of potential correlations between the frequency of their occurrence and animal gender, age, and diet.

Material and methods

The study was based on a questionnaire survey performed among amateur breeders of rabbits and chinchillas. Answers were received from 129 respondents, including 63 owners of rabbits and 66 owners of chinchillas, via on-line questionnaire developed based on the website www.google.pl/intl/pl/forms/about/. The questionnaire consisted of 15 questions, including 4 open and 11 closed ones. In most cases, the animals were kept in groups. Therefore, ultimately, answers were achieved regarding 122 rabbits and 166 chinchillas. For the needs of this study, two age groups were distinguished in each species of animals owned by the respondents: in the case of rabbits: group I – animals under 2 years of age and group II – animals over 2 years of age; in the case of chinchillas: group I – animals under 3 years of age and group II – older animals. The division was made based on the conclusions formulated by veterinarians after the analysis of medical records of lagomorphs and rodents. According to Kliszcz (2015b), the

incidence and specificity of dental problems in rabbits leads to the identification of two groups of patients: young individuals (already several months old), in whom most of the teeth in one or both arcades of a given side or all teeth at the same time are affected by a rapidly developing pathological process as well as animals of a few and several years of age, in which the dental defect develops asymptomatically for many months or years. The second group is characterized by a greater number and variety of symptoms. The somatic growth of the skull ends in rabbits at 18 months of age and all dental changes appearing afterward are of acquired character.

In the case of chinchillas, the veterinary practice distinguishes two groups of patients. The first one includes young chinchillas under 3 years of age with very advanced lesions and unsatisfactory prognosis as well as older ones with milder lesions, which, however, are underlying causes of chronic diseases (Böhmer, 2015). The answers to the questions in the questionnaire regarding age, sex, type of feed given to animals and the way in which access to hay is provided, allowed us to prepare Tables 1 and 2, as well as a summary showing the numbers of animals of a given species fed with a particular type of feed.

Table 1. Number of rabbits in age groups

Group	Females		Males		Total
	n	**%**	**n**	**%**	
I	5	38,5	8	61,5	13
II	44	40,4	65	59,6	109
Total	**49**	**40,2**	**73**	**59,8**	**122**

Table 2. Number of chinchillas in age groups

Group	Females		Males		Total
	n	**%**	**n**	**%**	
I	18	46,2	21	53,8	39
II	44	34,6	83	65,4	127
Total	**62**	**37,3**	**104**	**62,7**	**166**

While defining the feeding model, the respondents were asked to choose between four types of feed administered to their animals:

- hay + herbs – 33 rabbits (27.05%) and 20 chinchillas (12.05%)
- loose feed – 18 rabbits (14.75%) and 45 chinchillas (27.11%)
- pellet – 66 rabbits (54.1%) and 55 chinchillas (33.13%)
- loose feed + pellet – 5 rabbits (4.1%) and 46 chinchillas (27.71%).

The respondents owned both the animals with diagnosed dental problems and those without any symptoms of these health issues. Considering the data included in the questionnaire, the term 'healthy animal' should be seen as an expression of the subjective opinion of the owner, not always confirmed by an examination made by a veterinarian.

The analysis of the collected data in terms of potential correlations between the variables was based on the results of the chi-square test.

Results

Rabbits

Considering the sex of animals owned by the respondents, males predominated over females, regardless of age group and species. Answers to questions about the occurrence of a dental problem and specifying its nature showed that dental problems afflicted 46.72% of the rabbits.

The number of males in this group was 2.5 times greater than the number of females (Table 3). Comparing the number of sick animals to the size of the studied population of each sex, it can be concluded that sick males (56.16%) prevailed over healthy males, whereas sick females were inferior compared to the healthy ones (32.65%). The statistical analysis of the frequency of occurrence of dental problems showed significant differences between rabbits of different sexes ($p = 0.011$). In age group I, including 13 individuals, dental problems were diagnosed in 38.46% (n=5) of the rabbits, including 4 males. In the group of 109 older individuals (group II), the number of healthy rabbits (52.29%, n=57) exceeded the number of six animals (47.71%, n=52), among whom the sex-dependent tendency was similar to group I, i.e. a higher number of males than females.

Table 3. Numbers of sick and healthy rabbits depending on sex and age group

Sex	Females		Total	%	Males		Total	%
	Group I	Group II			Group I	Group II		
Sick	1	15	16	32,65	4	37	41	56,16
Healthy	4	29	33	67,35	4	28	32	43,84
Total	**5**	**44**	**49**	**100**	**8**	**65**	**73**	**100**

p=0,011

All animals kept by the respondents had access to hay, regardless of the other administered feed types. Hay was administered to 97.54% of the animals *ad libitum*, while the others received it irregularly. As seen from data in Table 4, the number of sick animals exceeded that of healthy animals in most of the feeding models. The highest percentage of animals with dental problems was recorded among the rabbits fed loose feed + pellet (Table 4). The sick animals included males from group II. The lowest percentage of animals with dysfunctions was determined in the group of rabbits fed only hay + herbs. Except for one animal, the sick rabbits (7♂ and 4♀) were those aged over 2 years. There were no statistically significant correlations between

neither the frequency of occurrence of dental problems qualifying the animals as sick (p=0.107), nor the development of a given ailment (p=0.457) and feed type.

Table 4. Dental problems in rabbits depending on the variant of feeding

No.	Type of feed	Percentage of animals with dental problems (%)	Total number of animals	P*- value			
				1	**2**	**3**	**4**
1	Hay and herbs	33,3	33	–			
2	Loose feed	61,1	18	0,056	–		
3	Pellet	47	66	0,196	0,288	–	
4	Loose feed + pellet	80	5	0,047	0,433	0,154	

*P-value of chi-square test

When asked about the dental problems of their pets, the respondents indicated teeth overgrowth as the most frequent defect (tab. 5). Dental defects, regardless of their type, affected more females than males. The most frequently reported dental defect turned out to be molar hypertrophy.

Table 5. Dental problems in female and males rabbits

Dental problems	Females		Males		Total	**%**
	n	**%**	**n**	**%**		
Molar hypertrophy	7	25,93	20	74,07	27	47,4
Incisor overgrowth	4	26,7	11	73,3	15	26,3
Mandibular abscess	5	33,3	10	66,7	15	26,3
Total	**16**		**41**		57	**100**

Dental problems most often diagnosed in the group of younger rabbits (group I) included incisor overgrowth and mandibular abscess, whereas in the group of older rabbits (group II) – molar hypertrophy. The frequency of occurrence of a given dental problem was not age-dependent (p=0.571).

Questions concerning the prophylaxis of dental diseases and symptoms, the appearance of which prompted a visit to a veterinarian, showed that preventive veterinary examinations were carried out with 67 rabbits (54.9%) to prevent the development of dental problems or to detect them at an early stage. Table 6 lists the types of behaviors manifested in a group of 57 sick rabbits, which became symptoms of dental anomalies for their owners.

Table 6. Symptoms indicating dental diseases in rabbits

Symptoms	**n**	**%**
Salivating	13	22,8
Watery eyes	9	15,8
Loss of appetite	9	15,8
Selective appetite (Avoiding hard pieces of feed)	6	10,5
No symptoms; diagnosis given during a visit to the veterinarian	6	10,5
Abnormalities in the functioning of the digestive system	4	7
Protruding teeth	4	7
Weight loss	3	5,3
Apathy	3	5,3
Total	**57**	**100**

As it results from the respondents' answers to the question about relapses of the disease, one visit to the veterinarian did not ensure the animal's recovery in none of the cases. Disease

recurrences were reported in 43 (75.4%) rabbits, mainly males aged over 2 years (29♂ in group II and 4 in group I).

Chinchillas

Unlike rabbits, the number of healthy chinchillas exceeded that of the sick ones, but still dental problems were diagnosed in 34.3% of the chinchillas population (n=57). The affiliation to the chinchilla species ($p=0.034$) and feed type ($p<0.01$) had a statistically significant effect on the incidence of dental problems.

Healthy animals accounted for almost 90% of group I and over 70% of group II (tab. 7). The statistical analysis of the frequency of occurrence of dental defects demonstrated significant differences between age groups of chinchillas ($p<0.01$). Like in the case of rabbits, the number of sick males exceeded that of sick females, regardless of the age group. There was no significant correlation between the occurrence of dental problems and sex of chinchillas ($p= 0.439$).

Table 7. Numbers of sick and healthy chinchillas depending on sex and age group

Sex	Group I		Total	Group II		Total
	Sick	Healthy		Sick	Healthy	
Females	0	18	18	19	25	44
Males	4	17	21	34	49	83
Total	**4**	**35**	**39**	**53**	**74**	**127**
%	**10,3**	**89,7**	**100**	**41,7**	**58,3**	**100**

In the case of most feed types used by the respondents, the percentage of animals affected by dental problems was lower than in the population of rabbits (tab. 8). In the case of chinchillas, the incidence of dental diseases was significantly differentiated by feed type ($p=0.012$). The administration of hay + herbs and loose feed was associated with the highest

number of dental diseases, which – as in the case of rabbits – affected mainly older males (hay + herbs – 9♂ and 1♀ from group II; loose feed + pellet – 3♂ from group I and 11♂ and 8♀ from group II). The lowest incidence of dental diseases was determined in the case of animals fed the pellet. No significant correlations were found between the appearance of a given disease entity and feed type (p=0.136).

Table 8. Dental problems in chinchillas depending on the variant of feeding

L.p No.	Type of feed	Percentage of animals with dental problems (%)	Total number of animals	P*- value			
				1	**2**	**3**	**4**
1	Hay and herbs	50	20	–			
2	Loose feed	48,9	45	0,934	–		
3	Pellet	21,8	55	0,018	0,0045	–	
4	Loose feed + pellet	28,3	46	0,089	0,0432	0,455	

*P-value of chi-square test

Dental problems occurring in the highest frequency, mainly in the chinchillas over 3 years of age, included molar hypertrophy and incisor overgrowth (tab. 9). Both these ailements affected 90% of the animals from group II and more often males than females.

Table 9. Dental problems in female and male chinchillas

Dental problems	Females		Males		Total	%
	n	**%**	**n**	**%**		
Molar hypertrophy	10	35,7	18	64,3	28	49,1
Incisor overgrowth	8	40	12	60	20	35,1
Mandibular abscess	1	11,1	8	88,8	9	15,8
Total	**19**		**38**		**57**	**100**

Information collected during the questionnaire survey demonstrated that 102 chinchillas (61.4%) underwent prophylactic veterinary examinations. Table 10 presents symptoms whose presence was perceived by the owners as indicators of dental dysfunctions.

Table 10. Symptoms indicating dental diseases

Symptoms	**n**	**%**
Selective appetite (Avoiding hard pieces of feed)	20	35,1
Weight loss	10	17,5
Lack of appetite	10	17,5
Salivating	9	15,8
Poor coat condition	3	5,3
Apathy	2	3,5
Protruding teeth	2	3,5
No symptoms; diagnosis given during a visit to the veterinarian	1	1,8
Total	**57**	**100**

Disease recurrence was observed slightly more often in chinchillas than in rabbits. It was noted in 47 animals (82.5%), mainly older males (29♂ and 17♀ from group II and 1♂ from group I).

Discussion

Rabbits

Meredith et al. (2015) investigated the effect of four feeding variants (hay; extruded feed + hay; muesli + hay; muesli) on the length and curvature of the cheek teeth and the attrition of incisors in rabbits. The highest rate of incisor attrition was observed in the group of animals fed only with hay. The rabbits fed only muesli initially showed a greater degree of curvature of the cheek teeth, and finally, after 17 months of the experiment, they had longer cheek teeth on the mandible and larger interdental spaces between the first two molars, which should be considered as symptoms of early dental pathology.

The analysis of the data collected for the purpose of this study also showed a significantly lower level of dental dysfunction in animals fed with hay + herbs, compared to those fed with loose feed + pellet. Despite its hardness, the pellet is eaten quickly, which reduces the time spent on the mechanical abrasion of the teeth. The time it takes to ingest hay until the feeling of satiety is achieved takes much longer, and longer chewing translates into more intense abrasion (Richardson, 2004).

The proper course of digestive processes and the need to prevent tooth overgrowth and malocclusion in individuals of both species requires providing the animals with high-fiber fodders (Redrobe, 2008). Insufficient abrasion of the teeth causes an overgrowth of the clinical and alveolar crowns. The later can penetrate into the nasal cavity or even into the orbit. This in turn may lead to problems with mouth closing and to occlusion irregularities which cause the formation of needle-like outgrowths and sharp edges located on the cheek teeth, damaging the

mucosa and likely to induce secondary infections and sometimes abscesses (Strąk and Kliszcz, 2012). During pathological apex hyperplasia, the bony casing of the mandibular canal is destroyed and the mandibular nerve running in its lumen is exposed. The pressure exerted by the teeth during chewing causes pain (Kliszcz, 2014).

The nasolacrimal duct in rabbits runs over the roots of the incisors and premolars. Tooth root hypertrophy and sometimes also calcification of the roots of the upper cheek teeth can cause pressure on the duct, which results in the impairment of tear flow. Patency restriction results in epiphora (lacrimation) – a common cause of inflammation of the lacrimal sac. The obstructed flow of tears promotes the colonization of microorganisms and secondary bacterial infection of the obstructed duct (*Kołodziejska-Sawerska, 2014*). In the group of rabbits analyzed in this study, apart from salivation, watery eyes (lacrimation) was the symptom most often identified by the owners with the appearance of dental dysfunctions.

Rabbits use incisal teeth to remove dead hair and parasites from the fur, therefore the presence of dull and dirty cover is often a symptom of a dental disease (Harcourt-Brown, 2007).

According to Jodkowska and Wojtyś-Gajda (2007), the vast majority of dental defects arise from dental pulp diseases and malocclusions, although their occurrence may also be influenced by a wrong diet. In the case of rabbits analyzed in this study, a veterinarian suggested diet modification for over 60% of the animals, most often consisting in increasing the amount of administered hay.

According to Böhmer (2015), most domestic and farm rabbits crush the food between their teeth (pellet, carrots and other root vegetables), which is associated with a much greater axial load on the molars, pressure on the jaw bone and growing tooth tip, and insufficient abrasion (Donnelly and Vella, 2016). On the other hand, according to De Blas and Wiseman (2010), rabbits and guinea pigs have developed a mechanism that makes the speed of tooth growth dependent on the speed of their abrasion. These authors also suggest that food hardness

may not be as important a nutritional factor as has so far been thought, since the rate of tooth growth is rather affected by the type of food eaten, age and physiological condition, such as pregnancy. According to Wolf and Kamphues (1996), the degree of abrasion of the maxillary incisors is more influenced by the growth of antagonistic incisors of the mandible than by the level of feed hardness. Natural diet, due to the presence of lignin, cellulose and hard silicates (phytolites) in grasses and other plants, ensures the correct course of the abrasion processes. In addition, the phenomenon of "bruxism" is observed during periods of food absence in animals with healthy dentition. It consists in the grinding of incisors and cheek teeth to help maintain their physiological length and shape. Individuals with malocclusion avoid performing these procedures due to the accompanying pain.

Based on the data provided by the respondents, the frequency of diagnosis of periapical abscesses is similar to the results of a study by Bielecki and Wojtyś (2001), according to which cases of abscesses were diagnosed in approximately 30% of the rabbits studied. The often suggested causes of abscesses include: mechanical damage as a result of an injury with a hard element of the feed, hay stabbing into the gum (Szweda, 2014), or feed remaining in the grooves of the cheek teeth, leading initially to ligament damage, and then to the appearance of abscesses (Jodkowska and Wojtyś-Gajda, 2007). An individual feature of rabbits is the presence of weak alveolar-tooth ligaments. The overgrowth of the cheek teeth may be accompanied by the appearance of gaps between them, which are the perfect habitat of bacteria. The tips of the teeth are infected, abscesses form and, as a consequence, extensive lesions of adjacent bones and tissues develop most often within the mandible. The effective treatment of an abscess often requires removing the tooth being the source of the infection (Strąk and Kliszcz, 2012). The presence of a periapical abscess in rabbits is usually accompanied by purulent discharge from the nose or eye. It may also cause bone and marrow inflammation (Reiter, 2008). Information provided in scientific publications addressing the problem of periapical abscesses is often

mutually exclusive, without creating a clear pattern for managing sick animals (Szweda, 2014). Moreover, this data mainly concerns the veterinary aspect of the disease, without taking a position on the influence of nutrition or age on its development. According to Kliszcz (2014), 98% of the diagnosed abscess cases were due to previous dental problems. The chronic and recurrent nature of dental diseases was also confirmed by the results of the present study.

The continuous growth of teeth creates a high demand for calcium, which is essential for the formation of dental tissue (Harcourt-Brown, 2006). Inadequate diet can cause nutritional hyperparathyroidism, calcium and vitamin D_3 deficiencies, and consequently osteodystrophy, and even osteomalacia of the skull bones (Cooper, 2011; Harcourt-Brown, 1996; Harcourt-Brown & Baker, 2001). Progressive mobility and abnormal growth of incisors appear, which causes malocclusion. Teeth do not stick to each other and their mobility increases, leading to the development of interdental gaps and gingival pockets develop in places where the gums attach to the tooth and where food particles and hair accumulate. The inflammation that develops just below the gum line causes bone loss and deeper exposure of the alveolar crown, weakening the tooth attachment. Over time, the bacteria spread to the bottom of the socket and adjacent teeth, while the alveolar bone deforms and eventually resorbs. In the final phase, pus is collected and an abscess is formed (Harcourt-Brown, 2006; Harcourt-Brown, 2007). The metabolic disease leads to the loss of the alveolar bone located at the apex of the tooth, which allows it to overgrow into the surrounding bone and, apart from exerting pressure on the nasolacrimal canal, lead to orbital deformation (Donnelly and Vella, 2016). The consequences of the alveolar bone loss, apart from retrogressive tooth hypertrophy, include bone deformation, followed by teeth bending, separation, and rotation. Thus, calcium and phosphorus should be essential elements of the pellet. The diet of domestic rabbits can be severely deficient in calcium because its grains and legumes are low in calcium and have an inverse calcium to phosphorus ratio (Harcourt-Brown, 1996). Animals who had unrestricted access to hay and grass from an

early age, both of which are sources of dietary fiber as well as calcium and phosphorus, are unlikely to suffer from dental problems (Harcourt-Brown & Baker, 2001). As reported by Brach and Żądło (2005), no cases of dental diseases were reported in rabbits kept in traditional breeding. In turn, Redrobe (2008) demonstrated an increased level of parathyroid hormone (PTH) and a lower concentration of calcium in the blood serum of domestic rabbits diagnosed with dental disease. These results suggest that the rabbit rearing system generates dental diseases and changes in calcium metabolism.

Chinchillas

The number of chinchillas affected by dental diseases in this study was similar to that reported by Crossley (2001). He found dental anomalies in 35% of the animals, out of the 651 chinchillas examined, and emphasized that a small diversification is a very important and characteristic feature of the poor diet of wild animals, and that the reproduction of this nutritional model should support the maintenance of good dental condition of farm animals. Knowledge of the lifestyle and diet of free-living chinchillas is not satisfactory. Their diet is based on high-mountain vegetation, characterized by a high silica content, often covered with sand and therefore hard, and thereby required longer chewing. This process made it possible to maintain a balance between the rate of tooth growth and abrasion (Cortes et al., 2002). According to Kliszcz (2015a), the most popular diet regimen recommended for chinchillas, although with unconfirmed results of scientific research regarding its effectiveness and role in the prevention of dental diseases, includes: good quality hay, pellet, dried vegetables, as well as ingredients contributing to better teeth abrasion, like tree shoots, boards, sticks, or pumice. The addition of high-energy feeds, including dried and fresh fruit as well as nuts, raisins and seeds, is deemed unnecessary and adverse.

According to Crossley (2001), domestication and the related change in diet and living conditions were the underlying causes of dental problems in chinchillas. All kinds of disorders

and health problems can stem from even the slightest dietary mistakes. A study by Crossley on a population of 651 farm, home and zoo chinchillas, including skull measurements, CT scans, radiographs, and histopathological examinations, showed dentition problems in 230 animals (35%). 94% of the animals were diagnosed with an overgrowth of the tips of the cheek teeth, and 69% with an overgrowth of the clinical crown of the cheek teeth. Histopathological examinations of the skulls of 181 animals kept mainly at household conditions showed an overgrowth of the crowns of the cheek teeth in 86% (n=156) and the piercing of the alveolar bones by the overgrown tooth tips in 46% of the examined skulls (n=53). Genetically determined defects (mesiclusion) were found only in two cases. In the group of chinchillas analyzed in this study, the highest percentage of dental problems also concerned molars hypertrophy.

According to Capello (2016), chinchillas are almost always affect by the malocclusion in the area of the incisors as a consequence of cheek teeth diseases. According to this author, the formation of a periapical abscess is a problem affecting individuals over 3 years of age. The results of the survey conducted in this study confirm such a tendency.

In the studied population of chinchillas, the first signs of disease were, similarly as reported by Capello (2005), selective appetite, weight loss, and lack of appetite. The cited author also lists the following typical clinical signs of dental dysfunction: salivating, poor coat condition, apathy, and protruding teeth. According to Barabasz (2001), salivating and watery eyes are the most common visible symptoms of dental defects. They are often accompanied by the presence of sticky hair around the mouth and baldness on the chin and front limbs, caused by rubbing against them with the mouth (Strąk and Kliszcz, 2012). Although avoiding the consumption of hard elements of the feed and lack of appetite are symptoms of not only dental diseases, but their appearance is a legitimate reason for a veterinary control examination. The

clinical symptoms of occlusion problems are identical in both species, but the much smaller chinchilla's mouth makes it difficult to inspect the teeth (Lightfoot, 1997).

The results of the research by Sulik et al. (2004) showed a positive effect of phosphorus, calcium, and vitamin supplementation on the dental condition of animals. The study of Brach and Żądło (2005) was also devoted to the problem of greater susceptibility to occlusion anomalies in chinchillas as a result of calcium and phosphorus deficiencies. These authors hypothesized that the aforementioned deficiencies cause a reduction in the density and, consequently, in the hardness of the bone tissue, because in order to supplement the level of missing minerals, the body absorbs them from this source. The tooth tissue, being much harder than the mandible and exerting strong pressure when grinding the food, may in the case of deficiencies contribute to malocclusion. The osseous tissue becomes a source of covering calcium deficiency also in the case of too high blood levels of phosphates. In rodents, a too high body level of calcium is accompanied by its reduced intestinal absorption (chinchilla does not excrete calcium with urine), whereas a too low calcium level results in its intensified absorption. When the demand is not met, the body uses the calcium contained in the bones, successively weakening their structure. Lagomorphs passively absorb the available calcium by passive diffusion through the intestinal wall, and then actively control its level by excreting its excess with urine (Kliszcz, 2014). Vitamin D_3 plays an important role in the proper absorption of phosphorus and calcium and in preventing their excretion with urine. The feed for chinchillas is low in vitamin D, and additionally low in fat, which impairs vitamin D absorption (Szeleszczuk and Niedbała, 1998).

Recapitulating the study based on the survey results, healthy animals from both age groups outnumbered the sick ones in both rabbits and chinchillas. The most common ailments reported in both species included molar hypertrophy and incisor overgrowth. Older males dominated in the groups of sick animals. The use of hay in feeding rabbits and pellets in feeding

chinchillas was associated with the lowest number of dental problems. The incidence of dental diseases in chinchillas was significantly differentiated by the feed type (the highest number of diseases was associated with feeding hay + herbs and loose feed). Such a relationship was not found in the case of rabbits. In most of the feeding variants compared, the percentage of animals with dental problems was lower in the population of chinchillas than in rabbits.

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