STATISTICAL STUDY ON THE OCCURRENCE OF DENTAL CARIES OF DOMESTIC ANIMALS

I. HORSE

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It is known that dental caries is not limited to human beings but it also found in various animals. As in human beings, dental caries in animals causes a drop in ingestion due to pain or to loss of teeth. The difficulty of mastication causes indigestion. As a result animals suffer subnutrition with a decline in milk production, drop in work capacity and a definite loss of resistance against infection.

While in human beings, prevention and medical treatment in dental caries is applied extensively, hardly anything is done where domestic animals are concerned. Moreover no comprehensive statistical data are available. Attempts have been made in the present paper to clarify the state of dental caries in domestic animals and to set forth an outline of prevention and cure for the disease.

MATERIALS

Use was made of materials from 365 normal healthy horses slaughtered at the Sapporo slaughter house from June 1954 to August 1955 (Table 1).

TABLE 1. *Materials*

AGE	MALE	FEMALE	TOTAL
0～1 month	11	12	23
2 months ～ 2 years	76	72	148
3～ 5 〃	4	14	18
6～11 〃	27	82	109
Over 12 〃	3	64	67
Total	121	244	365

METHOD

Dentographical classification was made using that of human beings as an example, that is to say, the oral cavity was divided into left and right at the median line and by the upper and lower jaw.

Incisor teeth, premolar teeth and molar teeth were indicated respectively by Arabic numerals.

The degree of infection was indicated as in the case of human beings while special considerations were given to the difference in tissues of teeth in human beings and animals. This classification was conducted as follows.

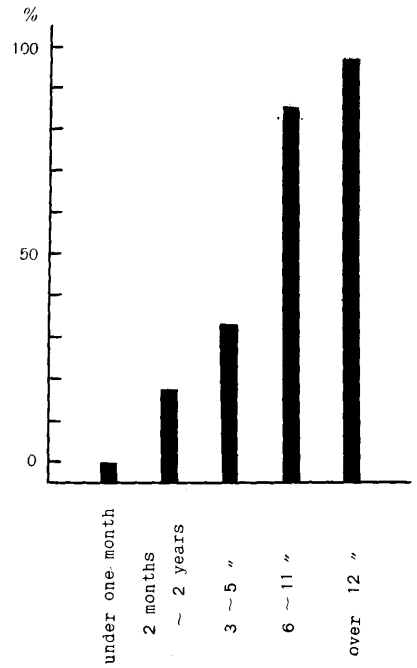
1. First degree of caries: Where the layer of cement is affected and the surface of enamel is changed.
2. Second degree of caries: Where the enamel is affected.
3. Third degree of caries: Where enamel and dentine are affected.
4. Fourth degree of caries: Where the pulp of the tooth is affected and the stump of the tooth is seen.
5. Fifth degree of caries: Where the teeth are completely missing due to caries or extraction.

RESULTS OF OBSERVATIONS

1. Relation between Caries and Age

As seen in figure 1, no evidence of caries was seen in animals aged one month. In animals of 2 months to 2 years of age, however, 17% and of 3 to 5 years of age 33.3% were

FIG. 1. *Relation between Incidence of Caries and Age*



affected with caries, while the values for animals from 6 to 11 years of age were 85.3% and for the animals aged over 12 years 97% were found to be affected. It was found that the number of animals affected with caries increases with the increase in age, and almost all the animals of over 12 years of age are affected with caries.

2. Relation between Caries and Sex

Although dental caries was seen at a higher rate of incidence in females from 1 to 5 years of age than in males, after 6 years of age the rate gradually increase in both sexes to 100% and in old age therefore no difference was seen between the sexes (Table 2).

TABLE 2. *Relation between Caries and Sex*

AGE		NUMBER OF ANIMALS EXAMINED	NUMBER OF ANIMALS AFFECTED WITH CARIES	PERCENTAGE OF INCIDENCE (%)
0～1 month	♂	12	0	0
	♀ 11		0	0
2 months ～ 2 years	♂	72	15	20.8
	♀ 76		7	9.2
3～ 5 〃	♂	14	5	35.7
	♀ 4		1	2.5
6～11 〃	♂	82	70	85.4
	♀ 27		23	85.2
Over 12 〃	♂	64	62	96.9
	♀ 3		3	100
Total	♂	244	152	
	♀ 121		34	

Note: ♂…Male ♀…Female

3. Incidence Rate of Loss of Teeth

As seen in table 3, it may be assumed that loss of teeth resulting from caries was limited, inasmuch as only 12 horses out of the 365 examined were affected in this manner. It was shown that while in the low age groups loss of teeth was not seen, in age groups over 6 years the first appearances were noted. Half of the animals suffering from loss of teeth were over 11 years of age.

Most cases of loss of teeth were seen in the first molar tooth followed by the third premolar tooth. One or two cases of loss of teeth were seen in the second premolar tooth and the second molar tooth. In the anterior part no cases were found (Table 4).

Since the number of samples examined was limited, a comparison between upper and lower jaw and also between left and right side could scarcely be made.

TABLE 3. *Incidence Rate of Loss of Teeth*

AGE	NUMBER OF ANIMALS EXAMINED			LOSS OF TEETH
	Male	Female	Total	
0～1 month	11	12	23	0
2 months ～ 2 years	76	72	148	0
3～ 5 〃	4	14	18	0
6～11 〃	27	82	109	2
Over 12 〃	3	64	67	10
Total	121	244	365	12

TABLE 4.

		INCISOR TEETH			CANINE TEETH	PREMOLAR TEETH			MOLAR TEETH			TOTAL
		I_1	I_2	I_3		P_1	P_2	P_3	M_1	M_2	M_3	
Upper	Right	0	0	0	0	0	0	1	1	0	0	2
	Left	0	0	0	0	0	1	1	0	0	0	2
Lower	Right	0	0	0	0	0	1	0	2	1	0	4
	Left	0	0	0	0	0	0	1	3	0	0	4
Total		0	0	0	0	0	2	3	6	1	0	12

4. Rate of Incidence of Caries in Each Tooth Age

Up till 2 years of age: As may be seen in table 5 the third milk premolar tooth was mainly affected while the second milk premolar tooth followed. Only a limited number of cases of caries were seen in the incisor teeth.

From 3 to 5 years of age: Whereas no caries were seen in the incisor teeth, many premolar and molar teeth were affected by caries especially in the third premolar and the first molar teeth.

From 6 to 11 years of age: Caries in the first molar tooth showed the highest rate of incidence followed by the third premolar and the second molar teeth. In the incisor teeth, the rate of incidence was highest in the second tooth followed by the third and the first teeth

After 12 years of age: Caries in the first molar tooth showed the highest rate of incidence followed by the third premolar and the second molar teeth.

In all cases the rate of incidence in the premolar and the molar teeth was higher than that in the incisor teeth.

TABLE 5. *Rate of Incidence of Caries in Each Tooth by Age*

AGE		INCISOR TEETH						CANINE TEETH		PREMOLAR TEETH						MOLAR TEETH						TOTAL
		I_1		I_2		I_3				P_1		P_2		P_3		M_1		M_2		M_3		
		L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	
Up to 2 years	Upper	0	0	0	1	1	1	0	0	0	1	2	2	6	2	1	1	·	·	·	·	18
	Lower	0	1	1	0	0	0	0	0	3	1	9	4	9	6	0	4	·	·	·	·	38
	Total	1		2		2		0		5		17		23		6		·		·		56
3～5 〃	Upper	0	0	0	0	0	0	0	0	1	1	2	1	3	1	2	1	1	1	1	1	16
	Lower	0	0	0	0	0	0	0	0	1	2	3	3	3	5	7	6	2	3	1	2	38
	Total	0		0		0		0		5		9		12		16		7		5		54
6～11 〃	Upper	8	8	14	12	10	10	2	2	10	5	10	8	29	25	47	49	21	19	13	6	308
	Lower	6	3	9	15	8	14	0	0	10	10	20	17	32	31	50	47	38	34	17	14	375
	Total	25		50		42		4		35		55		117		193		112		50		683
Over 12 〃	Upper	9	8	10	10	9	9	0	0	14	13	14	16	26	23	41	34	25	22	15	17	315
	Lower	3	3	4	3	3	4	0	0	17	14	22	18	30	25	35	29	26	22	20	15	293
	Total	23		27		25		0		58		70		104		139		95		67		608

Notes: L ……Left
R ……Right

5. The Degree of Caries in Each Tooth Group

Incisor teeth: In the milk teeth group, caries were of the first degree. In the ages from 3 to 5 years, no caries were seen owing to changes from old to new teeth. In the ages from 6 to 11 years caries were of the second degree. After 12 years of age, the third degree of caries appeared. The fourth degree of caries was not seen in any age group.

Canine tooth: The canine tooth is itself seen only in male horses of over 6 years of age. In 3 horses observed, no caries were seen in the lower jaw while two cases of caries were seen in the upper.

Premolar and molar teeth: Up till two years of age the first degree of caries showed the highest rate of incidence followed by a few samples of the second and the third degree. The same tendency was seen in the teeth of horses ranging from 3 to 5 years of age. After 6 years the third and the fourth degrees of caries increased with age.

DISCUSSION

For the present investigation it was difficult to get a random sampling. Therefore in discussion of the present data special consideration should be paid.

The observations as presented in this paper show that the incidence of caries increases with age attaining almost 100 % in samples after 12 years of age. In other words, dental caries of the horse increases gradually with age.

That a higher rate of caries was seen in females as compared with males through all ages seems to be due to sex difference, taking into consideration the fact that in the female in young age, that is to say, in ages before pregnancy also, the rate of caries is higher than in male. The caries in male, however, increases with age to a larger extent than in females and there seems at least little difference between the two sexes. This increase of caries in male in old age might be conjectured to be due to the higher muscle service of male than of female. Further investigation will be required, however, to determine the cause.

The reason for the higher incidence of molar infection in comparison with incisor infection seems to be largely due to the morphological difference. The former has more sulcus and cavity on its surface than the latter.

These are causes for the stagnation of food residue, which eventually gives rise to dental caries.

Teeth ground thin by over usage together with broken or damaged teeth are also assumed to give rise to dental caries.

The higher incidence of caries in the lower jaw as compared with the upper jaw seems also to come from the morphological difference of tooth and fang.

As the space between teeth in the former is larger, it follows that the amount of residue lodging in this space is larger.