

**RHINITIS OF THE DOMESTIC RABBIT. AN EPIDEMIOLOGICAL SURVEY DURING THE PERIOD 1986-1991. I. INFLUENCE OF THE YEAR, SEASON AND TYPE OF RABBITRY.**

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**ABSTRACT**

A study has been undertaken to establish the prevalence of rhinitis, or "snuffles", during the period 1986-1991. In that study, a total of 53632 females and 2752 males have been examined, distributed amongst 1869 sampling procedures at 435 rabbitries, with a number of females at production comprised between 100 and 2500 does per rabbitry. The rabbit-raising farms were located on 37 different provinces of Spain, insular as well as peninsular.

The mean percentage of rabbits with rhinitis was particularly high, about 40%, but it has been substantially reduced during that 6-year period. The seasonal influence is important, with a major number of affected rabbits during the months of July, August and September of each year. We have also found significant differences in the percentage of rhinitis associated with the type of rabbitry.

**INTRODUCTION**

In the husbandry of rabbits as meat-producing animals, the respiratory diseases are those with a paramount technical and economical incidence between adult animals (1,5,6,7,10,13,15,18). Rhinitis is the most common clinical form (4,19). It always must be considered as a dangerous condition (1), provided it is harmful by its self, and that it can be coincident or give rise to other severe clinical forms of the respiratory syndrome: pneumonia, otitis, encephalitis, metritis, etc. (2,5,6,9).

The pathological processes of the higher respiratory tract, are the result of a combination of infecto-contagious and multifactorial causes, to which one must add the anatomical features of the nasal sinuses of the adult rabbit (6).

Rhinitis is one of the most typical clinical forms of the flock pathology (3), and it is widely diffused amongst the rabbit-raising farms (11,12,16,17), specially in those rabbitries with closed rabbit buildings (14).

When an epidemiological survey is started at one or several rabbitries, the prevalence of rhinitis is an important and very useful hygienic indicator (1,11,16), although to assess precisely the severity of a respiratory process, it is necessary to supplement this information with some other parameters, as can be the simultaneous presence of different clinical situations, as can be pneumonia, otitis and metritis at the nursery, and also coryza, subcutaneous abscesses, pneumonia and otitis at the fattening section (17).

The goal of this work is to study the prevalence of rhinitis within different rabbit populations, during a six-year period. In the first part, we studied the influence of the year, season and type of rabbitry. In the second part, we discuss the influence of sex and of the productive stage of the doe.

## MATERIALS AND METHODS

The epidemiological survey was carried out during the period comprised between January 1986 to December 1991. Throughout the interval of the study, 616 different rabbit-raising farms were visited, with a number of producing does comprised within 100 and 2500 females per rabbitry, being the most frequent number about 150 and 350 does.

As can be seen from Table 1, the total number of visits was of 3774; a rabbitry visited was such one where you can go inside and take a look to the animals; this statement is made because, in some cases, we only had a talk with the rabbit raiser, at the office or outside the building.

The rabbitries examined were those in which a sampling of the lactating does was taken, about a 5% of the stock, chosen randomly, if they had more than 1000 does, or a 10% if they had less than 1000 does. The number of rabbit-raising farms surveyed was of 435, with a total of 1869 examinations. All the sampling procedures were carried out by the same veterinarian, with a notebook schedule as that showed in the following example:

NAME						DATE						NUM.DOES(E.G.:160)					

During the period 1986-1991, 53632 does were examined individually; for each one of them the nose and the medial face of the forelimbs were inspected very carefully to ascertain if rhinitis was present, because of the appearance of the characteristic mucopurulent discharge and/or because they had the fur of the front feet clotted. At the same time, the presence of mastitis, wounds in the sole of the limbs or mange, was also considered. In the year 1990, we begin to examine 3-5 males per rabbitry, and since June 1991 a minimum of 10 bucks were inspected each time.

In that study a data bank has been used, which contains the total number of does and bucks examined and also those that were ill, for each one of the 1869 sampling procedures performed. Amongst the population employed, the 435 rabbitries sampled, there were different climatic zones: mediterranean, continental and atlantic, with cold (0-10°C) and dry winters, but specially humid (60-70% RH), and warm (25-35°C) and humid summers, but specially dry (20-30% RH). Of them, 27 rabbitries were open-air or semi open-air type, with metal sheet or metal wire cages or with cages constructed with solid concrete; however most of them had closed buildings, with static ventilation, by windows, or dynamic ventilation, employing forced-air ventilation systems by overpressure or air extraction. For that study, we considered only 13 open-air type rabbitries, with solid concrete cages, with a total population of 5850 does. This 13 rabbitries will be designated TG-2, and all the other rabbitries included in the study will be designated TG-1. The factors associated with the animal, feeding and management, are not considered as variables. The statistical treatments applied, are described with each parameter under study.

YEAR SOURCE	1986	1987	1988	1989	1990	1991	TOTAL
RABBITRIES VISITED	185	190	192	197	222	205	616*
NUMBER OF VISITS	769	690	709	650	521	435	3774
RABBITRIES EXAMINED	92	105	130	154	191	177	435*
NUMBER OF EXAMS	232	323	314	365	361	274	1869
DOES EXAMINED	5548	7998	8641	10981	11200	9263	53632

Table 1.- General features of the study. Period 1986-1991.

\*This is the number of different rabbitries, not the summatory of the six years (NUMBER OF EXAMS OR FREQUENCY).

## RESULTS AND DISCUSSION

With the general data bank of 53632 does, a factorial analysis of variance was made, where the influence of the year (1986-1991) and the season (April-June: spring; July-September: summer; October-December: autumn; January-March: winter) were investigated.

SOURCE	SUM. OF SQUARES	DEGREES FREEDOM	MEAN SQUARE	F	TAIL PROB.
MEAN	188075.47	1	188075.47	4607.03	0.000
YEAR	521.14	5	104.22	2.55	0.026
SEASON	2472.76	3	824.25	20.19	0.000
Y x S	2436.16	15	162.41	3.98	0.000
ERROR	75319.47	1845	40.82		

Table 2.- Analysis of variance for the % of does with rhinitis.

similar to those obtained for the interval 1983-1985, a 41% of rhinitis, with a sample of 3088

The two sources of variation, year and season, are significant as can be seen from Table 2.

Next, we studied the results as a function of the year, as it is shown in Table 3.

During the years 1986 and 1987 the mean percentages of does with rhinitis, 43.55% and 41.96% respectively, were very

does coming from 101 rabbitries (16). Some other authors have also obtained results which range around a 40% of rhinitis (20,12,11), thus representing a relatively high percentage of sick animals. Although in our case, from 1983 to 1987 it was maintained above a 40% but, since the

last year, an improvement in the percentage of affected does has been observed.

To quantify that correlation, a linear regression was made between the year and the mean yearly percentage of rhinitis. The coefficient of correlation obtained was high ( $r = 0.90 \pm 0.21$ ) and the coefficient of regression was negative ( $-2.70 \pm 0.65$ ). Considering

YEAR	TOTAL FREQUENCY	MEAN	STANDARD DEVIATION	STD.ERR. OF MEAN	COEFF. OF VARIATION
1986	232	43.55	17.06	1.1203	0.39
1987	323	41.96	15.74	0.8760	0.37
1988	314	37.24	15.92	0.8985	0.42
1989	365	32.36	16.53	0.8653	0.51
1990	361	29.49	15.36	0.8086	0.52
1991	274	33.05	17.42	1.0526	0.52
TOTAL	1869	35.78	17.02	0.3938	0.47

Table 3.- Annual evolution for the % of does with rhinitis.

those data, if the rate of decrease is similar to that of these years (1986-1991), one can estimate an annual fall of 2.70.

From our point of view, this improvement in the situation is due to a best clinical and epidemiological knowledge about rhinitis, to an enhancement of the environmental conditions and to a best application of the therapeutical measures as well as to a reinforcement of the prophylactic ones (culling of sick animals and environmental disinfection).

It is important to remark that during the years 1986-1981, there were only 27 rabbitries duplicated, which were sampled on each one of the 6 years. If the 92 rabbit-raising farms sampled on 1986, had been also duplicated during all the 6 years, the decrease in the percentage of rhinitis, may have been even greater. However, the control measures applied to the farms recently incorporated to the sampling procedure (1990-1991), were more efficient than those applied in the former years.

In Table 4 are shown the results corresponding to the seasonal factor. In a preceding work (16),

we have observed a variation associated with the season of the year, but we thought it would be imperative to evaluate information from some more years. Those variations related to the season of the year, have also been described by some other authors (4,8,18,19,20).

SEASON	TOTAL FREQUENCY	MEAN	STANDARD DEVIATION	STD.ERR. OF MEAN	COEFF. OF VARIATION
SPRING	469	36.69	17.02	0.78	0.46
SUMMER	459	41.76	16.71	0.78	0.40
AUTUMN	481	33.11	16.35	0.74	0.49
WINTER	460	31.65	16.24	0.75	0.51
TOTAL	1869	35.78	17.02	0.39	0.47

Table 4.- Seasonal evolution for the % of does with rhinitis.

Webster (19,20) examined 4455 rabbits during the period comprised between November 1924 and August 1925, distributed in four sampling intervals, and with the following results: 46.2% in November; 48.9% in February; 49.1% in May and 43.3% in August. This author postulates that the periods with a major number of sick animals were September/October and March/April. Our results differ partially from those obtained by Webster, which, in our opinion, may be a consequence of the climatic factors. In Spain, summer is characterized by very high temperatures and low percentages of relative humidity, specially in the central areas of the country. All these factors constitute a severe threat for the respiratory tract of the rabbit, which associated to a loss of unspecific protection in the animals, because of a decrease in the feed consumption ranging a 20-30%, stimulates an increase in the percentage of sick animals.

**Table 5** shows another analysis of seasonal means. As can be seen from it, there are big differences between seasons; if you make groups using the statistical differences between them, three groups are obtained, from greater to lesser incidence: summer, spring and autumn-winter. In Spain, the cold in the winter is generally combined with an elevated atlantic humidity, which favours a greater diffusion of the infecto-contagious diseases. The fact that this situation is coincident with a small percentage of rhinitis affected animals, may be a consequence of a greater feed consumption by the does during that period, and to a better conditioning of the buildings, which is, however, only an hypothetical association in our work; its meaning may also be a decrease in the sensibility of the respiratory apparatus of the rabbit during the winter.

SEASON	GROUP	MEAN	WINTER	AUTUMN	SPRING	SUMMER
SUMMER	A	41.76	9.24*	7.99*	4.65*	—
SPRING	B	36.69	4.62*	3.32*	—	5.07
AUTUMN	C	33.11	1.34 NS	—	3.58	8.65
WINTER	D	31.65	—	1.46	5.04	10.11

**Table 5.** - Comparison of the means for the % of does with rhinitis in different seasons.

Different letters mean different groups.

Upper diagonal, t of Student.

Lower diagonal, differences between means.

NS, non significant differences.

\*  $p < 0.001$

To evaluate the influence of the type of rabbitry considered, a total of 84 sampling procedures applied to 3093 does, corresponding to the 13 open-air type rabbitries with concrete cages and named TG-2 in Materials and Methods, were carried out during the period 1986-1991.

In **Table 6** are shown the results of the analysis, as a function of the type of rabbitry, during all the 6-year period.

YEAR	TYPE OF RABBITRY	NUMBER DOES EX.	TOTAL FREQ.	MEAN	STAND. DEVIAT.	STD. ERR. OF MEAN	COEFF. OF VARIATION
1986	TG-1	5478	229	43.77	17.05	1.12	0.38
	TG-2	70	3	27.00	7.55	4.35	0.27
1987	TG-1	7671	311	42.94	15.22	0.86	0.35
	TG-2	378	13	19.38	9.92	2.75	0.51
1988	TG-1	8008	295	38.67	14.99	0.87	0.38
	TG-2	583	18	12.77	9.75	2.29	0.76
1989	TG-1	10201	345	33.46	16.09	0.86	0.48
	TG-2	780	20	13.45	12.05	2.69	0.89
1990	TG-1	10530	343	30.11	15.45	0.83	0.51
	TG-2	630	18	17.83	6.33	1.49	0.35
1991	TG-1	8863	265	33.47	17.48	1.07	0.52
	TG-2	400	9	20.77	9.45	3.25	0.46

**Table 6.** - Type of rabbitry and % of does with rhinitis.

probably due to a lack of homogeneity for individual years.

TYPE OF RABBITRY	NUMBER DOES EXAMINED	TOTAL FREQ.	MEAN	STAND. DEVIAT.	STD. ERR. OF MEAN	COEFF. OF VARIATION
TG-1	50751	1788	36.65	16.75	0.40	0.45
TG-2	2881	81	16.54	10.11	1.12	0.61

**Table 7.** - Type of rabbitry and % of does with rhinitis.

greater than in the last years (1990-1991), which is a consequence of the fall in the incidence observed in type-1 rabbitries, already reviewed. This fall has not been observed in type-2 rabbitries, which are stationary during all the 6 years.

As can be seen from the table, there are big differences between both groups, as it is also shown in **Table 7**.

The difference between the two types is very high (20.11%), being also statistically significant (t of Student = 16.88,  $p < 0.001$ ). That difference is greater than the one obtained in the study carried out during the years 1990-1991,

In **Table 8** the differences within each year are represented.

As can be seen in that table, in the years 1986-1989 the difference is

YEAR	TYPE OF RABBITRY		DIFFERENCE	t STUDENT
	TG-1	TG-2		
1986	43.77 ± 1.12	27.00 ± 4.35	16.77	3.73*
1987	42.95 ± 0.86	19.38 ± 2.75	23.56	8.17*
1988	38.69 ± 0.87	12.77 ± 2.29	25.90	10.53*
1989	33.46 ± 0.86	13.45 ± 2.69	20.01	7.06*
1990	30.11 ± 0.83	17.83 ± 1.49	12.27	7.18*
1991	33.47 ± 1.07	20.77 ± 3.25	12.70	3.70*

Table 3.- Yearly evolution for the % of does with rhinitis and type of rabbitry.

\* p<0.001

All those results cannot be extrapolated to other open-air types of rabbitries, and are exclusively referred to a model of rabbitry which is located within an area of 70 Km in the Catalanian coast zone; however, they partially agree with the observations made by Lieve Okerman (14).

From all the data presented, the following conclusions can be outlined:

- Rhinitis is a respiratory disease with an elevated mean prevalence (40%) in the 435 rabbit-raising farms examined.
- A progressive lowering in the percentage of affected does, has been observed throughout the 6 years of the study.
- The seasonal influence is highly significant, reaching the maximum of affected does in summer.
- The percentage of sick does may vary as a function of the type of rabbitry, being remarkable an open-air model with a level of rhinitis much more lower than the mean.

**Acknowledgements:** We thank Montse Saco for her help in preparing the translation and writing this paper (parts I and II).

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