

**RHINITIS OF THE DOMESTIC RABBIT. AN EPIDEMIOLOGICAL SURVEY DURING THE PERIOD 1986-1991. II. INFLUENCE OF THE SEX, NUMBER OF KINDLING AND PHASE OF LACTATION.**

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**ABSTRACT**

In this work the prevalence of rhinitis as a function of different factors inherently associated with rabbits, as can be the sex, the phase of lactation and the number of kindling, is studied. In addition, the association of rhinitis with other simultaneous disease processes in the same doe, has been evaluated. Finally, the influence of the application of an antibiotic at kindling in the percentage of diseased does, is examined.

The work was carried out during the subinterval comprised between the years 1987-1991, using two data bases, one with 53632 females and 2752 males, and the other one with 4201 does individually identified. That second data bank was joined to another one with 4723 does, in which the association of diseases was also investigated.

It has been noticed that rhinitis is prone to predominate in bucks more than in does. No relationship has been found with the other two parameters, phase of lactation and number of kindling. Mastitis and rhinitis are significantly associated in diseased does, but rhinitis and "sore hocks" are not.

Likewise, we have not found a significant influence of the medication at kindling upon the percentage of rhinitis affected does; however, a drift towards a reduction has been recognised in medicated ones.

**INTRODUCTION**

The mean prevalence of rhinitis in rabbit-raising farms, is particularly high in adult animals (7), although there are some rabbitries with figures rather below and above those mean values. Moreover, in association with that variability between rabbitries, in the practice the veterinarian can also report a highly irregular degree of affection amongst adult rabbits within the same rabbit-raising farm.

Their rapid reproductive rate and, in addition, their generational interval so short, are some of the causes that made rabbit raising so complex. A doe is exposed to such a physiological pressure

and supports such rapid neuroendocrine changes, that requires an accurate balance of the management to which she is subjected, to avoid the arising of undesirable situations of organic weakness and sanitary risk.

Fluctuations in the sanitary condition of does, concerning to rhinitis, have been already reviewed by some other authors (1). Patton (1988) suggested that the reproductive stress is associated with the development of respiratory diseases.

It is generally recognized that one of the main causes of culling in does are respiratory disorders (1,7,8); however, those affections can be found significantly associated, in the farm as well as in the laboratory, with other intercurrent diseases, as can be "sore hocks" (8) and mastitis (5). The aim of this work is to study the prevalence of rhinitis as a function of the sex, the phase of lactation and the number of kindling of the doe. Furthermore, the efficiency of some therapeutical measures over rhinitis is investigated.

## MATERIALS AND METHODS

To carry out this work two data banks have been used; a general one, built up with the mean prevalences of rhinitis in 435 rabbitries, with 53632 does examined during the interval 1986-1991. The second data bank comprised 4201 does, and it contained also information about the disease processes observed in each doe, the phase of lactation, if less or more than 15 days have elapsed from the kindling, the number of kindling and also if the doe has been medicated at kindling with an antibiotic; it was built up with data coming from 105 rabbit-raising farms, located in 24 provinces of Spain, visited and sampled during the interval comprised between June-December 1991.

The sampling procedures were always carried out by the same veterinarian, regularly assisted by another colleague, from a team of 10 veterinarians, devoting to rabbit production more than the 50% of its time.

During the period 1987-1988, another data bank was used, built up with 4723 does, very similar to that of 4201 females used for this study, to asses the simultaneous prevalence of various disease conditions (rhinitis, mastitis, "sore hocks" and mange) in the same doe (Rosell, 1990, unpublished data).

As in part I of this work (7), we will use simultaneously the terms rhinitis or "snuffles"; however, in Spain rabbit practitioners commonly use to say rhinitis or coryza.

The statistical treatments applied, are described with each one of the parameters analyzed.

## RESULTS AND DISCUSSION

### *Prevalence of rhinitis as a function of the sex.-*

In a complete analysis in which the sex was the only qualitative variable considered, and carried out during the years 1990 y 1991, the results outlined in Table 1 were obtained. As can be seen from it, there is a difference of a 4.35% in favour of does. The higher coefficient of variation found in males, is due to the smallest size of the sample, and for that reason, the results obtained in does are more confident.

SEX	NUMBER OF RABBITS	TOTAL FREQUENCY	MEAN	STANDARD DEVIATION	STD.ERR. OF MEAN	COEFF. OF VARIATION
MALES	2752	610	35.24	28.66	1.16	0.81
DOES	19870	610	30.89	16.37	0.66	0.53

Table 1.- Influence of the sex in the % of adult rabbits with rhinitis.

However, this bias could be true because, from our point of view, does are given more hygienic and therapeutical care than males.

This analysis can also be done as a function of two variables, the sex and the type of rabbitry (see part I of the study, Rosell et al., 1992), as indicated in Table 2. As can be seen in that

SEX	MEAN ± STD.E. RABBITRIES		DIFFERENCE	t OF STUDENT
	TYPE 1	TYPE 2		
MALES	36.06 ± 1.18	17.55 ± 4.02	18.51	4.40**
DOES	31.44 ± 0.68	18.81 ± 1.45	12.63	7.84**

Table 2.- Influence of the sex and the type of rabbitry in the % of snuffles.  
\*\* p<0.001

table, there are big differences which are statistically significant amongst both types of rabbitries, in males (18.51%) as well as in does (12.63%).

In Figure 1 and Figure 2, is shown the graphic representation of these results.

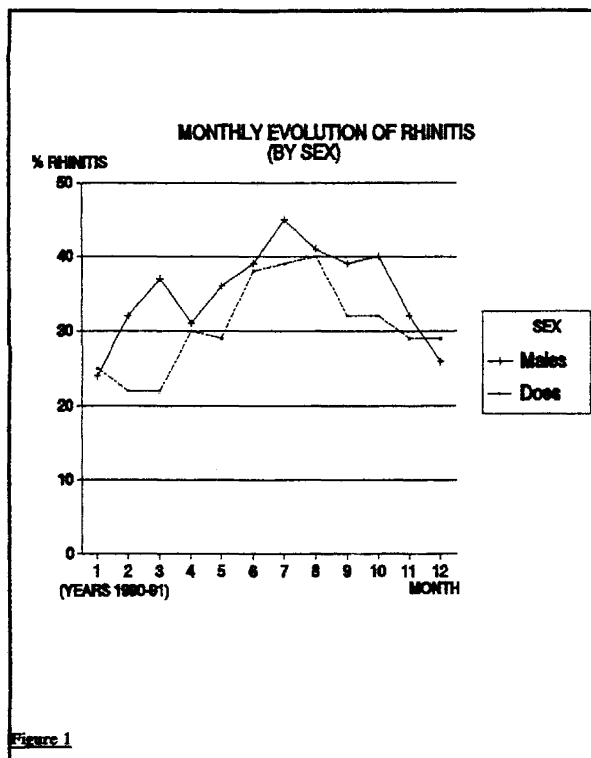


Figure 1

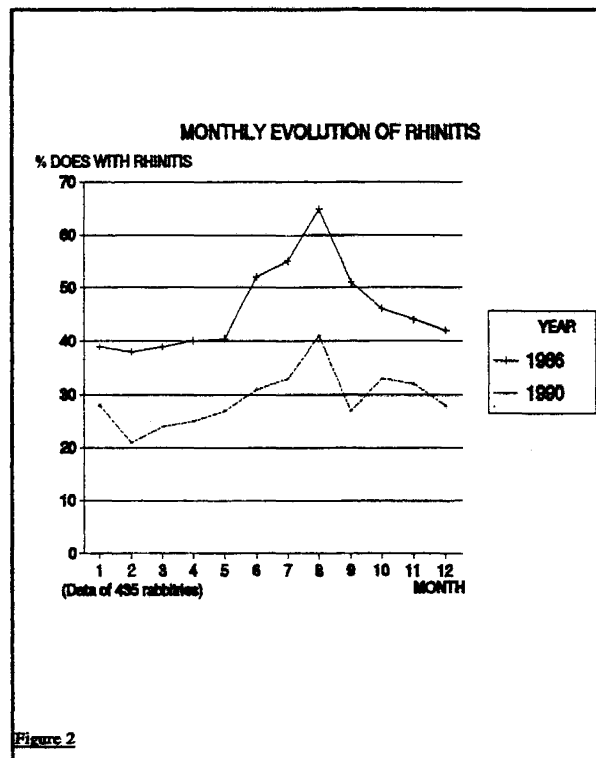


Figure 2

*Influence of the number of kindling.-*

To analyze the influence of this factor of variation, we made 11 groups, from the 1th to the 10th kindling and from the 11th and successive kindlings on, as is shown in Table 3.

The evolution of the mean percentages of rhinitis during the reproductive life of the does, is not following an homogeneous pathway and is difficult to understand, because the culling of does

from the 3th or 4th kindling, makes the sample on each kindling not to be taken at random (culled does are the most affected with rhinitis).

It is reasonable the fact that the first kindling presents a percentage of rhinitis much lower than the subsequent ones, because the doe is not yet exhausted. It is also reasonable that from the forth kindling on, the percentages become lower, being the probability to found a doe with rhinitis even lower, but being the probability to have rhinitis the same. Torres et al., 1986 (8), have also noted the existence of non significant relationships between rhinitis and the number of kindling.

NUMBER OF KINDLING	% OF RHINITIS	DOES WITH RHINITIS	DOES EXAMINED
1	33.59	218	649
2	39.15	242	618
3	39.16	206	526
4	36.69	160	436
5	35.32	130	368
6	34.53	105	304
7	30.76	72	234
8	43.53	101	232
9	35.17	70	199
10	25.16	38	151
>10	36.30	163	449
<b>TOTAL</b>	<b>35.39</b>	<b>1505</b>	<b>4166</b>

Table 3.- Influence of the number of kindling in the % of does with rhinitis.

**Influence of the phase of lactation.-**

During the interval comprised between June and December 1991, 1979 does were examined, in 55 sampling procedures, carried out in 61 rabbitries, in which no therapeutical measures were applied at kindling. In Table 4 are shown the results for all this examinations.

	FIRST PHASE LACTATION < 15 DAYS POST PARTUM	SECOND PHASE LACTATION > 15 DAYS POST PARTUM	DIFFERENCE
<b>X ± STD.E. %</b>	36.58 ± 2.57	35.78 ± 2.68	10.79 ± 2.34 NS
<b>NUMBER OF DOES</b>	990	989	
<b>NUMBER OF EXAMS</b>	55	55	

Table 4.- Influence of the phase of lactation in the % of does with rhinitis (without treatment at kindling).

NS = non significant difference

does affected with coryza at kindling, were visibly recuperated at mating (10 days post-partum) and were subsequently affected at the end of the gestation period and following kindling. According to the results of that author, the homogeneity in the percentage of rhinitis found in the two phases studied, could be explained, and in further work it might be interesting to establish four phases instead of two.

**Association of rhinitis with some other disease processes in the same doe.-**

The association of rhinitis with mastitis and "sore hocks" in the same doe, has been measured with an association analysis based on the chi-square statistic ( $\chi^2$ ). For each association between disease processes, a contingency table is presented (Table 5 and Table 6).

	RHINITIS		
	YES	NOT	%
<b>MASTITIS</b> YES	117	137	6.05
NOT	1388	2559	93.95
<b>%</b>	35.82	64.18	T=4201

Table 5.- Relationship of rhinitis with mastitis.  
 $\chi^2$  of association = 12.32\* (p<0.001)  
c of Pearson = 0.05

	RHINITIS		
	YES	NOT	%
<b>SORE HOCKS</b> YES	180	316	11.81
NOT	1325	2380	88.19
<b>%</b>	35.82	64.18	T=4201

Table 6.- Relationship of rhinitis with sore hocks.  
 $\chi^2$  of association = 0.052 (non significant)

There is a significant and positive association between rhinitis and mastitis, although the coefficient of contingency, which estimates the degree of association, is low (5%).

However, as regards as the situation of rhinitis and "sore hocks", the value of the  $\chi^2$  statistic obtained is non significant, and so there is no association between these two disease conditions. The results of this analysis agree with those obtained in a preceding one, carried out during the period 1978-1988 and including 4723 does (6). In an other study, Torres et al., 1986 (9) found a statistically significant association between respiratory diseases and "sore hocks". From our point of view, although in our results there is no association between both disease processes, the simultaneous appearance of both at the same rabbitry could be the result of the influence of common predisposing factors, as for example a weight loss and a lower level of unspecific protection in a doe, whether because of the stress and neuroendocrine changes subsequent to kindling, whether during the lactation phase. As already described by some other authors, the simultaneous presence of the etiological agents: *Pasteurella multocida* and *Staphylococcus aureus*, has a low probability (2,3,5).

However we have found association between rhinitis and mastitis in the same doe. As the present study has no analytical bacteriological support, neither in rhinitis nor in mastitis, our hypothesis establishes that this coincidence is due, for the most part, to some common predisposing factors, as for example:

- drastic environmental conditions,
- the combination of cold and humidity,
- cold air currents,

joined to a greater organic weakness of the respiratory apparatus and the mammary gland. Renault, 1981 (5), from the laboratory examinations made during 1980 on diseased does, coming from 215 rabbitries, established the following points:

- *Pasteurella multocida* is one of the foremost agents of coryza, combined with *Bordetella bronchiseptica*, but can also be found in cutaneous sites, as in case of abscesses and mastitis.
- *Staphylococcus aureus* is isolated most frequently from mastitis (65.1%) than *P. multocida* (34.8%).
- More than one half of mastitis affected does, undergo at the same time a respiratory disease.

***Influence of the medication at kindling on rhinitis.-***

In 44 out of 105 different rabbitries sampled between June and December 1991, all the does were injected at kindling with penicillin and streptomycin or with long action oxytetracycline. In 61 farms (58%), this therapeutical practice was not applied. Although the application of an antibiotic at kindling is a medical prophylactic measure, used essentially to prevent mastitis, and staphylococcal infection and enteritis-diarrhoea in the suckling kitlings, we wanted to analyze the influence of this parameter upon rhinitis. The results obtained are those represented in **Table 7**.

	WITHOUT TREAT.	WITH TREAT.	DIFFERENCE	t STUDENT
$\bar{x} \pm \text{STD.E.} (\%)$	38.01 $\pm$ 2.20	35.83 $\pm$ 2.52	2.18	0.65 NS
NUMBER OF DOES	2240	1961		
FREQUENCY	64	57		

As can be seen from it, medication slightly improves the percentage of affected does (2.18%), but the difference is not statistically significant. If, at the same time, the fase of lactation is considered in

**Table 7.** - Influence of the post-partum medication on the % of does with snuffles.  
NS = non significant

rabbitries where does were medicated, the difference is non statistically significant either. The results are presented in **Table 8**.

As final conclusions outlined from the present study, we want to remark the following points:

- The mean prevalence of rhinitis is prone to be much lower in does than in bucks.
- We have not observed any relationship between the phase of lactation and the number of kindling, and the percentage of diseased does.
- There is a significant association between rhinitis and mastitis in the same doe, but there is no association between rhinitis and "sore hocks".
- The influence of medication with antibiotics at kindling, is not statistically significant in the percentage of rhinitis affected does.

	<15 DAYS PP	>15 DAYS PP	DIFFERENCE
$\bar{x} \pm \text{STD.E.}(\%)$	33.72 $\pm$ 2.64	32.51 $\pm$ 2.92	1.13 $\pm$ 2.26 NS
NUMBER OF DOES	877	876	
FREQUENCY	47	47	

**Table 8.** - Influence of the phase of lactation in the % of does with rhinitis in rabbitries with medication at kindling  
 PP = post-partum  
 NS = non significant

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