

TECHNICAL NOTE

**HEALTH STATUS OF COMMERCIAL RABBITRIES IN THE
IBERIAN PENINSULA. A PRACTITIONER'S STUDY**

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ABSTRACT: A total of 414 visits were made to 130 rabbitries, with an average of 903 adult females per farm. Prevalence of routinely monitored diseases was determined on 110 rabbit farms. Mean annual prevalence of coryza in 8,209 females randomly examined in 154 revisions was 22.1 %, as well as mastitis 4.6 %, sore hocks 10.4 %, and mange 2.7 %. After checking 853 males in 60 examinations, prevalence of coryza was 33.4 %, sore hocks 5.7 % and mange 1.9 %. These disorders frequency decreased in the course of the period 1983 - 2002. After 197 visits with troubles (plus 217 revisions), and 431 *post-mortem* examinations, digestive disorders (60.8 % of the visits and 72.1 % of the necropsies), especially mucoid enteropathy, were the most relevant.

Key words: rabbit, pathology

INTRODUCTION

Rabbit diseases have effects on associated events such as the welfare and productivity of the rabbits, financial status of the farmers, rabbitry environment or the food supply and health in human beings (zoonoses). The aim of this paper is to present observations about rabbit health status made in Spain and Portugal when visiting commercial rabbitries, and to show how a practitioner works to evaluate the sanitary status of these rabbitries. Some results on most commonly rabbits diseases encountered in 2002 are provided as well as the evolution of the sanitary status since the period 1980-1990.

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MATERIALS AND METHODS

During 2002, a total of 414 visits were made to 130 industrial rabbitries in Spain and Portugal. Routine and emergency visits were made alone or together with other colleagues of a team: one colleague in Portugal and nine in Spain. They were the regular attending veterinarians. The product manager acted as outside consulting veterinarian and gave a second opinion, or followed up clinical trials. Figure 1 shows the location of the visited farms and rabbitries where females were examined to evaluate their health condition.

There are two kinds of visits: those to attend troubles (emergencies, first aid visits) and others not related to diseases, so-called routine visits (advisory, revision). Visits as a result of problems are always urgent, and those for revision are frequently on the initiative of the clinician, for instance to follow up past trouble; preventive

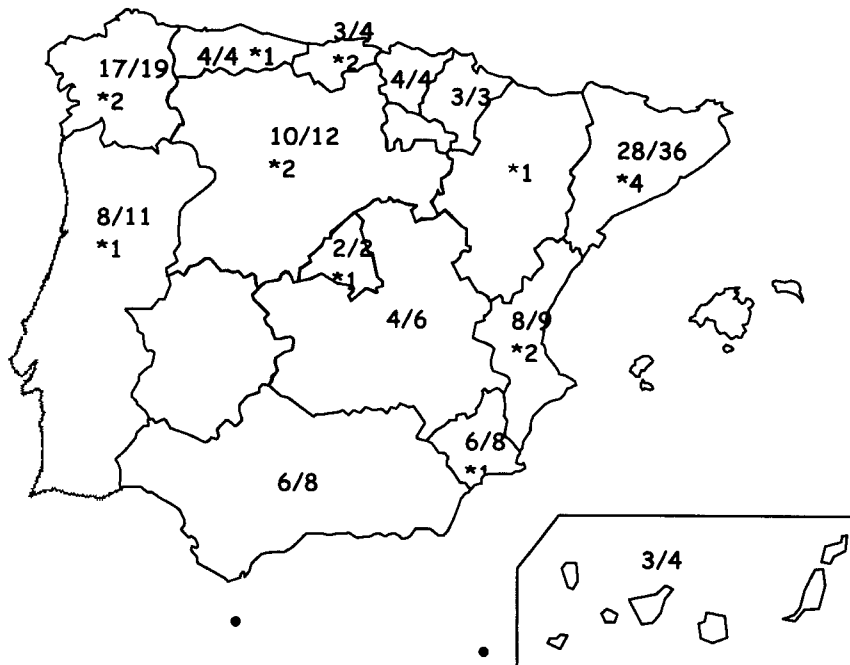


Figure 1: Location of the 110 rabbitries where does were examined/over the 130 breeding units visited during 2002 in Spain and Portugal. Numbers with an* correspond to units of bucks.

medicine is implemented in this case. Routine visits should take place on the occasion of weaning, and also a few days before inseminating large batches. In all visits there was access to the farm, and animals were observed.

Protocol of a visit:

• **Listening** and performing an **anamnesis**, in all cases, were initial steps to evaluate the sanitary qualities of the farm. Variables such as the number of rabbits, type of reproductive system: mating or insemination (AI) and rhythm of reproduction, breed/lines of rabbits, types of rations, vaccination schedules, therapeutics and metaphylactic treatments employed, were collected.

• **Recording evaluation** of performance targets to identify quickly and accurately the bottlenecks for productivity and profitability of the rabbitry. Important performance data were ages of adults, mortality and culling rates of adults, pregnancy rate, abortions, stillbirth ratios, pre and post weaning mortality, global feed conversion ratio, and availability/quality of replacement stock.

On 110 farms and 154 visits (over 130 rabbitries and 414 visits in total), random clinical **examination of bucks and suckling does** outside their cages was performed during 2002, for routinely-monitored conditions such as snuffles/coryza, mastitis, sore hocks and mange. Numbers of lactating does examined were between 30 and 120 depending on the size of the rabbitry or the objectives (usually to obtain criteria for diagnosing and sometimes surveys or clinical trials). Results of prevalence were noted as follows: N does- X with snuffles (%)- Y mastitis (%)- Z sore hocks (%)- V mange (%).

The perianal region was examined for signs of diarrhoea and the anus was examined in the evening for *pinworms* when hard faeces were excreted. While the does were being observed, the clinician was able to obtain other criteria as: body condition of adults, skin and hair quality; sanitary and body condition of sucking rabbits (kits) and evaluation of hygiene and routine management procedures in nests.

Outline of **other critical control points of the rabbitry**. These included daily feed and water consumption, housing and ventilation, degree of cleanliness or organisation, resources for biosafety, which was done specifically or during the observation of adults. Clinical examination of individuals is a very useful tool but epidemiology is essential for the practitioner visiting large rabbit populations.

· **Post-mortem examinations** were performed when the clinician required information on diseases and body condition (fat reserves in does). Dead rabbits were necropsied or sometimes the most representative ones euthanased. From these necropsies fresh and formalized samples could be taken for laboratory analysis, as well as live animals, blood, faeces, hair and scabs, water or feed. Apparent causes of death or illness that were compatible with gross lesions observed were noted with codes.

· **Written summary** of the visit. In each case, a concise document was given to the raiser, with a copy for the practitioner, containing recommendations for manipulating determinants of disease, therapeutics for correcting a disease or preventive measures to maximise efficiency of resources. A code was established for cataloguing each visit. On some rabbitries diseases occurred simultaneously, for instance, mucoid enteropathy and myxomatosis; in this case the summary of the visit referred to myxomatosis as the most dangerous disease.

RESULTS

Characteristics of the rabbitries observed during 2002

Some relevant characteristics of the 130 rabbitries visited were as follows: average number of stock breeders was 903 does (mated/inseminated one or more times, that is *does in production*) per farm during 2002. The smallest one had 82 females and the largest 6,000 does. During 2002 AI was applied on 52 % of the visited rabbitries and does were mated or inseminated 8-17 days *post-partum/pp* on 71 % of the farms; others at 1-7 days *pp* or 18-25 days *pp*. In some cases primiparas

were mated at weaning. Frequent weaning ages were 33-37 days, with a range of 28-47 days. Recording evaluation was done in relation with certain variables (Table 1). These were external targets. Each rabbitry used its own targets for several indices. Other variables are essential; for example, weekly mortality rate after weaning, and mortality in function of the number of kindlings. Sometimes, 50 % of females die or are culled in the course of the first three kindlings.

Table 1: Performance targets for intensive rabbitries.

Index variable	Target	Interference level
Monthly percentage of adult doe culling	7	<5 >10
Monthly percentage of adult doe mortality	<3-4	>5
Rates pregnancy/mating and pregnancy/AI	>85 >80	<75 <70
Abortions %	1	>2-3
Stillbirths %	<7	>7
Mortality before weaning and after elimination* %	<13 <10	>15
Mortality after weaning (averages 33-62 days) %	<7	>7

*Some newborn are transferred and adopted amongst females, but 5-10 % of them are eliminated (the weakest ones).

Reasons for visits

Of the 414 visits, 215 were for revision (51.9 %), that is, they were not emergency cases. Several troubles were noted on the remaining 199. Table 2 shows the results of visits with problems during 2002.

Digestive disorders were the main pathological events: 60.8 % of the visits with problems during 2002. These troubles concerned:

- a) Usually weaned or fattening rabbits. Mucoïd enteropathy and enteritis-diarrhoea compatible with several disorders: intestinal coccidiosis, colibacillosis, clostridiosis, and Tyzzer's disease.

- b) Sometimes adults with epidemiological and clinical signs compatible with colibacillosis, clostridiosis, or with mucoid enteropathy. In 2002 one case of salmonellosis was confirmed by the laboratory.
- c) Sucking rabbits affected by *yellow diarrhoea* at 2-15 days of age, or cecal impaction, that is mucoid enteropathy, at 18-25 days of age.

Reproduction diseases. Infertility, abortions, and stillbirth are relevant disorders in adult rabbits because of the existence of large batches (rabbitries with AI). 22 visits were made during 2002 for these reasons. Respiratory diseases are also notable within breeders and sometimes young rabbits. These were the major

Table 2: Visits with troubles during 2002 on rabbitries in the Iberian Peninsula.

Criteria	Year 2002: 199 cases or visits with some major disease
Mucoid enteropathy (weaned, kits, adults)	77 (including 8 cases of cecal impaction in kits)
Enteritis-diarrhoea (weaned, kits, adults)	44 (including 3 visits as a result of yellow diarrhoea in kits)
Digestive disorders (total)	121
Diseases of reproduction (infertility, abortions, stillbirth)	22
Staphylococccic diseases (adult, kits)	10
Myxomatosis (classical, atypical)	13
Skin diseases (ringworm, manges)	13
Respiratory diseases (adult, young rabbits)	7
Death of females (several disorders)	6
Toxicoses (adverse effects of antimicrobials, water or feed additives)	4
VHD (adult, fattening)	1
Other (splay leg, low daily weight gain, weight loss)	2

disease problems on 7 visits. Myxomatoses are common all year round: 2 visits in winter (January, February, March), 1 in spring, 3 in summer, and 7 in autumn. Atypical myxomatosis was predominant, though some classical cases have been seen. This is why myxomatoses are referred to in the plural form.

Besides the incidence of the above diseases, some conditions were monitored from the physical and random examination of 8,209 does during 2002 (Table 3).

Table 3: Basic statistics for prevalence of diseases monitored on each farm..

Sex	Disease	No of visits	Mean	SD	Range	% of affected farms
Females	Snuffles	154	22.15	17.61	0 - 81.67	98.70
	Mastitis	154	4.61	5.09	0 - 25.00	70.12
	Sore hocks	154	10.40	8.31	0 - 42.50	89.61
	Mange	154	2.76	6.73	0 - 40.00	29.22
Males	Snuffles	60	33.44	17.35	0 - 66.67	96.69
	Sore hocks	60	5.77	7.37	0 - 33.33	49.23
	Mange	60	1.96	6.43	0 - 33.33	12.30

The mean annual prevalence of coryza/snuffles in 154 samples (average 53.3 females examined/sample) taken from 110 farms was 22.1 %. For clinical mastitis (usually in the chronic form) prevalence was 4.6 %, sore hocks 10.4 %, and psoroptic mange 2.7 % (sarcoptic mange was seen on one farm). Results of 853 males also randomly examined on 50 farms (60 rabbitries without males) in 60 revisions (on average 14.2 bucks/sample) were: 33.4 % for coryza, 5.7 % for sore hocks, and 1.9 % for mange.

With regard to staphylococccic infections, causes of culling during 2002 on a farm affected by this disorder are shown in Table 4, compared with another farm

where respiratory troubles were notable, and one rabbitry without any major disease problem.

Staphylococcal infections included high prevalence of mastitis and incidence of *pioderma pustulosa* in kits and adults. Respiratory troubles were characterised by high prevalence of coryza and incidence of pneumonia (dyspnea diagnosed by the farmer).

Table 4: Culling rates in does on farms with respiratory troubles and staphylococcal infection.

Rabbitries Criteria	With respiratory troubles		With staphylococcal infection		Without major diseases	
	Does culled	%	Does culled	%	Does culled	%
N	1,100		1,228		1,142	
Respiratory	213	30.5	105	10.7	15	2.1
Low productivity	132	18.9	143	14.6	269	38.1
Sore hocks	84	12.0	117	11.9	27	3.8
Age	91	13.0	-	-	-	-
Mastitis	54	7.7	380	38.7	55	7.8
Body condition	53	7.6	150	15.3	119	16.9
Abortions	14	2.0	11	1.1	19	2.7
Uterine disorders	21	3.0	-	-	46	6.5
Vertebral fracture	6	0.8	13	1.3	18	2.5
Miscellaneous	30	4.3	62	6.3	137	19.4
Total culled	698	63.4	981	80	705	61.7
Total dead	364	33.1	645	52.5	309	27

N: number of does in production.

Post-mortem examinations

Results of 124 groups (or visits with one or more necropsy each) of necropsies with 431 rabbits examined in the field are shown in Table 5. In 431 necropsied rabbits 311 (72.1 %) showed enteric damage as the presumptive cause of illness or death.

Table 5: Necropsies carried out on rabbitries during 2002, with apparent causes of death or illness.

Conditions	Females	Males	Young does	Kits	Fattening
Enteritis-Diarrhoea	24	-	-	26	87
Mucoid Enteropathy	4	-	2	43	125
Pneumonia	20	2	3	29	5
Haemorrhagic Septicaemia/HS	6	1	1	-	-
Metritis, acute Mastitis, or both	8	-	-	-	-
Uterine Torsion	8	-	-	-	-
Pregnancy Toxaemia	3	-	-	-	-
Mummified Foetuses	2	-	-	-	-
Viral Haemorrhagic Disease	-	-	2	-	-
Compatible with staphylococccic infection	-	-	-	-	3
Compatible with encephalitozoonosis	-	-	-	-	4
Miscellaneous or unknown conditions	17	1	-	5	-
Total:	92	4	8	103	224

DISCUSSION

Characteristics of the rabbitries. Stock numbers on commercial rabbitries in Spain and Portugal increased during 2002. Mean numbers were 871 does per farm in 2001 and 798 does during 2000 (153 and 127 rabbitries visited, respectively). The use of AI also increased: it was applied on 48 % of the visited farms in 2001. This is

an interesting variable from the pathological point of view because large batches are used.

Reasons for visits. From 1996-97, the main technical and financial threat for rabbit production in Europe was the pandemic of mucoid enteropathy (ME), as it affected over 95 % of rabbitries (LEBAS et al., 2002). Populations at risk include any rabbit over 18-25 days of age, but incidence is particularly high in those between 40 and 50 days and to a lesser extent, adults. The brusque re-emergence (on the continent, from spring 1996 and in the United Kingdom from January 1997, according to JONES and DUFF, 2001) of this disorder has brought up many questions in fields related to economics, rabbit health, production, welfare or Public Health. During 2002, the incidence of myxomatoses was similar to preceding years. In the course of 16 years (1986-2001) 496 visits were made for this reason: 25.4 % in winter, 16.5 % in spring, 29 % in summer, and 29 % in autumn (unpublished). Some cases of contamination via semen have been observed in Spain and Portugal. The battle against the disease continues, especially with regard wild rabbits. VHD or RHD causes tremendous damage in these animals (COOKE, 2002); on the other hand, vaccination in domestic rabbits is completely effective: one visit in 2002, to a non-vaccinated rabbitry.

Clinical examination of adults. Clinical sampling to obtain criteria for diagnosis was a technique taught by MORISSE (1981), though classical work, for example, on the prevalence of coryza (WEBSTER, 1924), was already in existence and is also very interesting. When randomly examining 50 does and their respective offspring, the objective is looking for a criterion to assess the health condition of the farm. A larger size sample is surely necessary in the case of many diseases (especially when low prevalence is expected) to have more valid information and fewer errors, as indicated by THRUSFIELD (1995). With a small sampling, one can at least evaluate the tendency of each case and use this as a basis for work.

Evolution of health situation with time. Prevalence of coryza (22.1 % in 2002) is decreasing. During 1983-1985 prevalence was 41 % (3,088 females examined on 101 farms). During 1986-1995 the mean decreased to 34.8 % (93,069

does checked in 3,013 examinations on 691 rabbitries) (BADIOLA *et al.*, 2000). The health status of bucks has also improved: 42.8 % coryza during 1992-1993 (1,241 males examined on 84 farms) and 34.3 % in 2002. The control of environmental hazards, culling or chemotherapy were properly implemented. Prevalence of mastitis (4.6 % in 2002) was similar to preceding years. Sore hocks (10.5 % in 2002) is still relevant: 9 % during 1986-1996 (103,968 females checked in 3,276 examinations on 762 rabbitries).

Which are tolerable prevalence results for these conditions? Considering, for example, a selection farm, less than 20 % coryza, less than 5 % mastitis, less than 8 % sore hocks and 0 % mange is ideal; besides none myxomatosis, VHD, ringworm, enteropathogenic *Escherichia coli*, *Salmonella* spp., *Chlamydia* spp. (including *Chlamydophila psittaci*), *Mycoplasma* spp., *Encephalitozoon cuniculi*, and *Staphylococcus aureus* strains producing *pioderma pustulosa* in sucking rabbits (HAGEN, 1963). Sanitary strategies for these conditions include, for instance, reduction and control in pasteurellosis but eradication and prevention in salmonellosis (NOORDHUIZEN *et al.*, 1997). At present, surveillance is applied to salmonellosis.

Post-mortem examinations. The field perspective is different to that held by diagnosis laboratory experts, for example GRILLI and PISONI (2002), with regard commercial rabbits received at their laboratory, or by HOOP *et al.* (1993), for pet rabbits. All these perspectives are different, because what a practitioner finds on a rabbitry or in a necropsy does not correspond with what he sends to the laboratory, and with exceptions, he cannot usually perform etiologic diagnosis in the field; however, these two sources of information complement each other.

What are the differences between Mucoïd Enteropathy (ME) and Enteritis-Diarrhoea (ED)? There are cases (case or visit to an affected rabbitry) with ED only. There are also rabbit farms affected by mucoïd enteropathy only and rabbitries with a mixed clinical pattern and pathological findings of ME and ED. On farms with ME *post-mortem* findings sometimes correspond to an atypical ME pattern: the stomach full of liquid and gas, absence of cecal impaction, but small portions of 1-2 cm of impacted digesta floating in the caecum, without mucus in the small or large

intestine; this is when the disease is at a more advanced stage, going from ME to ED, or it may be due to the interference of antimicrobials. Intestinal coccidiosis is frequently associated with ME, in accordance with COUDERT *et al.*, (2000).

In this study some relevant variables concerning health status on intensive rabbitries in the Iberian Peninsula are presented. By no means is it an exhaustive analysis. Maybe in the future this type of data bases will be useful. For example, the study of susceptibility of breeds, as a predisposing risk factor of disease, placed in ecosystems with enabling risk factors of disease. Rabbit practitioners have new expertise to develop at the present time and in the future. They must strive to improve the health of the rabbit industry by controlling or preventing the more significant conditions, lowering costs and increasing profit and also aid producers to find their place not as rabbit raisers but as primary operators of the alimentary chain.

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