

ON-FARM CAUSES OF MORTALITY IN FEMALE RABBITS

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ABSTRACT

On-farm causes of mortality in female rabbits were collected from 1,000 necropsies of 803 dead and 197 moribund-euthanized rabbit does. Data were gathered on 488 visits to 173 doe farms, in Spain and Portugal during 2006-2011. The median size of the 173 doe farms was 600 does (minimum to maximum: 60-2,580 does), and 45 bucks (minimum to maximum: 14-180 bucks) on 45 farms/173 doe farms; there were no bucks on 128 farms. Our estimation of the causes of mortality was based on a population of 369,589 females at risk over a period of 6 years. The mortality risk per year $\times 100$ females (MR) was estimated, considering the relationship between necropsied does and the population at risk on each visit. We found alterations of the respiratory tract compatible with cause of death in 31.1 % of does (MR). MR due to digestive causes was 22 % (15.7 % enteritis-diarrhoea, and 6.3 % mucoid enteropathy, similar to Epizootic Rabbit Enteropathy), followed by metritis, pyometra and mummified fetuses (MR= 11.4%), hemorrhagic septicemia (8.4%), pregnancy toxemia/ketosis (8.4%), uterine torsion (7.5%), mastitis (chronic, but mainly acute; MR= 5.5%), viral hemorrhagic disease (4.1%). There were also miscellaneous health events (14.7%), and unknown conditions (cadaver with autolysis included; MR= 3.7%). Among the miscellaneous health events there were hepatopathies (abscesses and cholecystitis included; MR= 1.9%), uterine prolapse (1.9%), toxicosis caused by ionophore antibiotics in feed (1.5%), or nephropathies (1.4%). It would be very useful if this information were complemented with laboratory analyses. Knowledge of the apparent causes of disease and death in does is necessary for preparing better adapted prevention protocols.

Key words: Animal welfare, females, diseases, mortality, rabbits

INTRODUCTION

On commercial rabbit farms, rabbit health is the most important factor in animal welfare, along with housing, feeding and husbandry (Broom and Kirkden, 2004). Amongst the different health indicators, mortality is essential for monitoring and surveillance on farms (Botreau *et al.*, 2007). Diagnosis of the apparent causes of diseases and death on rabbit farms is carried out by veterinary practitioners who follow a protocol that includes carrying out necropsies and occasionally sending samples to analytical laboratories. Knowing the apparent causes of diseases and death, as well as viability rates and the prevalence and incidence of diseases, contributes to better adapting prevention protocols and, when necessary, treatment (Grandin, 2010). The expected benefits for both rabbits and producers are evident (EFSA, 2005).

After carrying out a preliminary study in which we evaluated 1046 necropsied does during 1996-2005 (Rosell and de la Fuente, 2009), our objective was to update the apparent causes of diseases and death in does, in necropsies performed by a veterinarian on visits to intensive production farms during 2006-2011.

MATERIALS AND METHODS

Farms and rabbits

We obtained information from necropsies performed by a veterinary practitioner (Rosell) on 488 visits to 173 commercial meat rabbit farms (160 in Spain and 13 in Portugal) between January, 2006 and December, 2011. Confidentiality was guaranteed at all times. The farms were closed-cycle and had a population of 369,589 females at risk, over a period of 6 years. AI was used on 87 % of the farms and does were serviced by mount on the other 13 %. 128 farms did not house bucks but the remaining 26 % did for AI or mount. The median size of the 173 closed-cycle farms was 600 does at risk (minimum to maximum: 60-2580 does), and 45 bucks at risk (minimum to maximum: 14-180 bucks). On 70 % of the farms, females were serviced (by mount or AI) on day 11 postpartum, on 14 % on day 18, on 9 % on day 25, on days 32 (3 %), 39 (3 %) and 45 days postpartum (1 farm).

We obtained information from necropsies performed on 1000 does (serviced one or more times). 803 does were already dead when we visited the farms and 197 were culled because they were moribund. 71 of the 1000 does had aborted; 36 were dead and 35 were culled. 652 were pregnant or pregnant and lactating and 348 were empty (not inseminated or not pregnant), lactating or not.

Traits and statistical analysis

The method of euthanasia was concussion stunning, followed by neck (cervical) dislocation, plus exsanguination. We used the protocol by Cuervo (2000) to carry out the necropsies. We classified the apparent causes of disease (moribund animal) or death based on post-mortem macroscopic findings. We established 58 causes of death, and there was also one "unknown cause or autolytic cadaver". Nevertheless, we simplified the classification; thus, with regard to pneumonia, the most frequently observed cause of death in a previous work (Rosell and de la Fuente, 2009), there were some cases of this (with different degrees of severity), and other disorders: pneumonia and mastitis simultaneously, with metritis, extrauterine pregnancy, enteritis-diarrhea, pregnancy toxemia, or purulent peritonitis, which we classed as pneumonia. There were cases of metritis plus peritonitis, or associated with enteritis, amongst other disorders, which we classed as metritis; or enteritis plus toxemia, and enteritis plus extrauterine gestation, which we included in the enteritis-diarrhoea group. We classified diseases of the digestive tract as enteritis-diarrhea (these clinical pictures are compatible with coccidiosis, enterobacteriosis caused by *Escherichia coli* and *Salmonella* spp., amongst others, and also clostridiosis) and mucoid enteropathy (similar to Epizootic Rabbit Enteropathy), of unknown aetiology (Marlier *et al.*, 2003), but which also caused diseases and death in female rabbits during 1996-2005.

In the statistical analysis for this retrospective study, the mortality risk per year $\times 100$ females was calculated, considering the relationship between necropsied does and the population at risk on each visit.

RESULTS AND DISCUSSION

For the study of the apparent causes of on-farm mortality or illness in rabbit does, we performed 488 groups of necropsies on 173 farms with female rabbits, or females and bucks, on a total of 1000 does. Table 1 shows the results of the postmortem examinations of dead or euthanized moribund does (197 of 1000 does). Respiratory tract disorders were apparently the main cause of diseases (euthanized moribund animals) and death, as observed in a previous work (Rosell and de la Fuente, 2009). A percentage of deaths as a result of haemorrhagic septicaemia (HS) caused by *Pasteurella multocida* can be added to the number of pneumonia-related deaths.

Other agents of HS during 2006-2011 were *E. coli*, *Staphylococcus* spp. and *Streptococcus* spp., amongst others (J.I. Badiola, personal communication), which caused a higher incidence of HS during 2006-2011 than 1996-2005. There were also a significant number of gastrointestinal disorders, mainly enteritis-diarrhea and mucoid enteropathy. Results for other causes were similar (by inspection) to

those found in previous years, except for VHD, which had a higher incidence in the current study due to the existence of virus variants (F. Parra, personal communication).

Table 1: Mortality (%) from apparent causes of death or illness in 1000 rabbit does. Necropsies performed on 173 rabbit doe farms in Spain and Portugal during 2006-2011, compared with the results of a previous study of 1046 does on 254 farms, during 1996-2005 (Rosell and de la Fuente, 2009).

Conditions	Mortality risk per year ×100 females	Proportional risk (%) *	
	2006-2011	2006-2011	1996-2005
Enteritis-diarrhea	15.7	13.5	20.0
Haemorrhagic septicemia	8.4	7.2	2.2
Miscellaneous health events	14.7	11.2	12
Mucoid enteropathy	6.3	5.4	7.3
Pneumonia	31.1	26.8	27
Unknown conditions	3.7	3.2	2.9
Viral haemorrhagic disease	4.1	3.5	0.4
Mastitis (chronic, but mainly acute)	5.5	4.7	5.6
Metritis, pyometra, mummified fetuses	11.4	9.8	8.9
Pregnancy toxemia/ketosis	8.4	7.2	6.5
Uterine (or vaginal) torsion	7.5	6.5	6.5

* Percentage of affected does in comparison with the number of necropsied does without considering the population at risk.

Table 2 shows the distribution of 123 sick (dying) or dead does as a result of miscellaneous health events.

Table 2: Yearly mortality risk (%) in 123 rabbit does with miscellaneous apparent causes of death or disease (moribund and euthanized). 173 doe farms, 2006-2011.

Conditions	Mortality risk per year x 100 females
	2006 - 2011
Calcinosis (thoracic aorta or other organs)	0.7
Cardiopathy	0.2
Caecal impaction (no mucoid enteropathy)	0.2
Extrauterine pregnancy	0.1
Heat stress	0.4
Hepatopathy (abscesses and cholecystitis included)	1.9
Hernia (umbilical)	0.5
Myxomatosis	0.1
Nephropathy	1.4
Other: abscesses, gastritis, duodenal ulcer, oxyurosis	1.6
Obesity (>7/9)	0.1
Other obstetrics (no uterine torsion)	1.3
Peritonitis (without metritis, pneumonia)	1.4
Prolapse (vaginal & uterine)	1.9
Pseudomonosis (cutaneous)	0.1
Sarcoptic mange	0.2
Sore hocks	0.2
Toxicosis (ionophores in feed)	1.5
Trauma (broken back, legs, arthritis)	0.1
Tumor (non-uterine)	0.1
Uterine prolapse	1.9

In this classification, some events have been underestimated, as only those considered by the veterinarian to be compatible with the cause of death were included. For example, cases of viral hemorrhagic disease are not included in hepatopathy. It should also be taken into account that not in all cases were samples taken and sent for laboratory analysis; finally, the population was not old, as only

23 does had had more than 15 parturitions; thus, the incidence of disorders such as uterine tumours was expected to be low. As for non-classified causes (MR= 3.7%), during 2006-2011 we reminded producers who had requested a visit to identify any cadavers with a record card and keep them in a cool place. In the past, moribund or dead animals were often sent to analytical laboratories; for this reason, some authors, such as Evans (1987), observed as many as 37% of autolytic specimens. Nowadays, tissue and organ samples and faeces, urine, intestinal content, fur, blood or nasal exudate are sent to these laboratories, and few animals.

CONCLUSIONS

Necropsies carried out on farms gave an insight into the most frequent apparent causes of diseases or death, and also less common ones. Mortality in breeding rabbits was compatible with respiratory tract diseases (> 30 %), followed by digestive tract disorders (> 20 %). Our next objective is to relate these causes to age and production stage with the aim of developing better adapted protocols.

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