



SHORT COMMUNICATION

Detection of pathological lesions in slaughtered rabbits

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ABSTRACT

The slaughterhouse is considered an important control point for the monitoring of rabbit diseases. In our study, 59,440 rabbit carcasses were examined, but only 1% of pathological lesions were recorded at *post-mortem* inspection. Mainly affected were tegumentary, digestive and urinary systems. The most consistent lesion was the subcutaneous abscess; nephritis, probably caused by *Encephalitozoon cuniculi*, was also frequent. Pathological alterations of the liver, classified as "necrotizing hepatitis" and localized at the caudate lobe, were observed for the first time.

Key words: Rabbit, Pathology, Slaughterhouse, Epidemiological observatory.

RIASSUNTO

LESIONI ANATOMO-PATOLOGICHE RISCONTRATE ALLA MACELLAZIONE DEL CONIGLIO

Il macello è un importante punto critico per il monitoraggio della patologia cunicola. Dall'esame di 59.440 carcasse, le lesioni rilevate rappresentano solo l'1%. Gli apparati più coinvolti sono stati soprattutto il sottocute, l'apparato digerente e l'apparato urinario. La lesione più importante è stato l'ascesso sottocutaneo, frequenti sono state anche le nefriti, imputabili con molta probabilità ad Encephalitozoon cuniculi. Sono state rilevate anche lesioni epatiche classificate come "epatite necrotizzante" del lobo caudato, mai segnalate prima.

Parole chiave: Coniglio, Patologia, Macellazione, Osservatorio epidemiologico.

Introduction

The slaughterhouse, and its regulations, represents a key control point of the livestock production chain (Facchin *et al.*,

2003). Any observation and information obtained at the slaughterhouse can contribute to the understanding of diseases of slaughter animals. The pathological examination represents a useful tool to make a

diagnosis within the slaughter line.

In this context, the noteworthy of hygienic and sanitary control of rabbit meat slaughtering should be emphasized since the growing interest of consumers in this meat and the high production level recently reached in our country (Di Sarno, 1994).

Records of *ante-* and *post-mortem* inspection make it possible to collect epidemiological data useful for the evaluation of diseases at the farm level and to verify the efficacy of prophylactic and therapeutic interventions (Cortesi, 1993).

Unfortunately, very few papers are published with respect to this area of study.

According to this "epidemiological observatory" role of the rabbit slaughterhouse, the aim of the current study was to check pathological lesions in slaughtering rabbits. The evaluation of the health status of farmed rabbits at slaughtering could reflect disease problems at farm level.

Material and methods

The study was performed in a slaughterhouse located in the province of Padua (Veneto Region), which processed meat rabbits from farms of different regions of Northern Italy. About 2,000 rabbits/hour (34 rabbits/minute) were slaughtered in this plant; animals were usually 80 to 95 days old and about 2% of animals was represented by culled does.

Pathological examination

For the detection of pathological lesions, 59,440 rabbit carcasses (of which 944 does) were examined at the carcass evisceration point within slaughtering line. To our aim, any abnormality of integument, digestive, urogenital, respiratory and musculoskeletal systems was recorded. Samples of pathological tissues were collected for histological examination, carried out according to stan-

dard techniques. Skin lesions, such as dermatomycoses, mange or sore hocks could not be evaluated, since carcasses were already skinned and eviscerated at the observation point. For the same reason, it was not possible to differentiate lesions from meat rabbits and culled does.

Necropsy of rabbits dead during transport

Twenty-five rabbits that died during the transport from the farm to the abattoir were necropsied.

Statistical analysis

Statistical analysis was performed to calculate the standard deviation of rabbits mean weights, the correlation between average body weights and rabbits dead during transport and between average body weights and condemnations.

Results

Table 1 reports data concerning slaughtered rabbits; the average body weight was 2.614 kg±0.207. During this study, on 59,440 carcasses examined, only 610 (1%) showed pathological lesions (Table 2). In total, 1,114 carcasses (1.9%) were not licensed for human consumption. Figure 1 shows the percentage of condemnations. An increase in condemned rabbits, compared to the average, could indicate more disease problems at the farm.

Pathological examination

The most frequent pathological lesion of tegument was the *abscess* -single or multiple - with varying localization and size. This lesion represented 0.39% and 37.7% of slaughtered rabbits and recorded lesions, respectively.

Respiratory system was not affected by a high prevalence of lesions. Briefly, these have been classified into two major cate-

Table 1. Data regarding slaughtered rabbits.

Farm*	Meat rabbits (n.)	Culled does (n.)	Average body weight (kg)	N. of condemned rabbits (%)	Rabbit deaths during transport	Detected lesions
A	30	30	-	8 (26.7)	4	4
B	4548	0	2.264	117 (2.6)	9	54
C	2005	69	2.633	77 (3.8)	3	26
D	1622	70	2.478	101 (6.2)	0	28
E	2546	13	2.553	28 (1.1)	19	12
F	2451	25	2.664	34 (1.4)	8	7
G	651	0	2.565	1 (0.2)	2	7
H	3061	71	2.625	37 (1.2)	0	16
I	3295	60	2.451	18 (0.5)	5	19
J	1363	26	2.702	16 (1.2)	0	16
K	3024	340	2.794	65 (2.1)	4	45
L	2941	0	3.098	41 (1.4)	13	43
M	280	6	2.692	27 (9.6)	2	39
N	2788	18	2.583	66 (2.4)	8	29
O	3687	0	2.555	33 (0.9)	16	22
P	1516	0	2.876	11 (0.7)	1	12
Q	2525	5	2.513	16 (0.6)	7	26
R	3105	0	2.232	66 (2.1)	0	11
S	542	0	2.343	29 (5.4)	0	9
T	1386	0	2.554	12 (0.9)	2	18
U	681	80	2.695	27 (4.0)	4	9
V	2603	30	2.779	8 (0.3)	8	11
W	683	15	3.101	20 (2.9)	1	20
X	718		2.465	19 (2.6)	2	5
Y	6260	30	2.656	115 (1.8)	6	56
Z	1029	20	2.643	22 (2.1)	0	7
AB	1157	0	2.390	19 (1.6)	0	5
CD	2943	36	2.684	111 (3.8)	10	54
TOTAL	59,440	944	2.614	1144 (1.9)	134	610

*Capital letters correspond to a group of rabbits from the same farm, but slaughtered on different days.

gories: a) *lung abscesses*, often involving only one lung (0.02% and 1.8% of slaughtered rabbits and recorded lesions, respectively); b) *pneumonia* and *pleuropneumonia*, characterized mainly by fibrinous inflammation (0.03% and 2.8% of slaughtered rabbits and recorded lesions, respectively).

At the enteric level, 26 cases of *enteritis*, varying from severe congestion to petechial hemorrhages, were detected (0.04% and 4.3% of slaughtered rabbits and recorded lesions, respectively); only in one case *tiphlitis* (0.002% and 0.16% of slaughtered rabbits and recorded lesions, respectively).

Table 2. Pathological lesions detected in slaughtered rabbits.

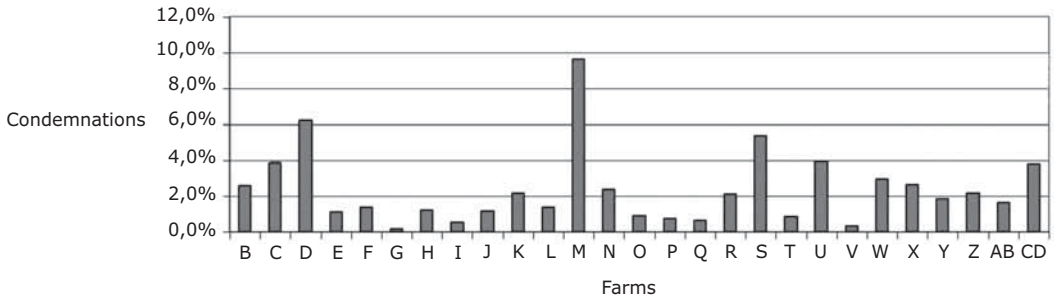
Lesions	N. of cases	% on slaughtered rabbits	% of recorded lesions
Integument:			
Subcutaneous abscesses	230	0.387	37.70
Respiratory system:			
Lung abscesses	11	0.019	1.80
Pneumonia	17	0.029	2.79
Digestive system:			
Enteritis	26	0.044	4.26
Typhlitis	1	0.002	0.16
Hepatitis	12	0.020	1.97
Hepatic degeneration	11	0.019	1.80
Steatosis	39	0.066	6.39
Liver necrosis	25	0.042	4.10
Necrotizing hepatitis	27	0.045	4.43
Perihepatitis	2	0.003	0.33
Hepatic coccidiosis	48	0.081	7.87
Cysticercosis	2	0.003	0.33
Peritoneal cysts	2	0.003	0.33
Hepatic cysts	1	0.002	0.16
Reproductive system:			
Pyometra	40	0.067	6.56
Metritis	16	0.027	2.62
Metropathy with foetus retention	3	0.005	0.49
Urinary system:			
Chronic nephritis	96	0.162	15.74
Kidney cysts	1	0.002	0.16
TOTAL	610	1.03	

was present, thus showing a very low prevalence.

Lesions in the liver consisted of degeneration, such as steatosis (0.066% and 6.39% of slaughtered rabbits and recorded lesions, respectively), or inflammation, mainly *chronic hepatitis* (0.020% and 1.97% of slaughtered rabbits and recorded lesions, respectively), such as hepatic abscesses, or disseminated miliary *necrosis* (0.042% and 4.10% of slaughtered rabbits and recorded lesions, respectively). Other liver changes were represented by hep-

atomegaly with irregular surface and necrotic foci in the parenchyma. Parasitic infections of the liver were also detected. *Cysticercosis* (0.003% and 0.33% of slaughtered rabbits and recorded lesions, respectively) was occasionally present, while *hepatic coccidiosis* was more frequent with a prevalence of 0.08% and 7.9% of slaughtered rabbits and recorded lesions, respectively. An unreported lesion of the liver was also observed. Because of a typical progression from an inflammatory picture to a complete necrosis, we called this alteration

Figure 1. Percentage of condemnations.



“*necrotizing hepatitis*”; the pathological change was always localized at the papillary process of the caudate lobe (27 cases; 0.05% and 4.4% of slaughtered rabbits and recorded lesions, respectively).

Regarding the reproductive system, the most frequent finding was pyometra (40 cases), with a prevalence of 0.067% and 6.6% of slaughtered rabbits and recorded lesions, respectively. *Metritis* (0.027% and 2.62% of slaughtered rabbits and recorded lesions, respectively) and *metropathy with foetal retention* (0.005% and 0.49% of slaughtered rabbits and recorded lesions, respectively) were also observed at *post-mortem* inspection of does.

Chronic nephritis (0.162% and 15.74% of slaughtered rabbits and recorded lesions, respectively) was the main lesion localized at the urinary system; in many cases both the kidneys were affected. Grossly, firm whitish fibrotic foci were seen. In other cases, small and diffuse fibrotic retraction was present on the kidney surface. Microscopic examination showed cortical fibrosis with multifocal areas of mineralization, sometimes involving the entire thickness of the cortical. *Encephalitozoon cunicoli* was found in such lesions.

Finally, it is opportune to emphasize

that some lesions were probably underestimated, due to the peculiar observation point within slaughtering line.

Necropsy of rabbits dead during transport

Severe bilateral fibrinous pleuropneumonia, with fibrinous exudate, was observed in 3 dead rabbits. One subject had severe purulent bronchopneumonia, probably caused by *Pasteurella multocida*, present in the left lung. The same subject was affected by *Passalurus ambiguus*. Histology showed severe disseminated suppurative bronchitis, severe multifocal perivascular oedema, and multifocal extensive areas of atelectasia. One rabbit had the rupture of the stomach, due to a severe trauma, which probably occurred during the loading at the farm. Only 1 carcass showed fecal soiling of perianal region due to enteritis, as confirmed at necropsy. In the remaining 19 rabbits pathological findings were: heart dilation and subepicardial blunting, atrial blood repletion and severe diffuse lung congestion. This condition is typical of transport stress.

Statistical analysis

No correlation between average body weights and rabbit deaths during transport and between average body weights and

condemnations could be demonstrated. This finding indicates that, during transport from farm to abattoir, heavy meat rabbits probably do not suffer high densities in transport cages and are not subject to metabolic stress, which could exacerbate silent pathological conditions.

Discussion

The prevalence of pathological lesions detected in this study is about 1%, a very low percentage on the total number of examined rabbits. This finding could probably mean that the health status of slaughter rabbits is satisfactory. Moreover, it could be noted that tegumentary diseases, particularly abscesses, are of great significance for the health status of rabbits, followed by digestive disorders.

Comparing our findings with similar studies performed about 20 years ago (Albiero, 1988; Ferrari *et al.*, 1989; Julini, 1993), a difference in the percentage of pathological lesions detected at rabbit slaughtering can be noted (0,5% vs 1%). This finding could rise from numerous factors, many of which are difficult to identify (i.e. origin of rabbits, hygienic-sanitary condition of farms, etc.), but it could also result from changes in housing and management systems in rabbit farming, particularly the high densities reached under intensive conditions. This hypothesis is supported by the high prevalence of subcutaneous abscesses detected in our study. In fact, this pathological condition is usually caused by predisposing factors related to environmental conditions of the farm. In contrast, the very low level or the absence of other pathologies, such as parasitic gastroenteric diseases or nutritional disorders (i.e. myodystrophy and myopathy) respectively, may emphasize a better control of such diseases in the modern rabbit farming.

An interesting finding is the clear decline of respiratory diseases, whereas enteric disorders seem to be increasing. The latter occur mainly in growing rabbits and are characterized by multifactorial aetiology. Imbalanced diets are usually considered as predisposing factors that can alter the normal gut microflora, so favouring the growth of pathogenic bacteria. Another factor that can contribute to the onset of enteric disorders could be the incorrect use of antibiotics.

It is also interesting to note an increase in cases of nephritis. This pathological condition could be caused by multiple factors, such as drugs, toxins, metabolic stress and parasites. In our study, since *Encephalitozoon cuniculi* was found in most samples, a wide spread of infection could be hypothesized, probably due to the rearing of breeds highly predisposed to the infection.

During this study, we detected a pathological alteration of the liver, defined as "*necrotizing hepatitis*", always affecting the papillary process of the caudate lobe. Since no scientific literature concerning this pathological condition is available at present, it has been hypothesized that a new genetic strain, characterized by an anatomical change of caudate lobe vascularization, has being commercialized in rabbit farming. Further investigation is needed to understand the etiopathogenesis of this alteration.

Finally, most of the rabbits that died during the transport from the farm to the slaughterhouse died following stress reaction. It can be supposed that rabbits kept under stressful farming conditions, could more greatly feel the effects of the transport and so a higher number of animals will probably die. It could thus be assumed that farms with high percentages of mortality could first suffer of management and disease problems.

Conclusions

In conclusion, the health status of slaughtered rabbits can be considered satisfactory; tegumentary lesions continue to represent common diseases of farmed rabbits, although enteric disorders seem increasingly becoming more significant.

From our findings, it is noteworthy to emphasize that most of the pathological lesions observed at slaughtering are from chronic diseases; whereas acute diseases, often causing significant economic losses in the modern rabbit farming, might go undetected. Consequently, it is evident that information collected at slaughterhouse could not give a complete picture of disease problems at farm level.

In contrast, it is comprehensible that detecting chronic diseases at the slaughterhouse, even if at low prevalence, could mean an exponentially more severe problem at the farm. Thus, it could be hypoth-

esized that the selection of slaughter rabbits during the growing period and at loading for abattoir could determine an underestimation of diseases occurring at the farm, particularly acute diseases. It could also be hypothesized that morbidity could be low at the farm, but this is clearly in contrast with the recent scientific literature (EFSA, 2005).

Recently, commercial rabbit farming has been considerably industrialized, but the domestic rabbit can easily suffer stress because it is still not completely adapted to the intensive husbandry and management systems. For this reason, diseases might cause devastating effects with high mortality rates at farm and consequently lack of detection during slaughtering process.

Nevertheless, the slaughterhouse seems to play a good "epidemiological observatory" role for chronic diseases, but it does not make it possible to obtain a comprehensive picture of rabbit diseases.

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