Proceedings 4th World Rabbit Congress, 10-14 October 1988, Budapest Hungary, Vol. 3, 316-324

SIGNIFICANCE OF ROTAVIRUS IN POSTWEANING DIARRHEA OF RABBITS

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Introduction

Rotaviruses are common enteric pathogens of several animal species and of man (McNulty, 1985). Their frequency in rabbits is indicated by high prevalence of antibodies especially at the age above 2 months (DiGiacomo and Thoules, 1986). Virus replication in the intestinal epithelial cells and virus shedding is reported to occur with severe to moderate diarrhea at 1-8 weeks of age (Schoeb et al. 1986).
Earlier investigations in Hungary, indicated the enteropathogenic significance of rotavirus in 4-6 weeks old rabbits and concluded that further studies should help to clarify its role in diarrhea (Kudron et al. 1982).

Losses resulted by diarrheal disease are mostly concentrated to the time after weaning (4-6 weeks) in rabbitries and are generally assumed to be resulted by lack of fibre, by coccidia and by bacterial proliferation (Peeters et al. 1984). Succesful reduction of losses is possible by increased fibre

content of feed.However, supplementation with anti-coccidal drugs was not succesful enough indicating that other factors may also take part in the postweaning diarrhea.

Studies reported here aimed to investigate the possible role of rotaviruses in the postweaning diarrhea of a large scale commercial rabbitry.

Materials and methods

Rabbitry was a 3.500 doe operation at the time of these investigations. Suckling rabbits were kept with the doe until 32 days of age (± 1-2 days) and transferred into the fattening unit.

Weaning rabbits received dried alfalfa and pelleted feed supplemented with Salinomycin (25 mg/kg feed).

Laboratory investigation was performed on 3-8 weeks old rabbits (mostly suffering from diarrhea) after euthanasia and included: regular post-mortem investigation bacteriological and microscopic investigation of the ileum and caecum and of parenchymal organs, histopathology, electron microscopy (EM) on negatively stained and on some ultrathin sections, counter current immuno-electrophoresis (CCIEP) for detection of rotavirus antibodies and antigens (Mocsári et al. 1982) as well as regular flotation and oocyst-counting techniques for coccidia.
Virus neutralisation technique was also used to detect antibodies against rotavirus in rabbits, using 100 TCID/0.1 ml of a cytopathogenic bovine rotavirus strain (Köves et al. 1977).

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Results

During the winter of 1987/88 there were about 30 % losses of weaned rabbits due to postweaning diarrhea. Which could hardly be decreased by addition of dried alphalpha. The feed contained Salinomycin and in one period sulfaquinoxoline-Na (0,25 g/litre) plus trimethoprim (0,05 g/litre) was also supplied in drinking water. In such latter case the losses were decreased to about 15 %.
During January - March 1988 there were 40 diarrheal and 32 nondiarrheal rabbits sacrificed and investigated as described in "Materials and methods".

Results of rotavirus detection in the caeca of these rabbits are summarized in Table 1. The peak of rotavirus detection in diarrheal rabbits was the time right after weaning.
In one rabbit rotavirus infection was combined with cryptosporidia, without coccidiosis.

Cryptosporidia were detected in 10 out of 40 diarrheal rabbits (in contrast to a total of 18 in 40 being positive for rotavirus). The most frequent finding was C. muris.

Coccidia were equally present and approximately in the same numbers ranging from 5×10^1 - 4×10^6/g in diarrheal as in nondiarrheal rabbits, without any clear tendency for proliferation before or after weaning. The predominant species in both groups was E. magna.

E. coli proliferation (= predominantly E. coli on aerobic culture media inoculated with caecal sample) was recorded in 8 of the 40 diarrheal rabbits and in 5 of the 32 nondiarrheal ones.

Rotavirus antibodies were detected in most of the does and in decreasing ratio of milk samples between 1-3 weeks postpartum (Table 2.). Circulating antibodies in young rabbits were rarely detectable between 2-5 weeks of age but were quite commonly registered therafter.
In 9 cases, rabbit sera containing rotavirus antibodies (based on CCIEP) were also tested for virus neutralization, and were found to neutralize the cytopathogenic bovine rotavirus isolate in dilutions 1:40 - 1:160.

Discussion

Data presented here support the hypothesis that rotavirus play an important role in the pathogenesis of postweaning diarrhea of rabbits and are in agreement with Peeters et al. (1984). It seems that most of the does are able to provide more or less antibodies to their offspring during pregnacy and after birth but the lactogenic and circulating maternal antibodies are decreasing to very low levels for the time of weaning. Under such circumtsances it is logical to assume that the highest peak of rotavirus detection right after weaning is a result of lacking passive or active oral protection at this time.
The higher prevalence of seropositivity at the age group of 70-120 days is obviously the result of active immunity due to mobilization of the rotavirus infection right after weaning.

This mobilization of rotaviruses is somewhat different from that of coccidia or cryptosporidia or E. coli detected in these rabbits. These other agents seemed to be more evenly distributed in the age groups of 5-8 weeks and their association with diarrhea was less marked in contrast to rotavirus.

Although more studies are needed to clarify important questions about possible synergism or additional effects of the rotaviruses and the enteric pathogens tested in this experiment, the highest incidence of rotavirus right after weaning, in correlation with

important enteric pathogen in the diarrheal complex of weaning rabbits. This is also indicated by the consequent circulating (reconvalescent) antibody production in 50-60 days old weaned rabbits.

Acknowledgements

Our thanks are due to Mr. I. Medgyes, dr. Z. Kátai for their professional help in management and in parasitology, to Mrs. Ildikó Gulyka, Mrs. Gabriella Halmos-Kiss, Mrs. Éva Szabó, Mrs. Judith Gáspár and Mrs. Piroska Solymosi and to Mr. L. Dupai for their skilled technical help provided in different ways.

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Table 1.

DETECTION OF ROTAVIRUS IN DIARRHEAL AND NORMAL RABBITS*

(tested by EM and CCIEP at different days postpartum)

	Preweaning (20-30 d.)	Immediate postweaning (32-40 d.)	Weaned (50-60 d.)
Diarrheal:			
EM	0/6	18/24	2/10
CCIEP	0/6	9/24	1/ 6
Normal:			
CCIEP	0/6	0/9	0/17

* positive per tested

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Table 2.

ROTAVIRUS-ANTIBODIES IN DOES AND IN OFFSPRING*

(tested by CCIEP at different days postpartum)

	Suckling (7-10 d.)	Prewaning (20-30 d.)	Immediate p ostwean. (32-40 d.)	Weaned (50-60 d.)	Young (70-120 d.)
Does:					
milk	5/9	0/10	-	-	-
serum	6/10	9/10	-	-	-
Offspring:					
serum					
diarrheal	NT	1/28	6/31	17/24	NT
normal	0/10	0/6	6/ 9	9/17	10/11

* positive per tested

NT = not tested

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SUMMARY

In a 3.500 doe commercial rabbitry postweaning losses increased to 30 % predominantly due to diarrhea. Electron microscopy and counter current immunoelectrophoresis (CCIEP) of caecal contens from 40 diarrheal euthanized rabbits revealed rotavirus in 18 of 24 tested at the early postweaning stage. Rotavirus was not or less frequently detected before or after that period.
In 32 nondiarrheal rabbits there were no rotavirus detectable by CCIEP. Coccidia, cryptosporidia and E. coli occured more randomly in all groups. Prevalence of antibodies to rotavirus was highest at 70-120 days of age.

It is concluded that rotavirus played an important part in the weaning diarrhea in this herd.

ZUSAMMENFASSUNG

Die, nach Absetzung volgende Verluste in einem Grossbestand von 3.500 Zuchtkaninchen gingen bis 30 % meistens von Diarrhöe verursacht. Elektronenoptische und gegestrom-immuno-elektrophorestische (CCIEP) Untersuchungen von 40 Durchfall erkrankten Tieren gaben positive Resultate für Rotaviren in 18 von 24 Kaninchen, kurz nach dem Absetzung. Früher oder Später waren Rotaviren weniger oft entdeckt. In 32 normalen Kaninchen wurden Rotaviren (mittels CCIEP) nicht nachweisbar. Kokzidien, Kryptosporidien und E. coli waren mehr einheitlich in allen Gruppen zu entdecken.

Antikörper gegen Rotavirus wurden in der Alter von 70-120 Tagen am meisten zu entdecken.

Es volgt, dass die Rotaviren in diesem Bestand eine wichtige Rolle in der Absetzdiarrhöe der Kaninhcen spielten.