# CHARACTERIZATION OF GROWING RABBIT MORBIDITY AND MORTALITY IN A RABBITRY IN CHAPINGO, MEXICO

**SALCEDO-BACA R.[1], MARTÍNEZ-GARCÍA G. E.[2], MONTESINOS-R. L. I.[3], GÓMEZ-LORENCE M.[1]**

[1]Departamento de Preparatoria Agrícola, [2]Departamento de Zootecnia, Universidad Autónoma Chapingo, Carretera Mex.-Tex. Km. 38.5, Texcoco, México CP 56230, México.
rames@correo.chapingo.mx
[3]Facultad de Medicina Veterinaria y Zootecnia, Universidad Nacional Autónoma de México, Avenida Universidad 3000, Circuito Exterior, Ciudad Universitaria, Delegación Coyoacan, México D. F., CP 04510, México.

## ABSTRACT

The objectives of this study was to characterize morbidity and mortality in a rabbitry during summer 2003. Animals from this study were at Chapingo, Mexico, which is located at 19° 29´ N latitude, 98° 53´ W longitude, and 2250 metros over sea level altitude. The climatic formula of the place is Cb (wo)(w)(i`)g, with 571.5 mm of precipitation and average temperature of 15.2 °C. Animals were managed in 3 band or sets with 14 d period within bands. The cages were cleaned and disinfected before any movement of animals, ones the rabbits were weaned they received a preventive 10 d period antibiotic. Records from rabbits during the fattening period of the three bands red (R), n=523 , green (G), n=432, and yellow (Y) n=449, were taken from July to September 2003. Morbidity (MOB) and mortality (MOT) were recorded daily in each cage. Sex and signs of the ill or dead animal were recorded. Autopsy was performed to 223 dead animals. Tissue samples were taken in approximately 20 % of animals of each of the kind of death (diarrhea, pneumonia, and other). The tissue samples from 43 rabbits were analyzed in the Pathology laboratory from the Facultad de Medicina Veterinaria y Zootecnia, Universidad Nacional Autónoma de México. The first group of animals (R band) was used to test two rabbit commercial formulas (A and B) with antibiotics or prebiotics and probiotics (Bio-Mos and Acid-Pak respectively, Alltech, T. M.). Previously to the analysis arcsin transformation was applied to the independent variables and proc GLM form SAS (V8) was utilized. Graphs were made in Excel (Microsoft T.M.). Morbidity rate was 16, 19, and 34% for G, R and Y bands respectively. Mortality rate was 12, 13 and 21% for G, Y and R bands respectively. Difference between bands in morbidity and mortality patterns are shown graphicaly. Y band had a higher proportion of deaths due to pneumonia whereas in the other 2 bands the main mortality cause was diarrhea. When the main cause of mortality was diarrhea the sex proportion of mortality was 70-30 (R band) and 60-40 (G band) for males and females respectively. Pneumonia explained 70% of mortality in Y band, where the sex proportion was 50-50. This suggests that males are more sensible to diarrhea than females are. The percentage of affected organs and the microorganism identified are shown.

**Key words:** rabbit, diarrhea, pneumonia, morbidity, mortality.

## INTRODUCTION

During the last months of 2001 diarrheas and respiratory problems incidence highly increased in Central Mexico rabbitrys. Both affections were the most important health problems explaining the highest morbidity and mortality rates. They caused great economical loses such that some rabbitries had to close and others to increase their spending in preventive programs using antibiotics.

A similar disease reported in Europe has been call mucoid enteropathy (ROSELL 2000). It showed up by the end of 1996 in Italy, France and other countries PÉREZ *et al*. (2003), however ROSELL (2000) mention that this disease was reported as the primary mortality cause in industrial rabbitrys during 1990 decade.

Because of the current trend in which the use of antibiotics is been avoided, prebiotics and probiotics are been evaluated in order to find out a remedy to the diarrheas problem in rabbits. Complete control has not been reach, new rabbitries are been affected even in the winter 2003-04.

The objectives of this study were to characterize morbidity and mortality in a rabbitry during summer, identify the kind of internal injury through autopsy, and identify possible causal agents through histopathologic studies.

## MATERIAL AND METHODS

Animals from this study were at the Unidad de Investigación Aplicada en Producción Cunícola from the Preparatoria Agrícola Departament (UIAPC), Universidad Autonóma Chapingo, Mexico, which is located at 19° 29´ N latitude, 98° 53´ W longitude, and 2250 metros over sea level altitude. The climatic formula of the place is Cb (wo)(w)(i`)g, with 571.5 mm of precipitation and average temperature of 15.2 °C (GARCIA, 1981).

The rabbitry floor was made of concrete, the roof consisted of zinc sheets with isolated material in the internal face, and the walls were made of bricks and concrete except for the ventilation inlets which have mosquito net. European commercial cages (98 X 32 X 38 cm) were distributed in 2 areas: one for reproduction (210 cages) another for growing (240 cages), in both cases there were 3 lines of cages. A food hopper was used to feed the animals. The cages had an automatic watering system with nipple drinkers.

Animals were managed in 3 band or sets: red (R ), green (G) and yellow (Y) bands, with 14 d period within bands for parity date, parity interval was 42 d. Both the litter and the doe were moved to the growing section on day 35 after parity. Does returned to reproduction section on day 40 for the next parity. The cages were cleaned and disinfected before any movement of animals. When the rabbits were weaned they received a preventive 10 d period antibiotic, Oxytetracyclin or Neomycin (in the water, 0.5 g/l) for animals in G and Y band. R band was used to test 4 treatments.

Records from 1404 rabbits during the fattening period of the three bands were taken from July to September 2003. morbidity (MOB) and mortality (MOT) were recorded daily in each cage. Sex and signs of the ill or dead animal were recorded. Autopsy was performed to dead animals (n=223), as ALUJA and CASAS (2002) indicate. Tissue samples were taken in approximately 20 % of each of the kind of death (diarrhea, pneumonia, and other). The tissue samples from 43 rabbits were analyzed in the Pathology Laboratory from the Facultad de Medicina Veterinaria y Zootecnia, Universidad Nacional Autónoma de México.

The first group of animals (R band) was used to test two rabbit commercial formulas (A and B) with antibiotics or prebiotics and probiotics (Bio-Mos and Acid-Pak respectively, Alltech, T. M.). Records for this trial were analyzed under the following model: $Y_{ij} = \mu + T_i + e_{ij}$, where $Y_{ij}$ represents the independent variable MOB or MOT, $\mu$ the general mean, $T_i$ the treatment effect, and $e_{ij}$ the experimental error. Records from the 3 bands were analyzed under a similar model where the independent variable was the band. Previously to the analysis arcsin transformation was applied to the independent variables and proc GLM form SAS (V8) was utilized. Band and treatment means were compared through Tukey test. Graphs were made with Excel (Microsoft T.M.).

## RESULTS AND DISCUSION

Least squares means for morbidity and mortality rates in each of the band are in table 1. Red band had highly significant differences ($P<0.01$) in morbidity and mortality in comparison with the other 2 bands.

**Table 1. Morbidity and mortality rate during the fattening period by band (%)**

| Band | N | Morbidity | Mortality |
|---|---|---|---|
| Red | 523 | 33.55[a] | 21.03[a] |
| Green | 432 | 15.78[b] | 11.51[b] |
| Yellow | 449 | 18.98[b] | 13.42[b] |

Means with same literal by column are not different ($a \leq 0.05$).

Treatment least squares means within Red band, are in table 2. Commercial formula brand A and B with Oxytetracyclin, and Brand A with Acid-Pak had not differences in morbidity and mortality ($P > 0.05$). Commercial formula brand B with Oxytetracyclin or with Bio-Mos and Acid-Pak were not different ($P > 0.05$) in morbidity and mortality.

**Table 2. Morbidity and Mortality by treatment for red band rabbits (%)**

| Treatment | N | Morbidity | Mortality |
|---|---|---|---|
| Commercial formula brand A + Oxytetracyclin (T1) | 79 | 18.36[a] | 13.03[a] |
| Commercial formula brand B + Oxytetracyclin (T2) | 149 | 32.31[ab] | 18.44[ab] |
| Commercial formula brand B + Bio-Mos + Acid-Pak (T3) | 219 | 41.19[b] | 26.26[b] |
| Commercial formula brand A + Acid-Pak (T4) | 76 | 17.53[a] | 12.38[a] |

Means with same literal by column are not different ($a \leq 0.05$).

The morbidity and mortality pattern through the growing period was very different from band to band. Maximum MOR and MOT rates was between first and second week, in the three cases. See figure 1.

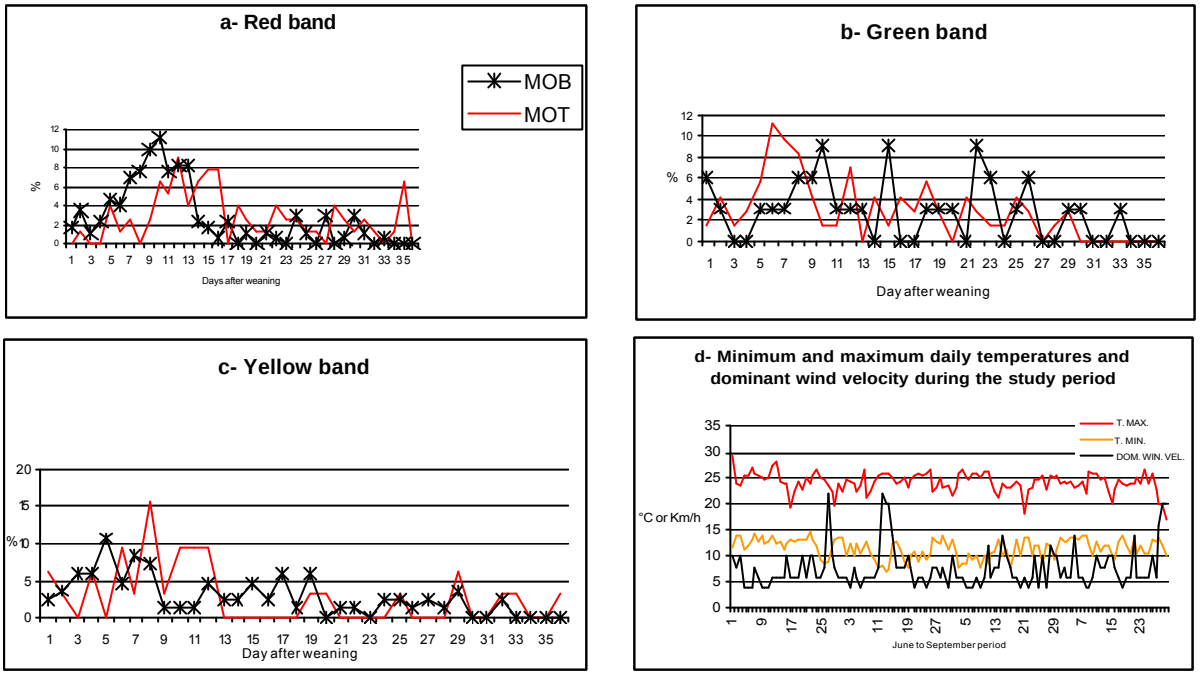


**Figure 1. Daily morbidity (MOB) and mortality (MOT) pattern through the growing period for the three bands (a, b and c in %) and environmental conditions during the trial period: daily minimum (T. Min.), maximum (T. Max) temperature (in °C) and dominant wind velocity (in Km/h) by day.**

The maximum daily morbidity for red and yellow band was between 10 and 12% and appeared on day 10 and 5 after weaning respectively. Green band showed a very different pattern, it had three maximums on days 10, 15 and 22 after weaning but the level was inferior to 10%.

Daily mortality rate greater than 4% was present on day 9 to 11 and day 35 for band red, with a maximum of 9% on day 12. Green band many days with daily mortality greater than 4% which were 4 to 10, 12, 15, 18 days and the maximum was 11% on day 6. Yellow band had daily mortality rate greater than 4% on days 4, 6, 8, and 10 to 12, the maximum was reach on day 8 with 16% of mortality.

Difference between bands in morbidity and mortality patterns maybe associated to treatments that were applied to each band, 4 treatments in red band but only one treatment in the other two bands. Environmental conditions may be another factor, days with the extreme highest and lower temperatures and very windy can be seen in figure 1

(d), rabbits from red, green, and yellow band were weaned and started the growing period on July 11, July 25, and August 8. In figure 2 can be seen that yellow band had a higher proportion of deaths due to pneumonia whereas in the other 2 bands the main mortality cause was diarrhea, which is associated with high velocity of the wind. See figure 2(a).

In general, diarrhea was the main cause of mortality however in yellow band pneumonia was (August 15 presented extreme temperatures and high wind velocity, corresponding with yellow band starting). When the main cause of mortality was diarrhea (75 and 55% for red and green bands respectively) the sex proportion of mortality was 70-30 and 60-40 respectively for males and females, however in yellow band pneumonia explained 70% of mortality, the sex proportion was 50-50 See figure 2(b). This suggests that males are more sensible to diarrhea than females are.

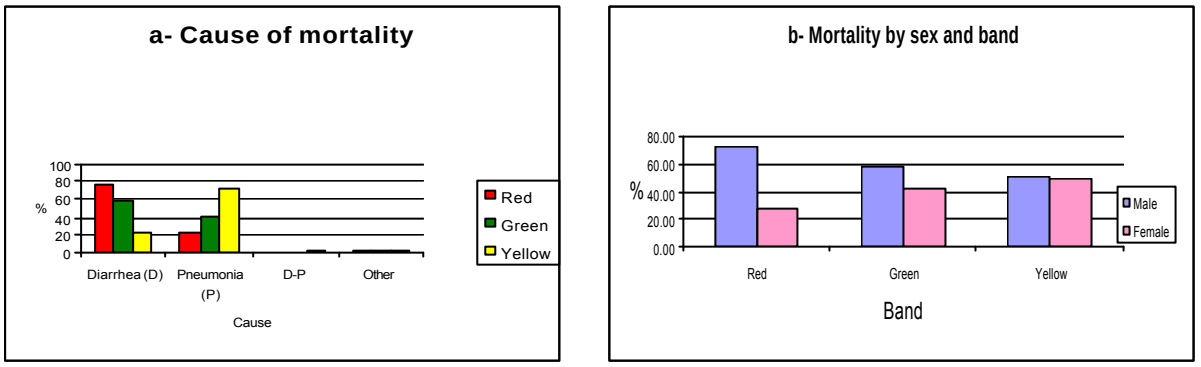


**Figure 2. Cause of mortality (a) and sex mortality distribution (b) by band (%)**

From 43 dead rabbits that were studied in the laboratory, the internal organs that showed some injury were: brain 30.23%, lung 44.19%, intestine 72.09%, kidney 16.28%, spleen 16.28 %, heart 27.91%, liver 20.93%, caecum 18.60%, and stomach 11.63%. Inclusion corpus compatible with *Rotavirus* and *Coronavirus* were found. *Escherichia coli, Clostridium, Coccidia sp., Pasteurella sp., Saccharomyces sp., Glutaratus sp., Salmonella sp., and Encephalitozoon cuniculi* were found in different organs. Similarly, many research proyects have been developed in Europe without finding a specific causal agent ROSELL (2003).

The disease can be defined as a multi factorial ill in which environmental, feeding and management factors can be found associated with infectious agents. Mucoid enteropathy affects digestive tract of 3 to 10 weeks old rabbits. Signs are: lack of appetite, knocking down, stomach inflammation, mucus in faecal matter, teeth gnash, hypothermia, dehydration, tight caecum content, and gut inflammation absence (ROSELL, 2003). Because of the low feed consumption gut dysbiosis is generated and there is a decrease of volatile fatty acids levels and an inversion in the 3 and 4 carbon acids ratio balance with lost of equilibrium for the microbiotic gut populations (PEREZ *et al*., 2003).

## CONCLUSIONS

Growing rabbit's morbidity and mortality during the summer of 2003, at the UIAPC was higher during the first and second weeks of the fattening period, in the three evaluated bands. Total morbidity and mortality rates, when different treatments were tested reached the maximum values (R band). Diarrhea and pneumonia explained more than 95% of mortality; diarrhea was the most important cause in 2 out of the 3 bands. There were a higher proportion of males dead when diarrhea was the cause of mortality.

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