Technical Note

Colibacillosis in Pig Litters

Danays Palacio Collado *, Yorkis Tamayo Escobar *, Yoandy Sosa de la Torre **

*Faculty of Agricultural Sciences, Ignacio Agramonte Loynaz University of Camagüey. Carretera Central Este Camino Viejo Nuevitas Km. 5 ½ Camagüey, Cuba, PC 74650.

** Director of Computer Sciences and Communications in Tourism, Camagüey City, Cuba.
Correspondence: danays.palacio@reduc.edu.cu

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INTRODUCTION

In Cuba, colibacillosis is one of the major causes of death by infection of newborn and young pigs, which is dependent from the climatic conditions of the country. The annual losses account for more than 10%, affecting the national economy in over one million pesos (Barreto *et al*., 2020a). Accordingly, techniques that enable farmers to implement measures in anticipation, are required. Consequently, the aim of this work was to determine the periods of the year with the greatest number of litters affected in swine farms, based on time series analysis.

DEVELOPMENT

The monthly data corresponding to the deaths (8 318), and the animals affected by *Escherichia coli* (13 260), diagnosed from a total of 172 730 births between January 2016 and December 2020, at the Territorial Laboratory of Animal Health in Camagüey, were included. The data were collected from Basic Production Farms *Crias Minas*, belonging to the provincial Swine Company in Camagüey, Cuba, on Lugareno Road, km 13 ½, and *Charles Morell* farm, located on Lesca Road, km 6 ½, province of Camagüey, Cuba.

The highest peak of affected and deceased animals after *E. coli* infection was observed in 2018 in *Crias Minas* and 2017 and *Charles Morell* farms (Table 1).

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Table 1. Summary of yearly cases per year in the farms

Year	Total births	Total affected	Total deaths
Crías Minas			
2016	11 776	1 729	1 346
2017	15 624	2 098	1 680
2018	24 397	2 622	2 253
2019	24 382	1 800	406
2020	19 231	1 891	318
Total	**95 410**	**10 140**	**6 003**
Charles Morell			
2016	15 860	689	513
2017	13 898	711	523
2018	12 487	619	450
2019	15 294	586	432
2020	19 781	515	397
Total	**77 320**	**3 120**	**2 315**

The results of what seemed the highest mortality in those years may be attributed mainly to predisposing causes related to the quantity and quality of the food consumed by the litters, the occurrence of resistance to antimicrobials, and climatic conditions that favored the propagation of this pathogen. As a matter of fact, colibacillosis control goes through vaccination, proper hygiene, and antibiotic treatment during the clinical manifestation of the disease (Carhuapoma *et al.*, 2020).

Escherichia coli is very commonly found in swine farms, since it is a common inhabitant of the intestinal flora, which is disposed of in large amounts in the feces. Although not all the strains of the bacterium are pathogenic, the risk of colibacillosis outbreaks is directly related to the level of challenge. This problem is aggravated in farms with a high density of animals, faulty facilities, and insufficient number of farrowing pens. Likewise, the existing sanitary breaches and inappropriate zootechnical and veterinary management of animals have a negative influence (Barreto *et al*., 2020, a and b).

Rain favors the conditions for contagion and transmission of enteric colibacillosis. Both high temperatures and high relative humidity in the air lead to stress in swine litters, which are more susceptible to the disease (Turcás, Pérez, and Sotto, 2012; Pérez and Quiñones, 2014).

In that sense, it is important to determine the moment of tightening hygienic-sanitary measures, and management of young pigs. Accordingly, the multiplicative seasonal decomposition process was performed, using Statgraphics Centurion XVII Version 16.1.18 (Statpoint, Inc. 1982-2012) with the following model:

$$Y_t = T_t * C_t * S_t * R_t$$

Where:

Y_t = Time series of affected animal proportion in relation to the born animals.

T_t = Tendency (T)

C_t = Cycles or cyclicity (C)

S_t = Seasonality (S)

R_t = Residual component

The seasonal indexes observed for the proportion of animals affected by *E. coli* animals in the period studied (Figure 1) were at their highest in June (*Cria Minas*), and October (*Charles Morell*). This demonstrates that the differences in zootechnical-veterinary management are determining in the detection of sick animals.

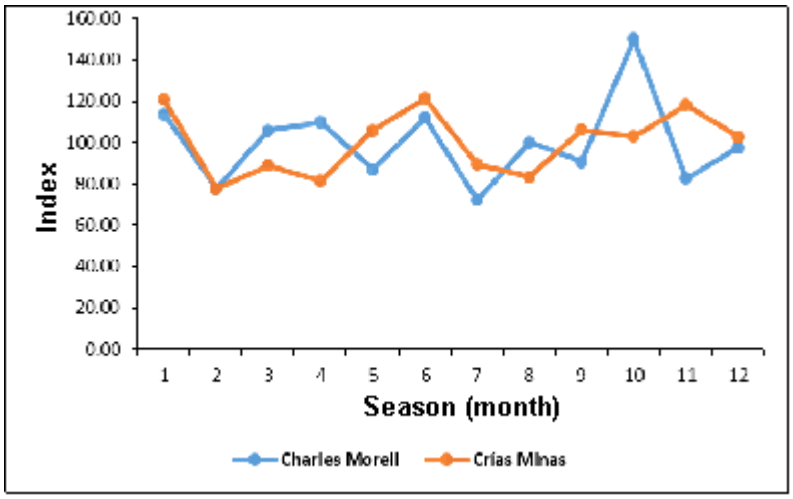

Figure 1. Seasonal indexes for the affected animal proportion

The diarrheal processes affect pigs during the neonatal and postweaning stages in several different swine farms, particularly the ones caused by *Escherichia coli.* The results achieved might be attributed to environmental temperature and relative humidity. These ecological factors act like predisposing elements that help increase the prevalence of diarrheal processes caused by *E. coli*, which affect swine litters (Palacio *et al*., 2018).

CONCLUSIONS

Annual time series analysis, using the data from other periods, allows for the evaluation and comparison of the level in which swine farms have been affected by *E. coli*.

The identification of seasonal peaks in infection may indicate the time in which special attention should be paid to animal control and management.

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AUTHOR CONTRIBUTION

Conception and design of research: DPC, YTE, YST; data analysis and interpretation: DPC, YTE, YST; redaction of the manuscript: DPC.

CONFLICT OF INTERESTS

The authors declare no conflict of interests.