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Original

Categories Linked to Causes Affecting Production on a Swine Farm in Camaguey, Cuba

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ABSTRACT

Background: Swine production systems are exposed to economic losses due to various diseases and sanitary slaughter. **Aim:** To establish a ranking of occurrence of some causes of mortality on the mix swine farm, along with the most deeply involved categories.

Method: Official information related to economic losses due to mortality caused by enteropathies, respiratory diseases, sanitary slaughter, and others, was collected within categories litters, pre-fattening, and fattening animals, in the 2012-2016 five-year period. Accordingly, a linear regression without error was performed to establish the rank of mortality causes, through standardized coefficient (β); and an ANOVA, using the Duncan's multiple comparison test to determine the level of affectation in the categories studied.

Results: the losses due to mortality rose to $ CUP 113 215.94. All the causes had significant impacts, and followed a descending order, headed by enteropathies, and followed by respiratory diseases, sanitary slaughters, and the like. The most widely affected categories were litters and pre-fattening animals. The prophylactic use of indicated antibiotics during these growing stages does not meet the expected effects.

Conclusions: Enteropathies, respiratory diseases, sanitary slaughter, and other causes had significant influences on the mortality of litters and pre-fattening animals. The prophylactic use of recommended antibiotics during these growing stages did not meet the expected effects.

Key words: respiratory diseases, enteropathies, swine raising, sanitary slaughter (Source: *MeSH)*

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INTRODUCTION

Swine industry is one of the most promising choices to meet the food demand of an exponentially growing human population. Pork production had an increasing trend until 2016, when the annual growth rate underwent a 0.9% decrease (Instituted Trusteeship Associated to Agriculture, 2016). Although this industry is very powerful, even with hegemonic growers, it is exposed to economic losses associated to respiratory and gastrointestinal pathogens, whose presence is increasing (Oedekoven, 2017; Leidenberger *et al.*, 2017). Additionally, other causes that hinder production are generally associated to deficient management (Calderón Díaz *et al.*, 2017). Hence, it is important to determine them in order to implement measures that reduce their negative impact.

The aim of this research was to set up a prevalence ranking of some the causes of mortalities on one mix swine farm in Camagüey, as well as the most heavily affected categories.

MATERIALS AND METHODS

This research was conducted on a mix swine farm in the province of Camagüey that comprises areas for reproduction and fattening (offspring from York Land breeders X CC-21 boars), under an intensive production system, using Flat-Deck technology. Official information recorded on the farm was used, in relation to economic losses due to mortality caused by enteropathies, respiratory diseases, sanitary slaughter, and others (hypoglycemia, crushing, and other unclear causes), in categories litters, pre-fattening, and fattening animals, during the 2012-2016 period. The animals were given Levamisole and Shotapen ^{TM} L.A, as a procedure implemented to fight bacterial and parasitic diseases during the pre-fattening stage (100 000 UI G procaine Penicillin, 100 000 UI G benzathine Penicillin, and 200 mg base Dihydrostreptomycin.). Later, on the fourth week, Fortius ^{TM} L. A., (every mL contains 100 mg Enrofloxacin), was administered parenterally.

Statistical analysis

A linear regression without error was made to analyze the cause-mortality ratio in the five-year period. Simple analysis of variance and Duncan's multiple comparison test were made to determine the behavior of mortality means within category animal. All the data were processed through IBM SPSS, version 23 (2015).

RESULTS AND DISCUSSION

During the farm study, the economic loss due to mortality totaled $ CUP 113 215.94. The analysis performed to establish the level of prevalence of causes related to this negative impact showed a descending order, particularly the enteric diseases, though all had a significant effect on the issue studied (Table 1).

Table 1. Results of linear regression in total deaths

Model		Non-standardized coefficients		Standardized coefficients (β)	Sig.
		B	Standard error		
1	Deaths caused by enteric disorders	1.000	0.000	0.695	0.000
	Deaths caused by respiratory disorders	1.000	0.000	0.325	0.000
	Sanitary slaughtered animals	1.000	0.000	0.135	0.000
	Other causes	1.000	0.000	0.123	0.000

In swine productions, the deaths associated to enteropathies are a severe problem also present in industrial countries. In the United States of America, heavy losses have been produced due to the swine epidemic diarrheal virus (SEDV) since 2013 (Schulz and Tonsor, 2015). This situation has worsened with the inclusion of other epidemic viruses, like the virus causing transmissible gastroenteritis, and swine delta coronavirus (Oedekoven, 2017). In addition to these emerging entities, affectations caused by bacterial agents coexist, with a long-lasting enteropathogenic trace. In that sense, several enteric pathotypes of *Escherichia coli* stand out, as recently reported in Great Britain (Emerging Threats, 2014), and other parts of the world (Barreto, Rodríguez, and Barreto, 2016; Luppi, 2017).

Respiratory diseases also have a negative impact on swine production. The ones caused by viruses are the most frequently reported diseases in industrial countries: swine respiratory and reproductive syndrome viruses, and type-2 circovirus, which are just a couple of examples. Likewise, *Mycoplasma hyopneumoniae*, a bacterial species, is the source of significant economic losses (Cano *et al.,* 2016).

Several grounds have led to sanitary slaughter; other causes are assumed by foreign researchers as the consequence of processes with several etiologies, and deficient zootechnical management, which have a negative impact, whatever the variant implemented (including slaughtering), though the term is not explicitly stated (Calderón Díaz *et al.*, 2017).

A comparison of means of the total deaths by category evidenced that the highest related economic losses were observed in litters and pre-fattening animals (Table 2) (Dependent variable: total deaths).

Table 2. Total death means by category throughout the five years of the study

Category	Mean	Standard error	95% confidence interval	
			Inferior limit	Superior limit
Litters	40.650[a]	1.186	38.307	42.993
Pre-fattening animals	32.317[ab]	1.186	29.974	34.660
Fattening	7.633[c]	1.186	5.290	9.976

Legend: unequal superscripts show a significant difference (P<0.05), according to Duncan test.

The results correspond to the range of factors around the two categories. In the first, immaturity of the immune system of animals, in the second, post-weaning stress (Lee *et al.*, 2016). Hence, these enteric and respiratory diseases have a higher toll in those stages (Vila *et al.*, 2016; Luppi, 2017), in addition to the idea of using antibiotics in prophylactic doses as a protective alternative to both syndromes, as in this case, despite plenty of evidence of the risks inherent to this practice (Fouhse, Zijlstra, and Willing, 2016).

Enteropathies are quite frequent, and a serious health problem on swine farms' litters and pre-fattening animals. The enterotoxigenic pathotype of *Escherichia coli* is more prevalent in neonatal diarrhea, whereas toxigenic shiga types are more frequent at post-weaning (Bessone *et al.*, 2017). The occurrence and synthesis of these syndromes, like the respiratory ones, will persist for as long as there are unprotected litters, and in pre-fattening animals where the nutrition-microbiota-host ratio is neglected. The solution is not based on antibiotherapy, but on simple choices directed to stabilizing that animal microbiota. In that sense, several broad-range prebiotics and probiotics are useful (Barba-Vidal, Martín-Orúe, Castillejos, 2018), as well as multipurpose autochthonous microorganisms (Barreto, Rodríguez, Bertot, and Delgado, 2015; Fouhse, Zijlstra, and Willing, 2016; Blanco-Betancourt *et al.*, 2017).

CONCLUSIONS

The causes of mortality that affected production on the mix swine farm between 2012 and 2016 were enteropathies, followed by respiratory diseases. The highest impact was observed in litters and pre-fattening animals. In the latter, the prophylactic use of antibiotics failed to achieve the expected results.

REFERENCES

Barreto, G., Rodríguez, H., Bertot, A. & Delgado, R. (2015). Microorganismos autóctonos multipropósitos (MAM) para el control y prevención de la colibacilosis neonatal porcina. *Rev. Prod. Anim*., 27 (2), 16-19. https://revistas.reduc.edu.cu/index.php/rpa/article/view/1318

Barreto, G., Rodríguez, H. & Barreto, H. (2016). Inducción de antibiorresistencia en *E. coli*

enterotoxigénica con cobre. *Revista electrónica de Veterinaria*, 17(12). http://www.veterinaria.org/revistas/redvet/n121216.html

Bessone, FA., Bessone, G., Marini, S., Conde, MB., Alustiza, FE. & Zielinski G. (2017). Presence and characterization of Escherichia coli virulence genes isolated from diseased pigs in the central region of Argentina. *Veterinary World*, 10(8), 939-945. Doi: 10.14202/vetworld.2017.939-945

Blanco-Betancourt, D., Ojeda-García, F., Cepero-Casas, L., Estupiñan-Carrillo, LJ., Álvarez-Núñez, LM. & Martín-Martín, GJ. (2017). Efecto del bioproducto IHplus® en los indicadores productivos y de salud de precebas porcinas. *Pastos y Forrajes*, 40(3), 201-205. http://scielo.sld.cu/scielo.php?pid=S0864-03942017000300005&script=sci_arttext&tlng=en

Calderón Díaz, JA., Diana, A., Boyle, LA., Leonard, FC., McElroy, M., McGettrick, S., ... & García, E. (2017). Delaying pigs from the normal production flow is associated with health problems and poorer performance. *Porcine Health Management*, 3(13), 2-6. https://link.springer.com/article/10.1186/s40813-017-0061-6

Cano, G., Cavalcanti, MO., Orveillon, MX., Kroll, J., Gomez-Duran, O., Morillo, A. & Kraf Ch. (2016). Production results from piglets vaccinated in a field study in Spain with a Type 1 Porcine Respiratory and Reproductive virus modified live vaccine. *Porcine Health Management*, 2(1), 22. https://porcinehealthmanagement.biomedcentral.com/articles/10.1186/s40813-016-0038-x

Emerging Threats (2014). Quarterly Report. Pigs. Quarterly Report 2014: April to June 2014. http://www.defra.gov.uk/ahvla-en/publication/pig-survreports/

FIRA. (2016). Estudio de caso del mercado de la carne de cerdo. Panorama Agroalimentario, Carne de Cerdo. http://www.oecd.org/daf/competition/Examenes-de-mercado-en-Mexico-Manual-2016.pdf

Fouhse, JM., Zijlstra, RT. & Willing, BP. (2016). The role of gut microbiota in the health and disease of pigs. *Animal Frontiers*. 6 (3), 30-36. https://doi.org/10.2527/af.2016-0031

Lee, IK., Kye, YC., Kim, G., Kim, HW., Gu, MJ., Umboh J., ... & Yun, C. H. (2016). Stress, nutrition, and intestinal immune responses in pigs—a review. Asian-Australasian journal of animal sciences, 29(8), 1075. Doi: 10.5713/ajas.16.0118

Leidenberger, S., Schröder, Ch., Zani, L., Auste, A., Pinette, M., Ambagala, A., ... & Blome, S. (2017). Virulence of current German PEDV strains in suckling pigs and investigation of protective effects of maternally derived antibodies. *Scientific reports*, 7 (1): 1-11. https://www.nature.com/articles/s41598-017-11160-w

Luppi, A. (2017). Swine enteric colibacillosis: diagnosis, therapy and antimicrobial resistance. *Porcine Health Management*, 3 (1), 16. https://porcinehealthmanagement.biomedcentral.com/articles/10.1186/s40813-0170063-4

Oedekoven, D. (2017). Animal Industry Board. Annual Report Fiscal Year 2017. Swine. http://dev.sdda.sd.gov/boards-and-commissions/animalindustryboard/disease-investigation.html

Schulz, LL. & Tonsor, GT. (2015). Assessment of the economic impacts of porcine epidemic diarrhea virus in the United States. *J. Anim. Sci.*, 93(11),5111–5118. https://www.ncbi.nlm.nih.gov/pubmed/26641031

Barba-Vidal, E., Martín-Orúe, SM. & Castillejos, L. (2018). Review: Are we using probiotics correctly in post-weaning piglets? *Animal*, 12(12), 2489–2498. Doi: 10.1017/S1751731118000873

Vila, J., Sáez-López, E., Johnson, JR., Römling, U., Dobrindt, UR. & Cantón, R. (2016). *Escherichia coli*: an old friend with new tidings. FEMS Microbiology Reviews, 40 (4), 437-463. Doi: 10.1093/femsre/fuw005

AUTHOR CONTRIBUTION

Research design and idea: HRT, GBA, ALC, RVM, IMS, YCE; data analysis and interpretation: GBA, HRT, RVM; redaction of the manuscript: GBA, HRT.

CONFLICT OF INTERESTS

The authors declare no conflict of interests.