Desayunos UMU-Empresa:
Sector ganadería y salud y bienestar animal

GUILLERMO RAMIS VIDAL, DVM PhD DIPLOMATE ECPHM, CoIP
E058-005 CRIA Y SALUD ANIMAL

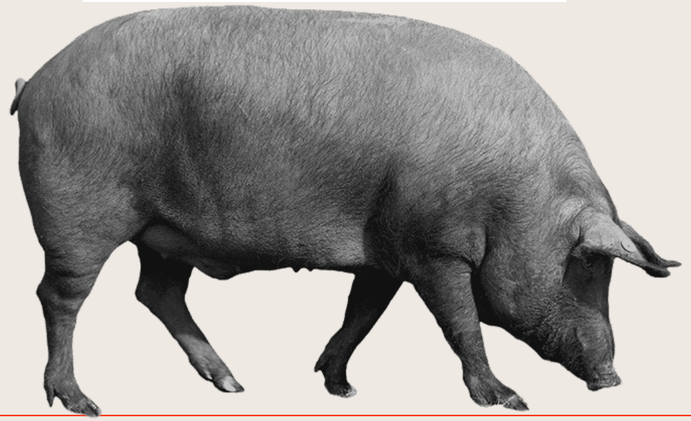
UNIVERSIDAD DE MURCIA

QUIENES SOMOS

Grupo fundado en 1994, inicialmente como CRIA Y SALUD DEL GANADO PORCINO y posteriormente (2007) CRIA Y SALUD ANIMAL

I.P.	(CU)	**MUÑOZ LUNA, ANTONIO**
I.P.	(TU)	**RAMIS VIDAL, MANUEL GUILLERMO**
INV.	(TU)	**ROUCO YAÑEZ, ANTONIO JOSE**
INV.	(AS)	ABELLANEDA CUADRADO, JUANA MARIA
INV.	(AS)	**MARTINEZ ALARCON, LAURA**
INV.	(COL)	BRETON SOBRADO, JORGE
INV.	(COL)	ECHEVERRY BONILLA, DIEGO FERNANDO
INV.	(COL)	**HERNANDEZ CARAVACA, IVAN**
INV.	(COL)	HERRERO MEDRANO, JUAN MANUEL
INV.	(COL)	LÓPEZ ÁLVAREZ, JOSE ANTONIO
INV.	(COL)	MARTINEZ ALMELA, JESUS
INV.	(COL)	**MENDONÇA PASCOAL, LIVIA**

especies



Líneas Principales

- Integridad y salud intestinal
  - Permeabilidad intestinal
  - Inflamación loca y sistémica
  - Microbiota
  - Transcriptómica
  - Eje intestino-pulmón
- Genómica
  - Identificación y parentescos
  - Diferenciación de razas (minoritarias; GOS)
- Inmunología
  - Respuesta inmune local y sistémica
  - Respuesta a patógenos, fármacos y vacunas
- Salud animal
  - Patologías frecuentes (PRRS, PCV2, *M. hyopneumoniae, M. suis, S. suis*, diarreas meonatales)
  - Patologías menos frecuentes (PFTS)
- Mejora genética
  - Diseño de programas de mejora en ganado blanco e ibérico
  - Comparación de reproductores y selección de animales mejorantes
  - Identificación de genes mayores y mutaciones (QTLs, WGS)

¿Cómo lo hacemos?




1. Trabajo de campo con animales: rendimientos productivos, eventos patológicos, evaluación sanitaria

Matrices de trabajo: semen y heces (no invasivas), sangre (poco invasiva), tejidos (muy invasiva)

2. Laboratorio

ADN:

- Genómica:
  - Identificación animales y parentescos (ARCA; Lab. Biol. Molec. ES13LG01, Lab. Gen Animal).
  - Diagnóstico: presencia de patógenos.
  - Genotipados: SNPs (identificación de QTLs), WGS (identificación de ultra-alta densidad)
  - Metagenómica: microbiota
  - Metiloma: epigenética

ARN:

- Expresión génica (pocos genes)
- Metatranscriptómica (20.000 genes)

Proteína:

- Biomarcadores en todas las matrices (TJP, LPS, Histamina, Calprotectina, etc), pruebas de permeabilidad intestinal (OVA)

VACUNAS, PROBIÓTICOS, PREBIÓTICOS, SIMBIÓTICOS, FÁRMACOS, ADITIVOS ALIMENTARIOS, NUTRACÉUTICOS, ENZIMAS, OLIGOELEMENTOS, ETC…

animals

MDPI

Article

Effect of β-Mannanase Addition during Whole Pigs Fattening on Production Yields and Intestinal Health

Pedro Sánchez-Uribe [1], Eva Romera-Recio [2], Carolina G. Cabrera-Gómez [3], Elisa V. Hernández-Rodríguez [3], Álvaro Lamrani [1], Belén González-Guijarro [3], Clara de Pascual-Monreal [3], Livia Mendonça-Pascoal [4], Laura Martínez-Alarcón [5,6,*] and Guillermo Ramis [3,5]

1 ELANCO Animal Health, 20108 Alcobendas, Spain
2 Estación Experimental del Zaidín (CSIC), 18008 Granada, Spain
3 Departamento de Producción Animal, Facultad de Veterinaria, Universidad de Murcia, 30100 Murcia, Spain
4 Escola de Veterinária e Zootecnia, Universidade Federal de Goiás, Goiânia 74690-900, Brazil
5 Instituto Murciano de Investigación en Biomedicina (IMIB), 30100 Murcia, Spain
6 UDICA, Hospital Clínico Universitario Virgen de la Arrixaca, 30100 Murcia, Spain
* Correspondence: lma5@um.es; Tel.: +34-868884749

Simple Summary: Raw materials used in the manufacture of pig feed may contain anti-nutritional elements. These include β-mannans: oligosaccharides that produce a state of unnecessary inflammation in the intestine, hindering the absorption of nutrients and worsening animal performance. In this trial, an enzyme that degrades these sugars was used throughout the growing–finishing period, also reducing the energy of this feed (HC), compared to a control feed (CON). The animals were weighed, and growth and FCR were calculated. In addition, fecal consistency, gastric lesions at slaughter and a battery of 16 biomarkers in feces and tissues, indicators of intestinal integrity and immune stimulation, were studied. HC animals grew as well as CON animals and had a lower FCR. In addition, an anti-inflammatory state was observed in feces and in jejunum and ileum tissue at slaughter, suggesting that the use of this enzyme effectively controls the β-mannan-derived immune reaction.

Abstract: The presence of β-mannans in feed can produce a futile and chronic immune stimulation in fattening pigs. In this trial, a 1-4-endo-D-β-mannanase was added to the feed (HC) during growth and fattening (0.03% of Hemicell HT) and physical performance and pathological data were recorded, and intestinal integrity and immune activation were studied by molecular biomarkers, compared to a control group (CON). The treatment diet was reduced in energy content by 40 Kcal/kg NE. From each group, 113 and 112 animals housed in 8 pens were individually identified and weighed three times: at 7th, 63rd and 116th days in feed. The FCR was calculated for groups of two pens and ADG individually. There was no difference in ADG (CON = 0.836, HC = 0.818) nor in FCR between groups (p = 0.486). During growth, there was a higher frequency of normal feces in HC and there were also no differences in the frequency of gastric lesions. A significant increase in Claudin, Occludin, IFN-γ and IL8 was observed in the CON in feces and a significant decrease in IL-6 in HC. In tissues, there were differences for IL-12p40, TNF-alpha in jejunum (increased CON) and TGF-β in ileum and jejunum, (decreased HC). The economic performance was EUR 4.7 better in the treated group. In conclusion, the addition of 1-4-endo-D-β–mannanase to the feed with a 1.6% reduction in net energy compared to the control, allowed the animals to perform as well as the animals on the higher energy diet, with lower prevalence of diarrhea.

Keywords: pathogen associated molecular patterns; β-mannans; β-mannanase; finishing; growing; intestinal integrity; pigs

check for updates

Citation: Sánchez-Uribe, P.; Romera-Recio, E.; Cabrera-Gómez, C.G.; Hernández-Rodríguez, E.V.; Lamrani, Á.; González-Guijarro, B.; de Pascual-Monreal, C.; Mendonça-Pascoal, L.; Martínez-Alarcón, L.; Ramis, G. Effect of β-Mannanase Addition during Whole Pigs Fattening on Production Yields and Intestinal Health. *Animals* **2022**, *12*, 3012. https://doi.org/10.3390/ani12213012

Academic Editor: Yong Su

Received: 21 September 2022
Accepted: 31 October 2022
Published: 2 November 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

1. Introduction

The ban of the use of zinc oxide in 2022 [1] and the reduction of antibiotic use in enteric disease prophylaxis in the European Union [2], opens a bleak outlook for piglet

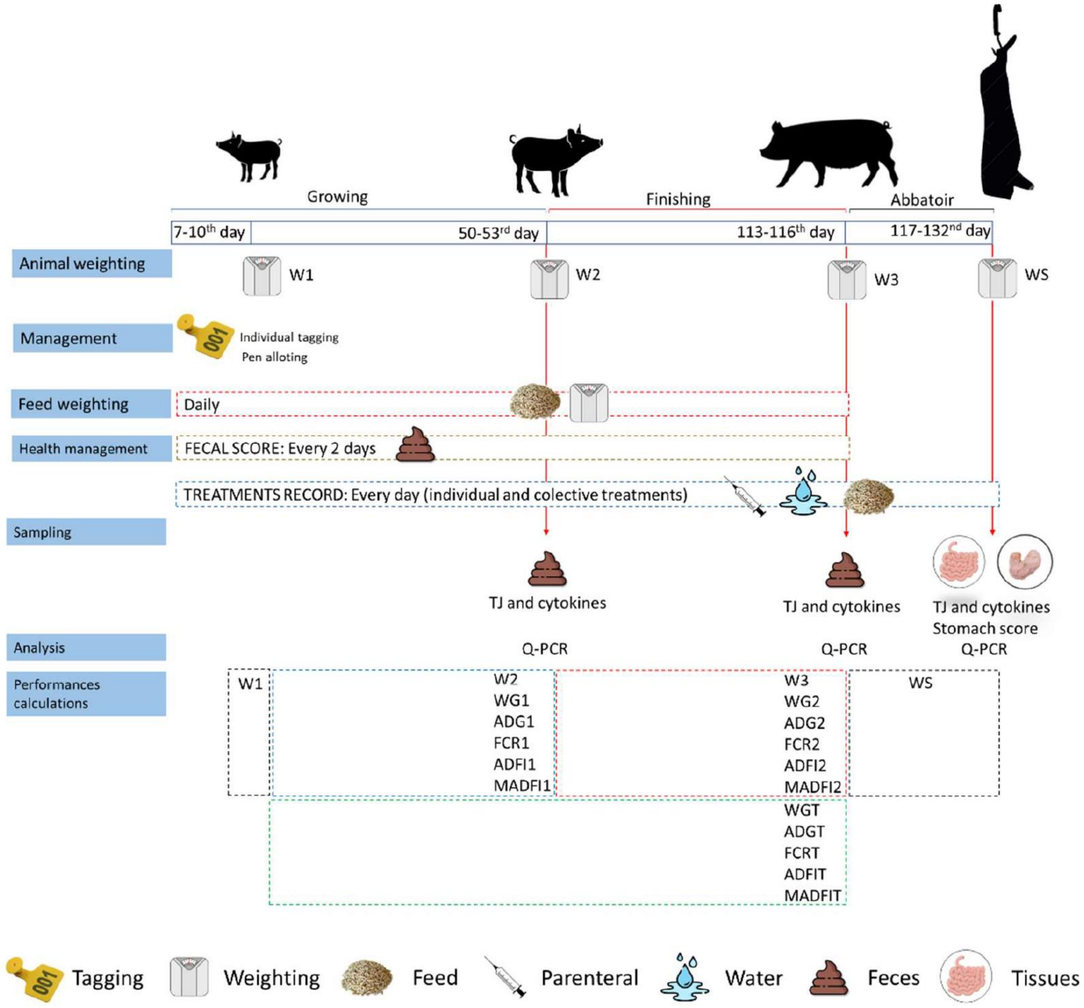


Figure 1. Summary of the methods used in the case–control test, including specific handling, animal and feed weighing, fecal and tissue sampling, monitoring of clinical status, laboratory tests developed, and performance parameters calculated.

animals

MDPI

Article

Is Oral Vaccination against *Escherichia coli* Influenced by Zinc Oxide?

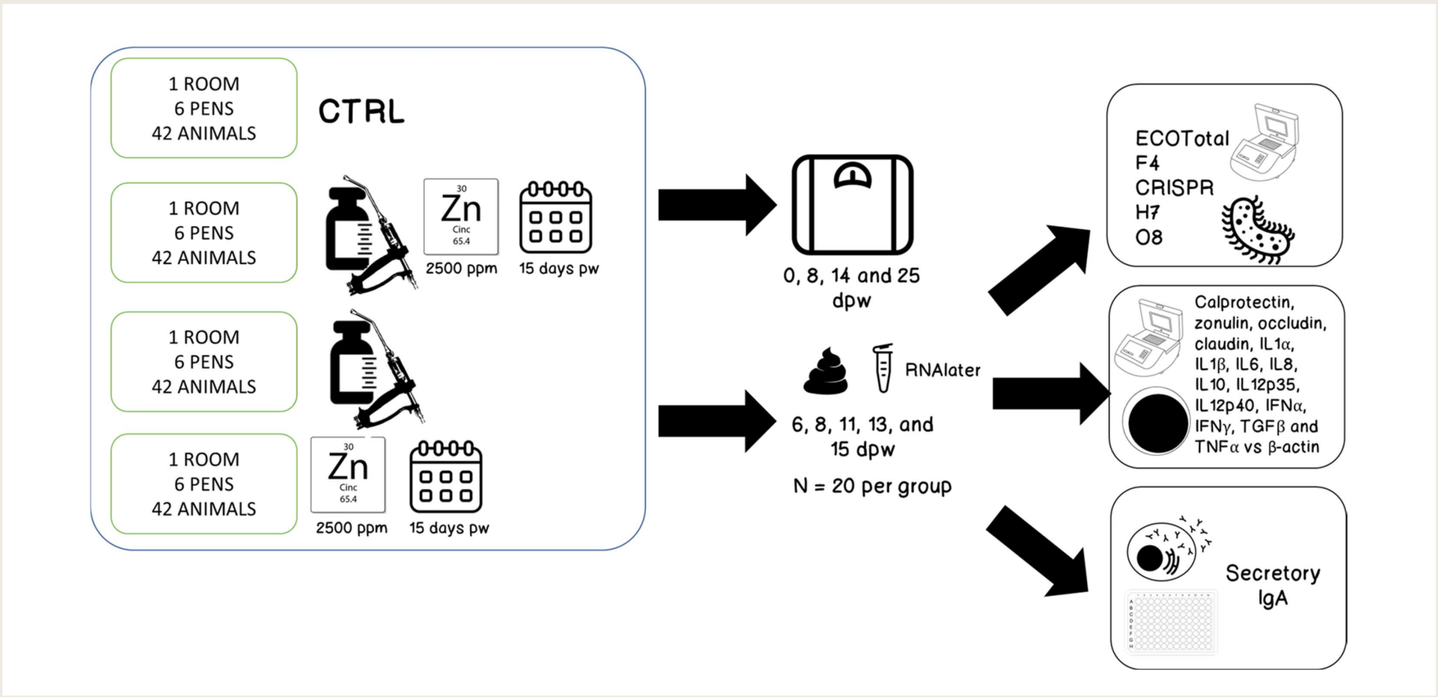
Guillermo Ramis [1,2], Francisco Murciano [1], Juan Orengo [1,*], Belén González-Guijarro [1], Amanda Cuellar-Flores [1], Daniel Serrano [3], Antonio Muñoz Luna [1,2], Pedro Sánchez-Uribe [4] and Laura Martínez-Alarcón [2,5]

1 Departamento de Producción Animal, Facultad de Veterinaria, Universidad de Murcia, 30100 Murcia, Spain; guiramis@um.es (G.R.); francisco.murcianor@gmail.com (F.M.); bgg@um.es (B.G.-G.)
2 Instituto Murciano de Investigación en Biomédicina (IMIB), 30120 Murcia, Spain
3 Departamento de Sanidad Animal, Facultad de Veterinaria, Universidad de Murcia, 30100 Murcia, Spain
4 ELANCO Animal Health, 28108 Alcobendas, Spain
5 Unidad para Docencia, Investigación y Calidad (UDICA), Hospital Clínico Universitario Virgen de la Arrixaca, 30120 Murcia, Spain
* Correspondence: jorengo@um.es

Simple Summary: Zinc oxide remains a widely used compound for the control and prevention of post-weaning *Escherichia coli* (*E. coli*) diarrhoea in piglets. It is sometimes administered concomitantly with oral *E. coli* vaccines. In this research, we assessed the influence of the administration of zinc oxide in piglet feed in combination with a bivalent vaccine against *E. coli*. We studied the immune activation, intestinal integrity, production of secretory IgA, and excretion of *E. coli* via faecal samples at different times post-vaccination. Although the main difference observed was the excretion of the *E. coli* vaccine strain, the immune response determined in both vaccine groups was similar, irrespective of the presence of ZnO in the feed.

Abstract: Background: Although zinc oxide has been banned at therapeutic doses in the EU, its use is still legal in most countries with industrial pig farming. This compound has been shown to be very effective in preventing *E. coli*-related diseases. However, another strategy used to control this pathogen is vaccination, administered parenterally or orally. Oral vaccines contain live strains, with F4 and F18 binding factors. Since zinc oxide prevents *E. coli* adhesion, it is hypothesised that its presence at therapeutic doses (2500 ppm) may alter the immune response and the protection of intestinal integrity derived from the vaccination of animals. Methods: A group of piglets were orally vaccinated at weaning and divided into two subgroups; one group was fed a feed containing 2500 ppm zinc oxide (V + ZnO) for the first 15 days post-vaccination (dpv) and the other was not (V). Faeces were sampled from the animals at 6, 8, 11, 13, and 15 dpv. Unvaccinated animals without ZnO in their feed (Neg) were sampled simultaneously and, on day 15 post-vaccination, were also compared with a group of unvaccinated animals with ZnO in their feed (ZnO). Results: Differences were found in *E. coli* excretion, with less quantification in the V + ZnO group, and a significant increase in secretory IgA in the V group at 8 dpv, which later equalised with that of the V + ZnO group. There was also some difference in *IFNα*, *IFNγ*, *IL1α*, *ILβ*, and *TNFα* gene expression when comparing both vaccinated groups ($p < 0.05$). However, there was no difference in gene expression for the tight junction (TJ) proteins responsible for intestinal integrity. Conclusions: Although some differences in the excretion of the vaccine strain were found when comparing both vaccinated groups, there are no remarkable differences in immune stimulation or soluble IgA production when comparing animals orally vaccinated against *E. coli* in combination with the presence or absence of ZnO in their feed. We can conclude that the immune response produced is very similar in both groups.

Keywords: *Escherichia coli*; oral vaccination; zinc oxide



check for updates

Citation: Ramis, G.; Murciano, F.; Orengo, J.; González-Guijarro, B.; Cuellar-Flores, A.; Serrano, D.; Muñoz Luna, A.; Sánchez-Uribe, P.; Martínez-Alarcón, L. Is Oral Vaccination against *Escherichia coli* Influenced by Zinc Oxide? *Animals* **2023**, *13*, 1754. https://doi.org/10.3390/ani13111754

Academic Editors: Maria Teresa Capucchio and Isabel Henning-Pauka

Received: 31 March 2023
Revised: 27 April 2023
Accepted: 22 May 2023
Published: 25 May 2023

animals

MDPI

Article

Oral and Parenteral Vaccination against *Escherichia coli* in Piglets Results in Different Responses

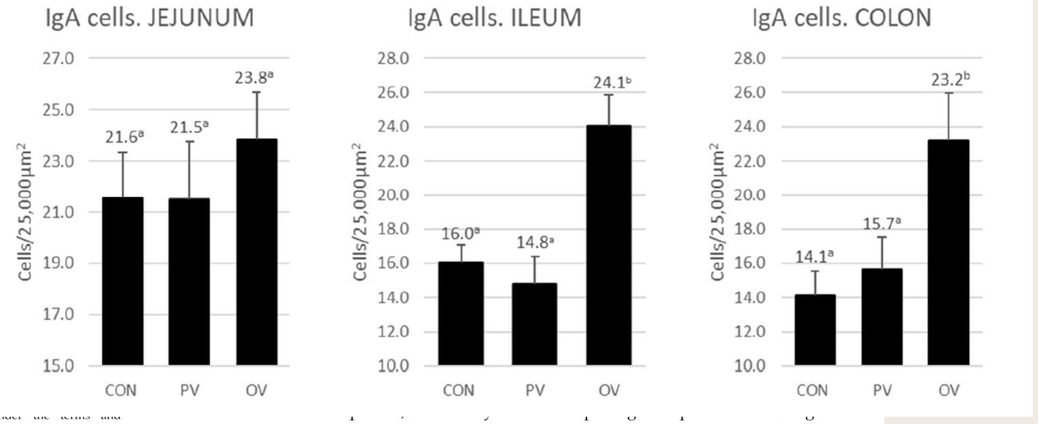
Guillermo Ramis [1,2,*], Lorena Pérez-Esteruelas [3], Carolina G. Gómez-Cabrera [1], Clara de Pascual-Monreal [1], Belén Gonzalez-Guijarro [1], Ester Párraga-Ros [4], Pedro Sánchez-Uribe [3], Miguel Claver-Mateos [3], Livia Mendonça-Pascoal [5] and Laura Martínez-Alarcón [2,6]

1 Departamento de Producción Animal, Facultad de Veterinaria, Universidad de Murcia, 30100 Murcia, Spain
2 Instituto Murciano de Investigación en Biomedicina (IMIB), 30120 Murcia, Spain
3 ELANCO Animal Health, 28108 Alcobendas, Spain
4 Departamento de Anatomía y Anatomía Patológica Comparadas, Universidad de Murcia, 30100 Murcia, Spain
5 Escola de Veterinária e Zootecnia, Universidade Federal de Goiás, Goiânia 74690-900, Brazil
6 UDICA, Hospital Clínico Universitario Virgen de la Arrixaca, 30120 Murcia, Spain
* Correspondence: guiramis@um.es; Tel.:+34-868-88-47-49

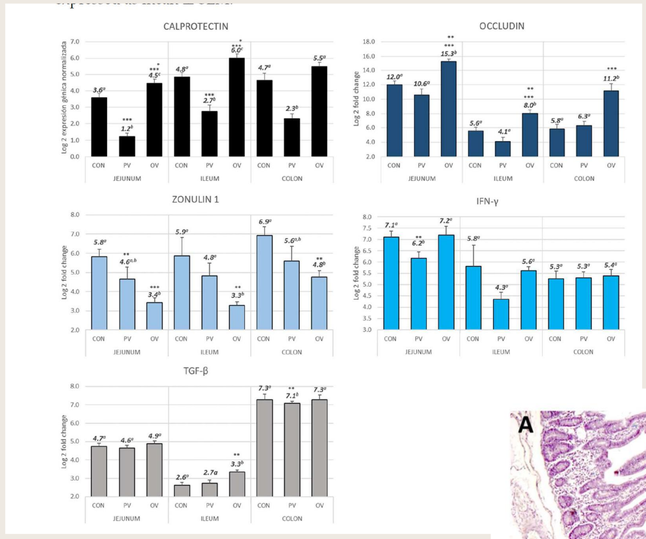
Simple Summary: One of the strategies for the prevention of *E. coli* related problems is the vaccination of piglets. Vaccines with different routes of administration are available: oral and parenteral. The former mimics the natural route of infection. Two different responses have been defined depending on the route of administration, with differences being observed in the number of IgA-producing cells, cytokine activation and intestinal integrity, depending on the route used. In general, there is evidence of greater immune system activation in the orally vaccinated group, which may indicate that the parenterally vaccinated group needs a second *E. coli* stimulus to fully develop the immune response. It should be noted that this is not an efficacy study as the animals were not inoculated and did not suffer from clinical problems related to *E. coli*.

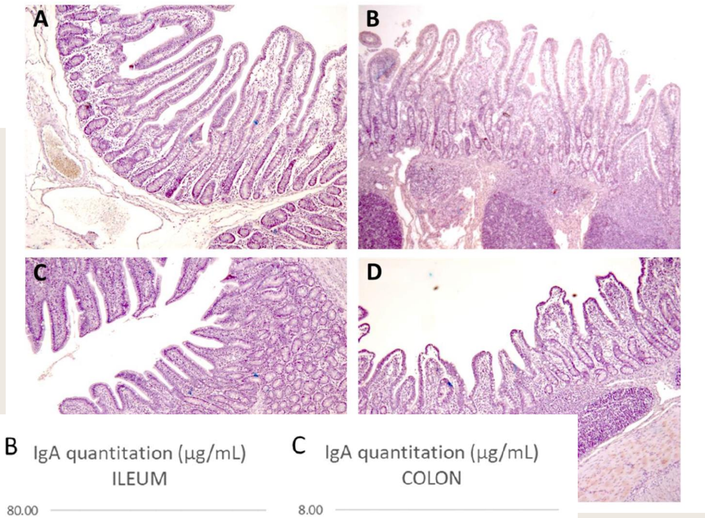
check for updates

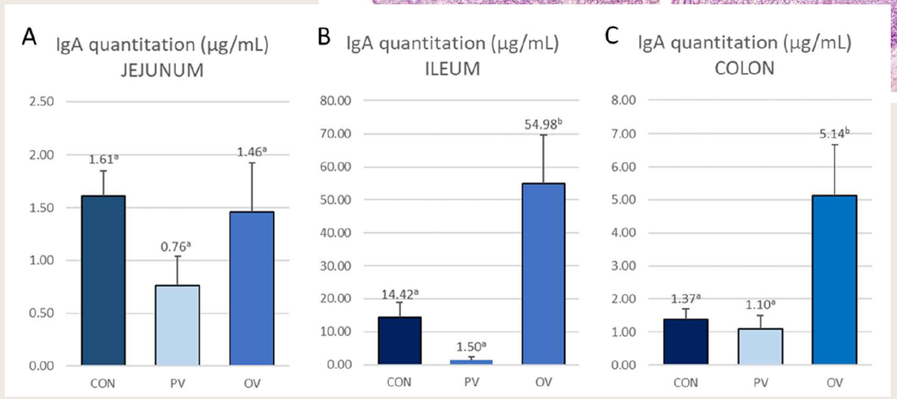
Citation: Ramis, G.; Pérez-Esteruelas, L.; Gómez-Cabrera, C.G.; de Pascual-Monreal, C.; Gonzalez-Guijarro, B.; Párraga-Ros, E.; Sánchez-Uribe, P.; Claver-Mateos, M.; Mendonça-Pascoal, L.;



proportion of diarrhea in piglets, both neonatal and post-weaning diarrhea (PWD) [1]. The pathogenic action of *E. coli* depends on the adhesion elements present, as well as the ability to produce thermolabile toxins (LT), thermostable toxins (Sta and Stb) and verotoxins (VT1 and VT2) [1,2]. In fact, *E. coli*-related diseases may be considered one of the most







UNIVERSIDAD DE MURCIA

Departamento de Comercialización e Investigación de Mercados

FORTALEZAS

Conocimiento del sector
Multidisciplinaridad (patología, genómica, transcriptómica, histopatología)
Sinergias (otros grupos de investigación y empresas)

Elanco
FATRO
trouw nutrition
a Nutreco company
ceva
Jefo
LALLEMAND
iNGASOFARM
Nutrition and Animal Health
andersen
PORCISAN
Agropor
Grupo
CAMPO JEREZ
Cefusa
GANADERIA PORCINA
BEHER
100% IBÉRICO
GePORK
UPB
GENETIC WORLD
Miguel Vergara
GRUPO
UNIVERSIDAD DE MURCIA
UNIVERSIDAD DE CÓRDOBA


UNIVERSIDAD DE MURCIA
1272