



## ASPA 25th Congress Book of Abstract

Angela Gabriella D'Alessandro, Pasquale De Palo, Aristide Maggiolino & Marcello Mele

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## Italian Journal of Animal Science

The *Italian Journal of Animal Science* is an international peer-reviewed open access journal publishing original scientific papers, reviews and short communications.

The journal serves as essential reading for animal scientists, technicians and all those who research animal production.

The journal encourages submissions of international relevance on the following subjects:

- Animal derived food quality and safety
- Animal genetics and breeding
- Aquaculture, poultry, companion and wild game animals
- Livestock systems, management and environment
- Non-ruminant or ruminant nutrition and feeding
- Production physiology and functional biology of farmed, companions and wild game animals.
- Animal behavior
- Animal welfare
- In vitro studies that have an application to farmed livestock

Manuscripts must address topics based on research at molecular, cellular, organ, whole animal and production system levels. Manuscripts discussing milk or meat analysis and compositions must show a direct link to either livestock production system, product quality, animal feeding/nutrition, animal genetics or breeding. Manuscripts describing laboratory animal models will be considered where the study highlights a potential benefit to farmed livestock.

Submissions discussing epidemiology, parasitology, infective diseases, food-borne diseases do not fit with the aims and scope of the journal.

Meeting reviews, book reviews and conference supplements are also published, as well as news and guidelines from the Animal Science and Production Association (ASPA). We welcome submissions from ASPA members and non-members alike.

### Article publishing charge

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# Italian Journal of Animal Science

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## ASPA 25<sup>th</sup> Congress

*Monopoli (BARI - ITALY), June 13-16, 2023*

### **Guest Editors**

**Angela Gabriella D'Alessandro, Pasquale De Palo, Aristide Maggiolino,  
and Marcello Mele**

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# **ASPA 25<sup>th</sup> Congress**

## ***Monopoli (BARI - ITALY), June 13-16, 2023***

**#ASPA2023**

### **ASPA 25<sup>th</sup> Congress Book of Abstract**

**The 25th congress of the Animal Science and Production Association**

**“Animal Production Science: Innovations and sustainability for future generation” is under patronage of Loghi patrocini**

**Monopoli (BARI - ITALY),  
June 13-16, 2023**

#### **Venue**

**Torre Cintola Natural Sea Emotions**

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## The 25<sup>th</sup> Congress of the Animal Science and Production Association “Animal Production Science: Innovations and Sustainability for Future Generation”

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The 25<sup>th</sup> Congress of the Animal Science and Production Association (ASPA) is hosted in Monopoli (Puglia) by the University of Bari.

The Congress is entitled "Animal Production Science: innovations and sustainability for future generations" and returns to Puglia after its second edition which was held in Bari 47 years ago.

The congress is hosted at the charming Torre Cintola resort in Monopoli (Bari) from the 13<sup>th</sup> to the 16<sup>th</sup> June 2023, a special location also for celebrating the 50<sup>th</sup> anniversary of our association.

This edition of the ASPA congress has received a total of 467 scientific contributions: 297 oral presentations and 170 posters have been selected. This is a very great result! The highest number of contributions of ever, according to our best knowledge. Moreover, 24 invited lectures will be presented.

The congress has implemented concrete actions for improving its sustainability, like the dematerialization of the posters (available through a smartphone app and on touch screen desks), the increasing of the use of public transportations, the donation of leftover food to charities, as well as the increased use of zero-mile food. Moreover, the Congress opens a focus also on the role of women in Science, dedicating the congress rooms to neglected scientists poorly celebrated but fundamental for the progress of knowledge and societal development. Finally, a disseminated photo exhibition in the Congress rooms on Marginal Areas is a further opportunity for attendees to deepen the knowledge of Southern Italy landscapes and their relationships with livestock industry.

The scientific program is enriched by 23 main lectures, covering all the main topics. Many thanks for the job to the President of the Organizing Committee, Prof. Pasquale De Palo, and to all the components. I also wish to thank all the members of the Scientific Committee, starting from the President Prof. Angela Gabriella D'Alessandro.

I would like to congratulate and to thank all people that have contributed to the organization of the meeting and that have collaborated in reviewing the summaries. A special thanks to them for what they have done for ASPA and for the Italian Animal Science. A special thank also to Prof. Marcello Mele, Editor-in-Chief of the Italian Journal of Animal Science, for having contributed to the edition of the proceedings.

Nicolò Pietro Paolo Macciotta  
ASPA President



# **ASPA 25<sup>th</sup> Congress**

## ***Monopoli (BARI - ITALY), June 13-16, 2023***

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## Program at a glance

**Tuesday June 13<sup>th</sup>**

	Room Daunia	Room Peucetia	Room Messapia	Room Apulia
	<b>14:30-17:00</b> <b>Chicken biodiversity</b> <i>Session 01</i>  Invited: <b>Cerolini Silvia</b> Chairs: <b>Iaffaldano N., Schiavone A.</b>	<b>14:30-16:00</b> <b>Environmental footprint</b> <i>Session 02</i>  Chairs: <b>Sevi A., Zucali M.E.</b>	<b>14:30-16:30</b> <b>Advances in dietary feed supplementation</b> <i>Session 03</i>  Chairs: <b>Calabrò S., De Palo P.</b>	/
<b>17:00 – 17:30</b>	<i>Coffee break</i>			
	/	/	/	<b>Opening Ceremony</b>
<b>20:00</b>	<i>Welcome cocktail</i>			

## Opening Ceremony





Chairs: **Nicolò Pietro Paolo Macciotta, Giuseppe Pulina**

<b>17:30</b>	Institutional Addresses
<b>18:00</b>	Book launch and presentation "Carni e salumi: le nuove frontiere della sostenibilità" by Bernardi E., Capri E., Pulina G., Franco Angelì Ed. <b>Giuseppe Pulina</b> <i>President of "Carni sostenibili" Association and Full Professor of "Livestock farming ethics and sustainability" University of Sassari</i>
<b>18:15</b>	Policies and perspectives of European livestock industry: which role is played by the Animal Science Community? <b>Paolo De Castro</b> <i>Member of the EU Committee on Agriculture and Rural Development and Professor of Agricultural Economics</i>
<b>18:45</b>	National Policies and future perspectives for livestock and animal food supply chain in Italy: is there a role for Animal Science Community? <b>Giuseppe Blasi</b> <i>Head of Department of European and International Policies and Rural Development, Ministry of Agriculture, Food Sovereignty and Forestry</i>
<b>19:15</b>	ASPA and its first 50 years <b>Nicolò Pietro Paolo Macciotta</b> <i>ASPA President</i>
<b>20:00</b>	<b>Official Opening of the 25<sup>th</sup> ASPA Congress</b>

## Wednesday June 14<sup>th</sup>

	Room Daunia	Room Peucetia	Room Messapia	Room Apulia
	<p><b>08:15 - 11:00</b> Environmental footprint <i>Session 04</i></p> Invited: <b>Kuipers Abele</b> Chairs: <b>Bernabucci U., Sepe L.</b>	<p><b>08:30 - 11:00</b> Advances in dietary feed supplementation <i>Session 05</i></p> Invited: <b>Salem Abdelfattah Z.</b> Chairs: <b>D'Alessandro A.G., Formigoni A.</b>	<p><b>08:30 - 11:00</b> Precision livestock farming: production efficiency in dairy cows <i>Session 06</i></p> Invited: <b>Giordano Julio O.</b> Chairs: <b>Abeni F., Pugliese C.</b>	<p><b>08:30 - 11:00</b> Development of genomics in biodiversity <i>Session 07</i></p> Invited: <b>Hanotte Olivier</b> Chairs: <b>Cecchinato A., Ciani E.</b>
<b>11:00 - 11:30</b>	<i>Coffee break</i>			
	<p><b>11:30 - 13:30</b> Environmental footprint <i>Session 08</i></p> Chairs: <b>Claps S., Sandrucci A.</b>	<p><b>11:30 - 13:30</b> Sustainable feeding strategies in livestock systems <i>Session 09</i></p> Chairs: <b>Bonanno A., Tufarelli V.</b>	<p><b>11:30 - 13:30</b> Animal welfare and health <i>Session 10</i></p> Invited: <b>Chebel Ricardo C.</b> Chairs: <b>Trevisi E., Gottardo F.</b>	<p><b>11:30 - 13:45</b> Advances in meat quality <i>Session 11</i></p> Invited: <b>Gagaoua Mohammed</b> Chairs: <b>Marino R., Mele M.</b>
<b>13:30 - 14:30</b>	<i>Lunch</i>			
	<p><b>14:30 - 16:30</b> Advances in rabbit and poultry products <i>Session 12</i></p> Chairs: <b>Maiorano G., Trocino A.</b>	<p><b>14:30 - 16:15</b> Genomic tools for ruminant resiliency <i>Session 13</i></p> Invited: <b>Miglior Filippo</b> Chairs: <b>Pilla F., Crepaldi P.</b>	<p><b>14:30 - 16:30</b> Heat stress and climate resilience in livestock <i>Session 14</i></p> Invited: <b>Dahl Geoffrey E.</b> Chairs: <b>Braghieri A., Cozzi G.</b>	<p><b>14:30 - 16:30</b> Metagenomic approaches in animal science <i>Session 15</i></p> Invited: <b>Laurenco Jeferson Menezes</b> Chairs: <b>Trevisi P., Castiglioni B.</b>
<b>16:30 - 17:00</b>	<i>Coffee break</i>			
	<p><b>17:00 - 18:30</b> New perspective in bees' production <i>Session 16</i></p> Chairs: <b>Fontanesi L., Minozzi G.</b>	<p><b>17:00 - 18:05</b> Breeding for our future <i>Session 17</i></p> Invited: <b>Cassandro Martino</b> Chairs: <b>Campanile G., Martelli G.</b>	<p><b>17:00 - 19:30</b> Advances in meat quality <i>Session 18</i></p> Chairs: <b>De Marchi M., Serra A.</b>	<p><b>17:00 - 18:30</b> Metagenomic approaches in animal science <i>Session 19</i></p> Chairs: <b>Buccioni A., Conte G.</b>
<b>20:30</b>	<i>Typical Dinner</i>			

## Thursday June 15<sup>th</sup>

	Room Daunia	Room Peucetia	Room Messapia	Room Apulia
	<p><b>08:30 - 10:30</b> Animal welfare and health Session 20</p> <p>Chairs: Albenzio M., Tarantola M.</p>	<p><b>08:15 - 11:00</b> Sustainability and innovation in aquaculture Session 21</p> <p>Chairs: Centoducati G., Parisi G.</p>	<p><b>08:15-11:15</b> Advances in milk and dairy products quality Session 22</p>  <p>Chairs: Di Trana A.C., Martini M.</p>	<p><b>08:15 - 11:00</b> New paradigms in animal breeding Session 23</p> <p>Invited: <b>Lourenco Daniela</b> Chairs: Ciampolini R., Landi V.</p>
<b>11:00 – 11:30</b>	Coffee break			
	<p><b>11:30 - 13:15</b> Advances in rabbit and poultry products Session 24</p> <p>Invited: <b>Stadnicka Katarzyna</b> Chairs: Bovera F., Soglia F.</p>	<p><b>11:30 - 13:45</b> L.E.O. project: the Italian research commitment for the future livestock strategies Session 25</p>  <p>Invited: <b>Burke Martin</b> Chairs: Donda M., Negri R.</p>	<p><b>11:30 - 13:30</b> Advances in milk and dairy products quality Session 26</p> <p>Chairs: Maggiolino A., Summer A.</p>	<p><b>11:30 - 13:15</b> Genomic tools for ruminant resiliency Session 27</p>  <p>Invited: <b>Di Croce Fernando</b> Chairs: Lasagna E., Sacchi P.</p>
<b>13:30 – 14:30</b>	Lunch			
	<p><b>14:30 - 16:30</b> Recent advances in mammary gland biology and health Session 28</p> <p>Chairs: Caroprese M., Lacetera N.</p>	<p><b>14:30 - 17:15</b> Sustainable feeding strategies in livestock systems Session 29</p>  <p>Invited: <b>Pulina Giuseppe</b> Chairs: Pinotti L., Masucci F.</p>	<p><b>14:30 - 16:45</b> Precision Livestock Farming: production efficiency and environmental impacts Session 30</p> <p>Invited: <b>Rose Guilherme</b> <b>O'Brien Bernardette</b> Chairs: Mattiello S., Neglia G.</p>	<p><b>14:30 - 16:30</b> Genomic tools for ruminant resiliency Session 31</p> <p>Invited: <b>Lecchi Cristina</b> Chairs: Bozzi R., Pasquini M.</p>
<b>16:30 – 17:00</b>	Coffee break			
<b>17:00</b>	/	/	/	<b>ASPA Assembly</b>
<b>20:30</b>	Social Dinner			

## Friday June 16<sup>th</sup>

	Room Daunia	Room Peucetia	Room Messapia	Room Apulia
	<p><b>08:30 - 10:30</b>  <b>Animal welfare and health</b>  <i>Session 32</i></p> <p>Invited:  <b>Laloë Denis</b>            Chairs:  <b>Di Palo R., Santillo A.</b></p>	<p><b>08:30 - 11:00</b>  <b>Development of genomics in biodiversity</b>  <i>Session 33</i></p> <p>Invited:  <b>Laloë Denis</b>            Chairs:  <b>Biffani S., Cipolat-Gotet C.</b></p>	<p><b>08:15 - 11:00</b>  <b>Companion animals</b>  <i>Session 34</i></p> <p>Invited:  <b>Switonsky Marek</b>            Chairs:  <b>Cutrignelli M., Stefanon B.</b></p>	<p><b>08:00 - 11:00</b>  <b>Sustainable feeding strategies in livestock systems</b>  <i>Session 35</i></p> <p>Invited:  <b>Atzori Alberto Stanislo</b>            Chairs:  <b>Di Francia A., Bailoni L.</b></p>
<b>11:00 - 11:30</b>	<i>Coffee break</i>			
	<p><b>11:30 - 13:30</b>  <b>Research and sustainability in horse production</b>  <i>Session 36</i></p> <p>Invited:  <b>Vial Celine</b>            Chairs:  <b>Salimei E., Capomaccio S.</b></p>	<p><b>11:30 - 13:15</b>  <b>Insects' production for animal feeding</b>  <i>Session 37</i></p> <p>Chairs:  <b>Chiofalo B., Gasco L.</b></p>	<p><b>11:30 - 13:30</b>  <b>Advances in dietary feed supplementation</b>  <i>Session 38</i></p> <p>Chairs:  <b>Trabalza Marinucci M., Nudda A.</b></p>	<p><b>11:30 - 13:15</b>  <b>Genomic tools for animal resiliency and susceptibility</b>  <i>Session 39</i></p> <p>Invited:  <b>Vergani Andrea Mario</b>            Chairs:  <b>Bagnato A., Sartori C.</b></p>

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## Dietary supplementation of *Ascophyllum nodosum* and *Lithothamnium calcareum* as functional feed additives for weaned piglets

Matteo Dell'anno, Sara Frazzini, Irene Ferri, Elena Scaglia, Serena Reggi and Luciana Rossi

Dipartimento di Medicina Veterinaria e Scienze Animali, Università degli Studi di Milano, Lodi, Italy

The weaning phase is one of the most critical stages in pig farming. At weaning, piglets should cope with several stressors exposing animals to develop multifactorial gastrointestinal disorders where pathogenic *Escherichia coli* play a pivotal role. Farmers resort to antibiotics treatments to restore the health status of animals. Due to the raising concern on antimicrobial resistance, novel strategies are required to control enteric infections and reduce the use of antibiotics. Functional feed ingredients provide bioactive compounds able to improve animal health and decrease infections. The aim of this study was to evaluate an innovative dietary combination of algae on performance, nutrients digestibility, intestinal health and oxidative status in post-weaning piglets challenged with *E. coli* F4+. Forty-eight weaned piglets ( $28 \pm 2$  days) were allotted to two different groups ( $n = 24$ /group) balanced per weight: control group fed with a commercial diet (CTRL), and algae group fed with commercial diet supplemented with 1.5% of *Ascophyllum nodosum* and 0.5% *Lithothamnium calcareum* for 27 days (ALGA). At day 13, twelve pigs/group were challenged with a single dose of  $10^7$  UFC of *E. coli* F4+ generating two infected sub-groups (CTRL+ and ALGA+). Body weight was recorded weekly for the evaluation of growth performance. Fecal samples were collected weekly and daily from day 13 to 20 for assessing nutrients digestibility by insoluble-ash method and microbiological analysis by plate counting. Serum samples were obtained at day 27 to assess the antioxidant barrier and oxidative status using colorimetric tests. Mixed model was used for the collected data and ANOVA was performed for evaluating the oxidative status. Results showed a significant increase in terms of average daily gain in ALGA+ compared to CTRL+ group from 17 to 20 days ( $1119.45 \pm 84.55$  vs  $-33.33 \pm 88.31$  g/day;  $p < 0.0001$ ). Plate counting showed a comparable trend for fecal *E. coli* shedding, total, coliform, and lactic acid bacteria CFU in each group over 27 days. Nutrient digestibility did not show differences among groups for all timepoints. A significantly higher serum antioxidant barrier was registered in piglets fed with algae compared to not-supplemented groups at day 27 ( $363.26 \pm 16.24$  vs  $230.69 \pm 32.08$  HClO/mL). In conclusion, the supplementation of *A. nodosum* and *L. calcareum* could be considered a promising

dietary strategy to contrast *E. coli* infections thus decreasing the use of antibiotics in swine farming.

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## Characterization of major algal species and their prebiotic potential

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In animal health, the need for a sustainable system that limits the phenomenon of antibiotic resistance is becoming increasingly evident. In this context, functional foods or ingredients are gaining ground and are also being researched as waste products from the supply chain. Among these, algal biomass is particularly rich in polysaccharides, which could potentially be exploited as prebiotic functional ingredients for both human and animal health applications. To this end, this study aimed to determine the potential prebiotic role of two algae species employed in animal nutrition, *Ascophyllum nodosum* and *Lithothamnium calcareum*. Initially, a metabolomic profile characterization was performed by LC-QTOF-MS system, in order to assess the content of bioactive compounds of the two algal species. Therefore, the effect of *A. nodosum* and *L. calcareum* extracts and their combination was evaluated *in vitro* on the growth of *Lactobacillus plantarum*. The antioxidant capacity was determined by the ABTS Radical Cation Decolorization Assay, and the total antioxidant capacity was expressed as the percentage of inhibition of radical scavenging (PI%). The antimicrobial effect of *L. plantarum* cultured with algal extracts against porcine O138 *E. coli* was evaluated following the microdilution bacterial growth method. The metabolomic characterization confirms the functional potential of algal extract, showing a high amount of all the bioactive compounds including polysaccharides. Thanks to the presence of these compounds algal extracts are also able to improve the growth of *Lactobacillus plantarum in vitro*. In fact, after 8 hrs of incubation both algal extracts improved *L. plantarum* growth, increasing it by about 30%. Furthermore, co-culture of *L. plantarum* with the extract of the algal combination allowed for increased growth as early as 6 hrs of incubation. Moreover, the presence of different bioactive compounds in the algal extracts, allowed an improvement in both antioxidant and antimicrobial capacity of *L. plantarum*. The results obtained from this study disclose that the extracts of *A. nodosum* and *L. calcareum* can be considered valid prebiotics in order to



enhance the functional properties of *L. plantaurum*. Further *in vitro* studies will be conducted to complete the knowledge about the employment of the algal extract as prebiotic, in order to subsequently evaluate their effect *in vivo*.

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### Functional characterization of hempseeds for nutritional applications

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Protein-energy malnutrition is a global challenge that requires attention, especially with population growth and ongoing food security plans. Therefore, nutritional research is investigating new protein sources for the food/feed sector, that can ensure a high nutritional profile and a key role in environmental protection. Among these, industrial hemp (*Cannabis sativa* L.) can be a promising source of high-quality nutrients. Today, following the re-establishment of the cultivation of hemp plants (<0.2–0.3% of delta-9-tetrahydrocannabinol), there is a growing interest in the production of the seeds due to their relevant nutritional value. While the nutritional profile of hempseeds (HSs) is mostly described in the literature, the functional aspect requires further studies.

The aim of the study was to assess the total phenolic content (TPC) by the Folin-Ciocalteu method and the antioxidant activity by the ABTS assay of HSs, comparing them to linseeds (LSs), matrix widely used in feed sector, following *in vitro* and *ex vivo* digestion protocols. At the same time, the efficacy of the two models was evaluated.

For the *in vitro* protocol, 0.5 g of sample was subjected to oral, gastric (39 °C × 2 h) and intestinal (39 °C × 4 h) digestion using commercial enzymes. Considering *ex vivo* digestion, after collecting gastric and intestinal fluids in piglets (days 40, *n* = 24), they were pooled. Then, 0.5 g of sample was subjected to gastric digestion (39 °C × 2 h) in gastric fluid, and further exposed to intestinal fluid (39 °C × 2 h).

Collected data showed that dry matter digestibility was not statistically significant between *ex vivo* and *in vitro* protocols (48.13 ± 1.10% vs 56.01 ± 0.50%, respectively). The same trend was observed for protein digestibility. Simultaneously, HSs showed an interesting functional profile. More specifically, HSs, after *in vitro* digestion, showed a higher TPC (846.18 ± 23.81 mg Acid Ascorbic Equivalent (AAE)/100 g), although not statistically significant compared to that of LSs (451.44 ± 59.29 mg AAE/100 g). This trend was also confirmed for the antioxidant profile of HSs and LSs (2368.58 ± 117.89 vs 1334.45 ± 43.59 mg Trolox Equivalent/100 g, respectively), showing statistically significant differences (*p* < 0.05).

These results encourage further investigation of the bioefficacy of HSs including both the identification of molecules involved and the setting up of *in vivo* trial, to identify the best level of inclusion of this matrix to ensure high animal performance and welfare.

## O353

### Effect of different doses of camelina cake as soybean meal substitution of growth performance and gut health of weaned pigs

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The camelina cake (CAM) is a co-product that could represent an alternative protein source to replace part of soybean meal, improving the environmental sustainability of the monogastric production. This study aimed to evaluate the effect of different doses of CAM in substitution of soybean meal on performance and gut health of weaned pigs. At 14 days post-weaning (d0), 64 weaned piglets were assigned to 4 groups balanced for body weight (BW) and litter and fed a standard diet (CO) or a diet with the inclusion of 4% (C4), 8% (C8) or 12% (C12) of CAM. Diets were isoenergetic and isoproteic. Pigs were weighed weekly. Faecal and blood samples were collected at d7 and d28 for microbiota (v3-v4 regions of the 16s rRNA gene) and ROMs analysis. At d28, pigs were slaughtered; pH was recorded on intestinal contents, organs were weighed and jejunal samples were collected for morphological and gene expression analysis. Data were fitted by a mixed model including diet as a fixed factor and batch and litter as random factors. From d0-d7 the CAM inclusion linearly reduced the average daily gain (ADG) (*p* ≤ 0.01). No effect was observed in the subsequent weeks, but considering d0-d28, CAM significantly reduced the ADG (*p* = 0.01). From d0-d7, the increase in CAM inclusion reduced linearly the feed intake (*p* = 0.04) and increased linearly the feed to gain (*p* = 0.004). The liver weight was increasing linearly with the CAM dose (*p* < 0.0001). ROMs concentration, intestinal pH and morphology, and gene expression in the jejunum were not affected by the diet, except for the expression of zonulin-1 (*p* = 0.07, quadratic effect). The inclusion of CAM increased the alpha diversity indices at d28 (*p* < 0.05). The C4 diet promoted the abundance of *Butyricoccaceae\_UCG-008* and *Erysipelatoclostridiaceae\_UCG-004*, which are usually correlated with resilient gut microbiota. In conclusion, despite the reduction of the ADG of piglets, the inclusion of CAM did not affect gut health and enhanced resilient gut