

Hasil IThenticate_SGHPFA_Fitra Yosi

By Fitra Yosi

Characterization of bacterial microbiomes according to the fecal phenotype in piglets before and after weaning

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Feed and osmolytes **in** digesta may change the consistency and color of feces in piglets irrespective of the abundance of pathobionts. Little research has been published that relate phenotypic aspects of piglets' feces to its microbiome and use them as proxy for gut health. This study aimed to monitor piglet's fecal phenotype and its associated microbiota, assuming that fecal color, consistency, and different sample types would come along with a specific microbiota before and after weaning.

From day of life (d) 28-36, fecal consistency was scored daily (1 to 5 scores; 1=watery feces; 5=very hard feces) from 192 piglets in two replicate batches (48 piglets/sex/replicate batch). Fecal samples from each piglet were collected on d28 (weaning day) and 33. Samples were collected by rectal stimulation with a sterile swab and classified by sample type (swab/feces), color (brown/yellow) and consistency.

DNA was extracted for 16S rRNA gene amplification and subsequent bioinformatics using QIIME2. Relative bacterial abundances and fecal scores were analyzed using MIXED PROC in SAS.

Daily monitoring showed a change in the fecal consistency, from harder balls on d28-32 (average score 3.5) to moister feces on d33-36 (average score 3; $P<0.001$). Swab samples comprised more *Escherichia* and *Bacteroides* on d28 but not on d33, whereas they contained more *Prevotella* on d33 compared to feces ($P<0.05$). Yellow feces were characterized by higher abundances of *Escherichia* on d28 and *Prevotella* and *Alloprevotella* on d33 compared to brown feces, whereas *Lactobacillus* abundance was higher ($P<0.05$). Firmer feces were characterized by lower abundance of *Escherichia* compared to moister feces on d28 but not on d33, whereas *Prevotella* and *Lactobacillus* were more abundant in firmer feces on d33($P<0.05$).

Results confirmed that the fecal phenotype has a distinctive microbiome composition, with associations between taxa and fecal characteristics differing ¹for the late suckling and early postweaning phase, reflecting changes in gut homeostasis. Data also indicated that swab samples resembled very little the other fecal phenotypes and should not be regarded as equal in microbiome studies.

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SIMILARITY INDEX

PRIMARY SOURCES

1

Barbara U. Metzler-Zebeli, Frederike Lerch, Fitra Yosi, Julia C. Vötterl et al. "Creep Feeding and Weaning Influence the Postnatal Evolution of the Plasma Metabolome in Neonatal Piglets", Metabolites, 2023

Crossref

13 words — 4%

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Program

Sunday, November 10

5:00 PM–7:00 PM Registration: Ballpark Registration Desk

Monday, November 11

8:00 AM–9:00 AM Breakfast: Lindberg Room

8:00 AM–4:30 PM Registration: Grand Foyer

SESSION 1

Chair: Brian Aldridge, Clemson University
Ballpark I and II

9:00 AM **Late weaning is associated with decreased abundance of *Enterobacteriaceae* and antimicrobial resistance transfer in the cecal contents of pigs.**
C. Anderson^{*1}, J. Wiarda², and C. Loving¹, ¹Food Safety and Enteric Pathogens Research Unit, National Animal Disease Center, Agricultural Research Service, United States Department of Agriculture, Ames, IA, USA, ²Virus and Prion Research Unit, National Animal Disease Center, Agricultural Research Service, United States Department of Agriculture, Ames, IA, USA.

9:30 AM **Characterization of bacterial microbiomes according to the fecal phenotype in piglets before and after weaning.**
C. Vaggi^{*1,2}, J. C. Vötterl^{1,2}, F. Lerch^{1,2}, F. Yosi^{2,3}, S. Ricci^{2,4}, D. Verhovsek⁵, and B. U. Metzler-Zebeli^{1,2}, ¹Centre for Veterinary Systems Transformation and Sustainability, University of Veterinary Medicine Vienna, Vienna, Austria, ²Christian Doppler Laboratory for Lab Innovative Gut Health Concepts of Livestock, University of Veterinary Medicine Vienna, Vienna, Austria, ³Department of Animal Science, Faculty of Agriculture, University of Sriwijaya, Palembang, South Sumatra, Indonesia, ⁴Centre for Animal Nutrition and Welfare, University of Veterinary Medicine Vienna, Vienna, Austria, ⁵Clinical Centre for Population medicine in Fish, Pig and Poultry, University of Veterinary Medicine Vienna, Vienna, Austria.

10:00 AM **Characterization of regional differences in neonatal calf gut-associated lymphoid tissues using high-resolution snRNA-sequencing.**
M. Donia^{*1,2}, B. Aldridge³, J. Lowe¹, and W. Li⁴, ¹Department of Pathobiology, College of Veterinary Medicine, University of Illinois, Urbana-Champaign, IL, USA, ²Department of Internal Medicine, Kafrelsheikh University, Kafrelsheikh, Egypt, ³Department of Veterinary Medical Sciences, College of Veterinary Medicine, Clemson University, Clemson, SC, USA, ⁴US Dairy Forage Research Center, USDA-Agricultural Research Service, Madison, WI, USA.

10:30 AM Coffee Break: Ballpark Foyer
Sponsored by Innovad

11:00 AM **Functional and structural characterization of the enteric nervous system in broiler chickens: The inner intestinal barrier of defense against foodborne pathogens.**
V. Caputi^{*}, A. M. Donoghue, and J. M. Lyte, *Poultry Production and Product Safety Research, USDA-ARS, Fayetteville, AR, USA.*

12:00 PM–1:30 PM Lunch: Lindberg Room



Poster Session

- 92720 **Effect of *Salmonella enteritidis* challenge on the microbiome of 54- to 56-week-old layers.**
T. Lavergne^{*1}, C. Elrod¹, and M. Nascimento², ¹*Natural Biologics, Inc., Newfield, NY, USA*, ²*Sapiens, Jundiai, Sao Paulo, Brazil*.
- 92713 **Deficiency in nitro-detoxification may limit *Salmonella* survivability in macrophages.**
A. Ingram¹, C. Johnson², N. Mast¹, R. Anderson^{*2}, and R. Arsenault², ¹*Department of Animal Science and Veterinary Technology, Texas A&M University-Kingsville, Kingsville, TX, USA*, ²*United States Department of Agriculture/Agricultural Research Service, Southern Plains Agricultural Research Center, Food and Feed Safety Research Unit, College Station, TX, USA*.
- 92733 **Impact of heat stress on intestinal barrier integrity in broilers: A comparison of low- and high-water efficient lines.**
M. F. Cuadrado^{*1}, B. Roach², E. S. Greene¹, K. R. Lassiter¹, W. G. Bottje¹, S. K. Orlowski-Workman¹, and S. Dridi¹, ¹*University of Arkansas, Poultry Science, Fayetteville, AR, USA*, ²*Har-Ber High School, Springdale, AR, USA*.
- 92704 **Standardization of methodologies in poultry microbiome research: One year of progress.**
J. Lyte^{*1}, D. Ayala², J. De Oliveira³, S. Dridi⁴, D. Grum², T. Johnson⁵, J. Kers⁶, M. Kogut⁷, J. Rehberger⁸, M. Seyoum⁴, A. Smith⁸, G. Zhang⁹, and M. Proskowiec-Weglarz¹⁰, ¹*USDA-ARS, Fayetteville, AR, USA*, ²*Purina Land O'Lakes, Gray Summit, MO, USA*, ³*Cargill, Vilvoorde, Belgium*, ⁴*University of Arkansas, Fayetteville, AR, USA*, ⁵*University of Minnesota, Saint Paul, MN, USA*, ⁶*Utrecht University, Utrecht, the Netherlands*, ⁷*USDA-ARS, College Station, TX, USA*, ⁸*Arm & Hammer Animal Nutrition, Waukesha, WI, USA*, ⁹*Oklahoma State University, Stillwater, OK, USA*, ¹⁰*USDA-ARS, Beltsville, MD, USA*.
- 92716 **Effects of a stimbiotic on nutrient digestibility, oocyst shedding, blood profiles, intestinal gene expression of tight junction protein, and cecal microbiota in necrotic enteritis-challenged broilers.**
H. Kim^{*}, S. Chang, D. Song, K. Jeon, and J. Cho, *Chungbuk National University, Cheong ju, Chungcheongbuk-do, Korea*.
- 92738 **Subclinical exposure to multiple mycotoxins causes cecal microbiota dysbiosis in broiler chickens.**
L. Kappari¹, J. Lourenco², T. Applegate¹, A. Glenn³, and R. Shanmugasundaram^{*3}, ¹*Department of Poultry Science, University of Georgia, Athens, GA, USA*, ²*Department of Animal and Dairy Science, University of Georgia, Athens, GA, USA*, ³*Toxicology and Mycotoxin Research Unit, US National Poultry Research Center, Agricultural Research Service, US Department of Agriculture, Athens, GA, USA*.
- 92728 **Effect of yeast fermentate on rumen microbiota and gas emissions in an in vitro model.**
E. G. Olson^{*1}, A. Rodrigues¹, I. Ferreira¹, A. Scheaffer², and S. C. Ricke¹, ¹*University of Wisconsin–Madison, Madison, WI, USA*, ²*SweetPro, Wahalla, ND, USA*.
- 92731 **Effects of feeding cashew nutshell liquid on rumen fermentation characteristics and methane emission in Japanese Black beef cattle (Wagyu).**
Y. Uyeno^{*1}, Y. Sakai², T. Abe³, K. Takahashi⁴, T. Kuramoto⁵, and H. Iwata⁵, ¹*Shinshu University, Minamiminowa, Nagano, Japan*, ²*Japan Cattle Industry Cooperative, Tokyo, Japan*, ³*National Livestock Breeding Center, Nishigo, Fukushima, Japan*,



⁴SDS Biotech K.K., Tokyo, Japan, ⁵Tokyo University of Agriculture, Atsugi, Kanagawa, Japan.

3:00 PM–4:30 PM

**STANDARDIZING A PROTOCOL FOR POULTRY MICROBIOME ANALYSIS/
OTHER PRODUCTION ANIMALS?**

Chair: Monika Proszkowiec-Weglarz, Glenn Zhang, Josh Lyte
Ballpark I and II

This session is open to all registrants, as the committee will discuss their progress in standardizing the protocol of measuring poultry microbiota and the steps they have taken over the course of the past year. The obvious reason behind this effort is to be able to make comparisons across published research on the topic. During this session, the floor will be open to other research groups (academic and industry) to discuss the possibility of standardizing the protocol for microbiota analysis in other production animals.

4:30 PM–5:30 PM

All Attendee Reception: Lindberg Room

Tuesday, November 12

8:00 AM–9:00 AM

Breakfast: Lindberg Room

8:00 AM–4:30 PM

Registration: Ballpark Registration Desk

SESSION 3

Chair: Brian Aldridge, Clemson University
Ballpark I and II

9:00 AM

The effects of heat stress and depressed feed intake on the cecal and ileal microbiota of broiler chickens.

P. M. Campos^{*1}, M. Proszkowiec-Weglarz¹, and S. Dridi², ¹USDA-ARS Animal Biosciences and Biotechnology Laboratory, Beltsville, MD, USA, ²Center of Excellence for Poultry Science, University of Arkansas, Fayetteville, AR, USA.

9:30 AM

Effect of heat stress on jejunal metabolic profile in broiler chickens.

E. S. Greene^{*1}, H. F. Castro², C. J. Christopher², S. R. Campagna², and S. Dridi¹, ¹University of Arkansas, Fayetteville, AR, USA, ²University of Tennessee, Knoxville, TN, USA.

10:00 AM

A curcumin derivative protease inhibitor mitigates *Brachyspira hampsonii*-induced swine dysentery.

R. Puentes, R. Hannawayya, N. Mirzadzare, L. Perez-Perez, K. Tiedje, and E. R. Cobo^{*}, University of Calgary, Calgary, Alberta, Canada.

10:30 AM

Coffee Break: Ballpark Foyer

Sponsored by Innovad

11:00 AM

Effects of dietary fats on diversity and function of cecal microbiota in broiler chickens.

V. V. Jadhav^{*}, Y. O. Fasina, P. C. Omaliko, J. Han, and S. H. Harrison, North Carolina Agricultural and Technical State University, Greensboro, NC, USA.

12:00 PM–1:30 PM

Lunch: Lindberg Room



SESSION 4

Chair: Allen Byrd, USDA-ARS, College Station, Texas
Ballpark I and II

- 1:30 PM **A commensal bacterium protects chickens against necrotic enteritis.**
I. Tobin^{*1}, J. Liu¹, M. Whitmore¹, M. Kim¹, Z. Zhao¹, J. Guo¹, J. Scaria², and G. Zhang¹, ¹*Department of Animal and Food Sciences, Oklahoma State University, Stillwater, OK, USA*, ²*Department of Veterinary Pathobiology, Oklahoma State University, Stillwater, OK, USA*.
- 2:00 PM **A meta-analysis of necrotic enteritis in the microbiome.**
D. Varela and A. Ballou^{*}, *SIWA, Iluma Alliance, Durham, NC, USA*.
- 2:30 PM Coffee Break: Ballpark Foyer
- 3:00 PM **Intestinal microbiome confers strong colonization resistance against necrotic enteritis in chickens.**
J. Liu¹, M. Whitmore¹, I. Tobin¹, M. Kaiser², S. Lamont², and G. Zhang^{*1}, ¹*Oklahoma State University, Stillwater, OK, USA*, ²*Iowa State University, Ames, IA, USA*.
- 3:30 PM **Pathological and microbiological investigations of enteric disorders in postweaning pigs: Association between pathogen co-infections and enteritis pattern.**
T. Hassan¹, S. Bagatella¹, M. I. Malik¹, A. Bellato¹, D. Ippolito², S. Zoppi³, M. B. Boniotti⁴, G. L. Alboralis⁴, and M. T. Capucchio^{*1}, ¹*University of Turin, Department of Veterinary Sciences, Grugliasco (Torino), Italy*, ²*National Institute of Health, Department of Food Safety, Nutrition and Veterinary Public Health, Rome, Italy*, ³*Istituto Zooprofilattico Sperimentale di Piemonte, Liguria e Valle d'Aosta, Torino, Italy*, ⁴*Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia-Romagna, Brescia, Italy*.
- 4:00 PM–5:00 PM All Attendee Reception: Lindberg Room

Wednesday, November 13

- 8:00 AM–9:00 AM Breakfast: Lindberg Room
- 8:00 AM–10:00 AM Registration: Ballpark Registration Desk

SESSION 5

Chair: Brian Aldridge, Clemson University
Ballpark I and II

- 9:00 AM **Calycosin from Astragali Radix as a potential phytogetic feed additive in weaning piglets: In vivo and in vitro studies.**
J. Wang^{*1,2}, ¹*Institute of Animal Husbandry and Veterinary Medicine, Beijing Academy of Agriculture and Forestry Sciences, Beijing, China*, ²*Sino-US Joint Laboratory of Animal Science, Beijing Academy of Agriculture and Forestry Sciences, Beijing, China*.
- 9:30 AM **Can the mixture of *Hermetia illucens* and *Tenebrio molitor* meals influence the gut health of broiler chickens?**
T. Hassan^{*1}, M. I. Malik¹, C. Sferra¹, M. Gariglio¹, I. Ferrocino², I. Biasato², L. Gasco², and M. T. Capucchio¹, ¹*University of Turin, Department of Veterinary Sciences, Grugliasco (Torino), Italy*, ²*University of Turin, Department of Agricultural, Forest and Food Sciences, Grugliasco (Torino), Italy*.



10:00 AM

Identifying and isolating primary degraders of resistant potato starch from the swine gastrointestinal tract.

H. R. Watkins*^{1,2}, C. L. Loving¹, and C. L. Anderson¹, ¹*USDA-ARS-NADC, Ames, IA, USA*, ²*Iowa State University, Ames, IA, USA*.