# Soyasaponin and vertical microbial transmission: Maternal effect on the intestinal development and health of early chicks

Mingkun Gao[1], Shu Chen[1], Hao Fan[4], Peng Li[1], Aiqiao Liu[3], Dongli Li[3], Xiaomin Li[3], Yongfei Hu[1], Guofeng Han[5], Yuming Guo[1], Zengpeng Lv[1, 2]

[1]College of Animal Science and Technology, China Agricultural University

[2]China Agricultural University-Sichuan Advanced Agricultural & Industrial Institute

[3]Beijing Huadu Yukou Poultry Industry Co., Ltd.

[4]Department of Medicine, The University of Chicago

[5]Institute of Agricultural Facilities and Equipment, Jiangsu Academy of Agricultural Sciences


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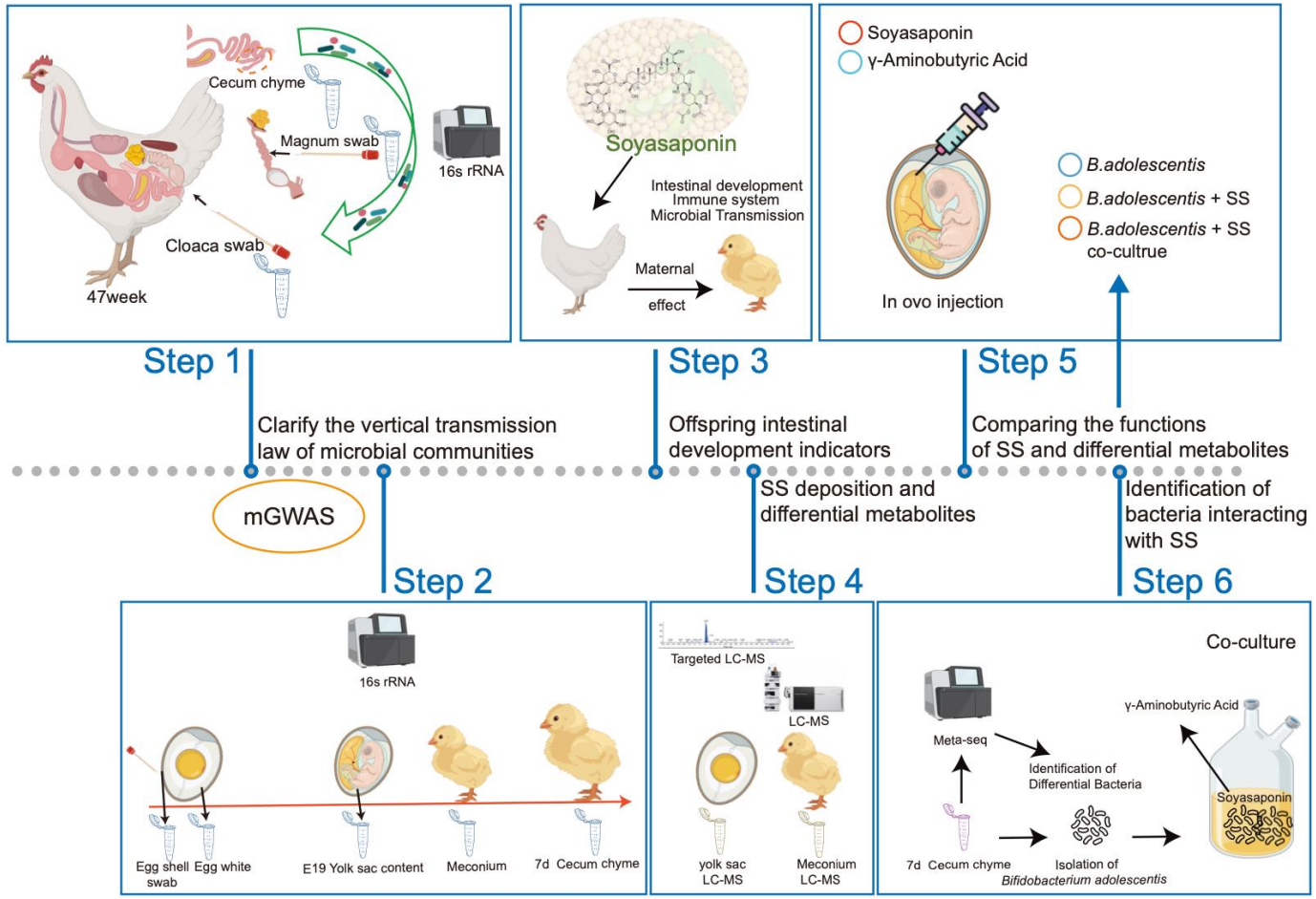
# Introduction

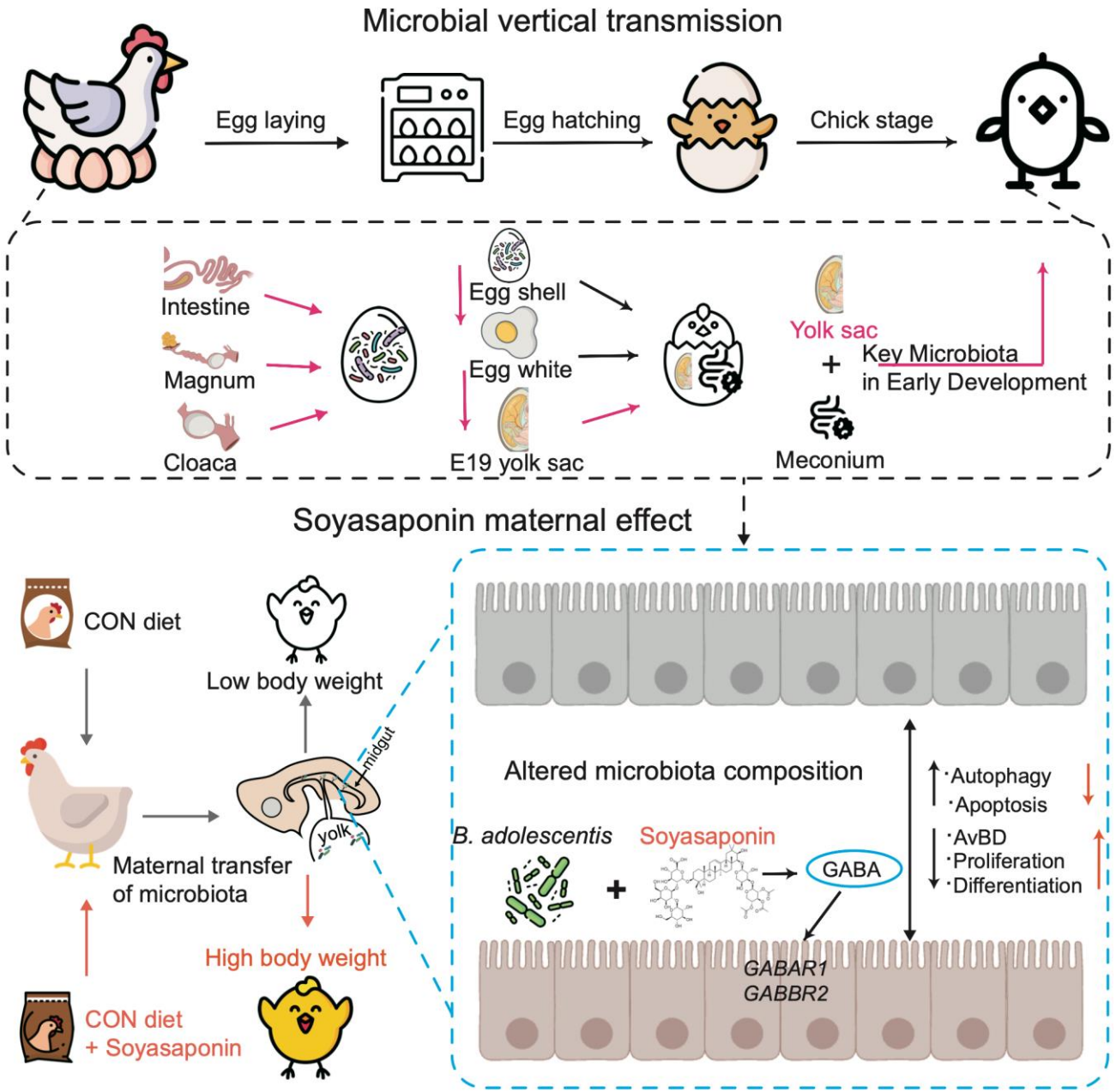
- Whether the yolk sac functions as a vehicle for microbial transmission during vertical transfer remains unclear.

- The potential of soyasaponins to improve offspring gut development via modulation of vertically transmitted maternal microbiota has not been systematically elucidated.




Gong *et al*., 2023, Li *et al*., 2022

# Highlights




1. The yolk sac plays a critical role in the vertical transmission of maternal microbiota in breeder hens.
2. Soyasaponins (SS) promote the colonization of *Bifidobacteria* in both maternal and offspring microbiota, facilitating microbial vertical transmission.
3. SS interacts with *Bifidobacterium adolescentis* to regulate embryonic development via microbial metabolic pathways.
4. SS enhances the GABA-producing capacity of *B. adolescentis*, thereby promoting chick intestinal development by modulating epithelial cell proliferation, differentiation, and apoptosis pathways.

# The yolk sac is a potential vehicle for vertical transmission of maternal microbiota

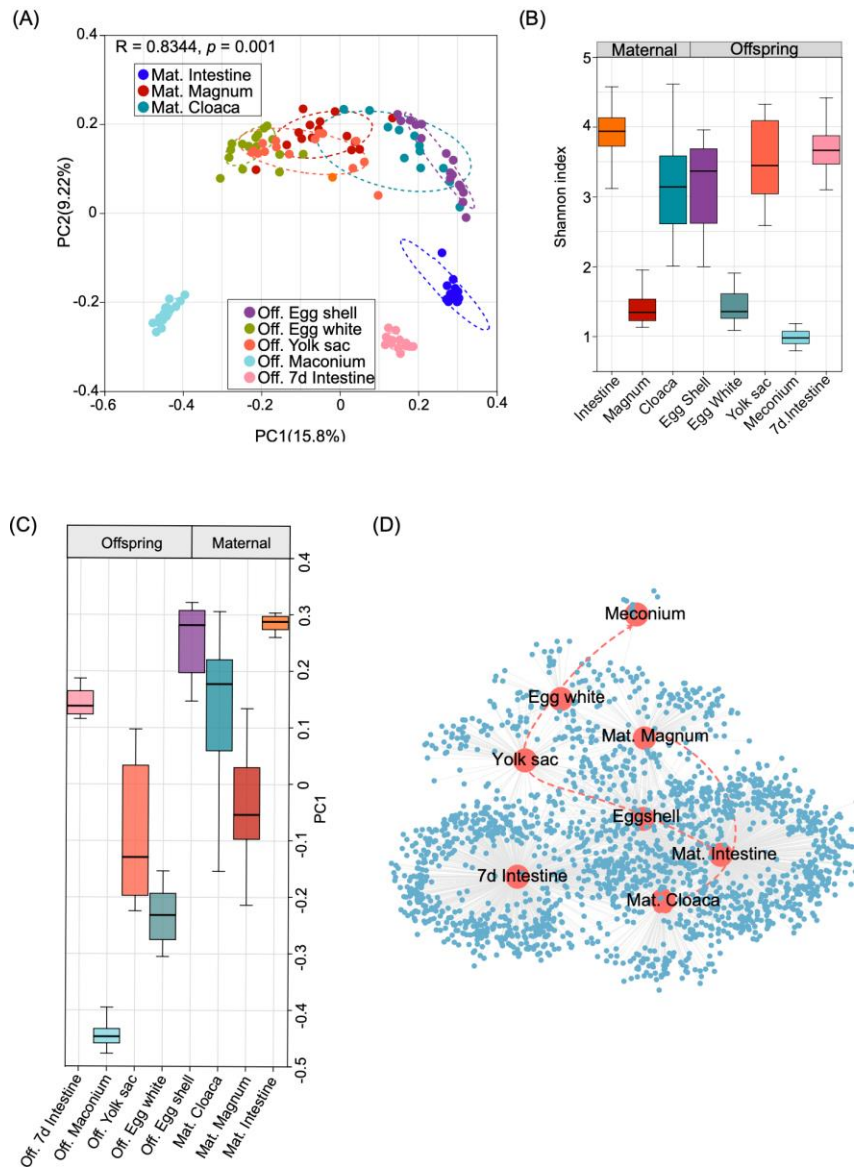



Figure 1 Colonization and body site specificity of the maternal and offspring.

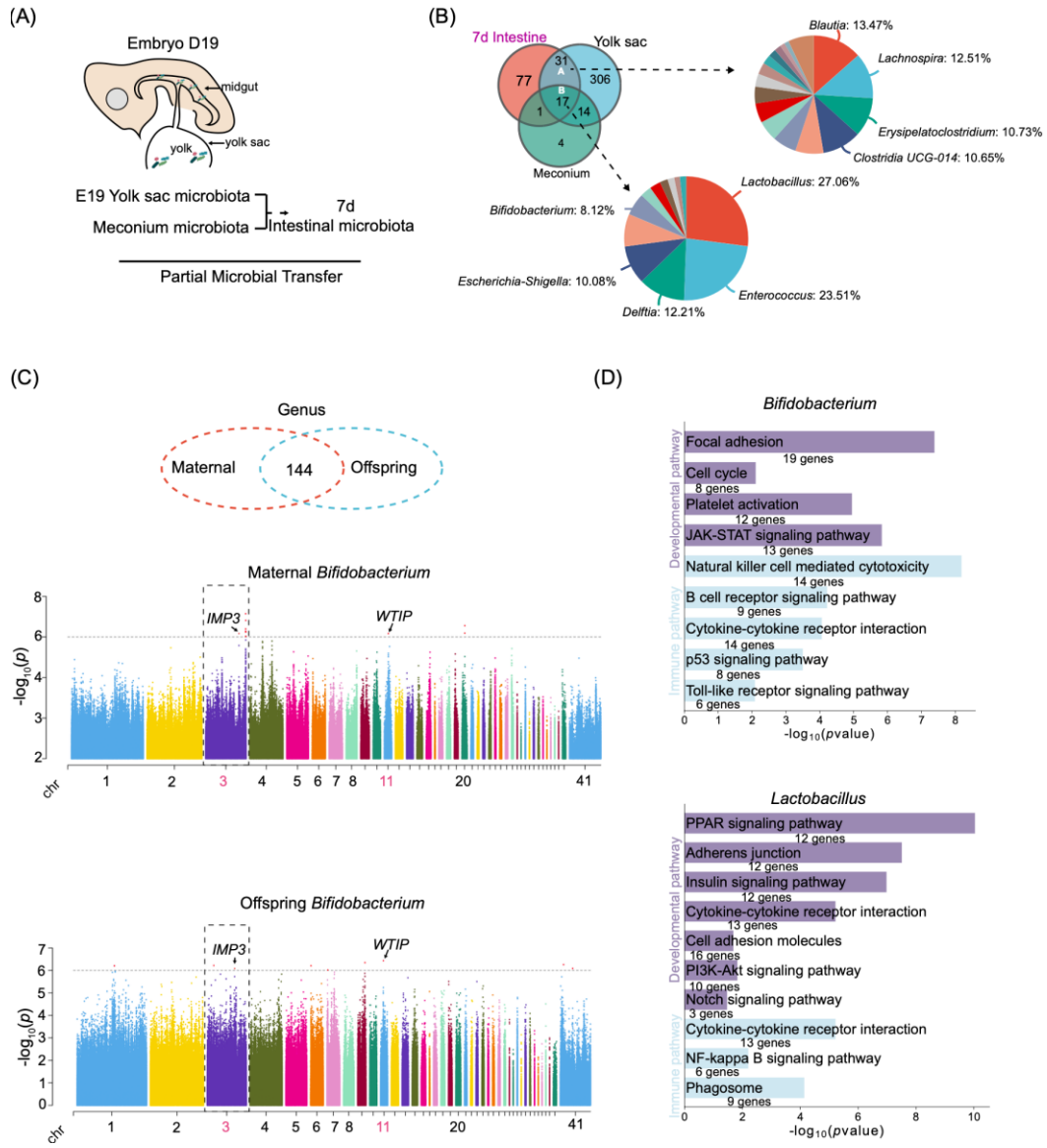



Figure 2 Host genotype regulates the vertical transmission of maternal microbiota.

# SS intervention alters the microbial composition of the maternal intestinal and reproductive tracts

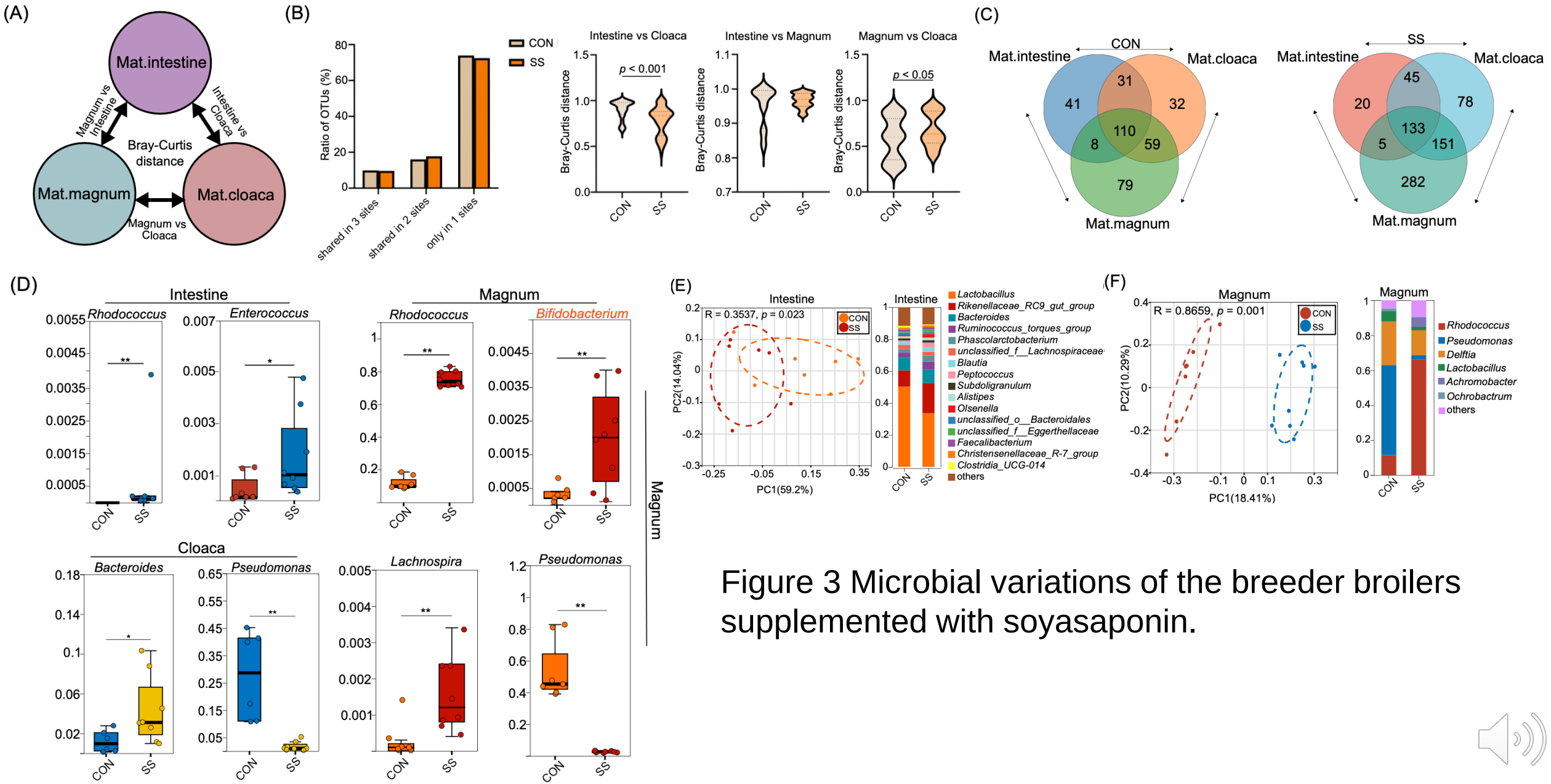



Figure 3 Microbial variations of the breeder broilers supplemented with soyasaponin.

# Maternal SS supplementation reshapes the microbial community structure in offspring

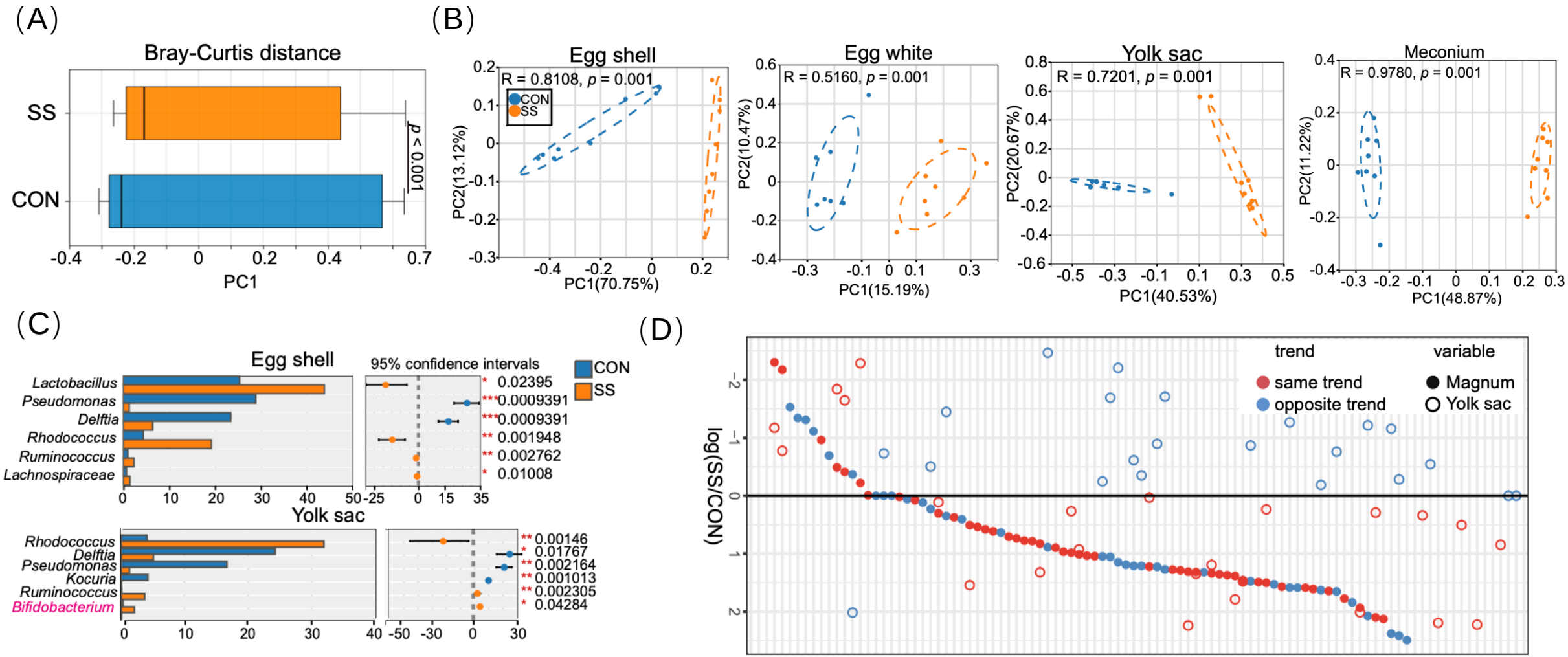



Figure 4 Offspring microbiota associated with maternal supplemented with soyasaponin.

# Maternal SS promote offspring intestinal development by reshaping the microbiota

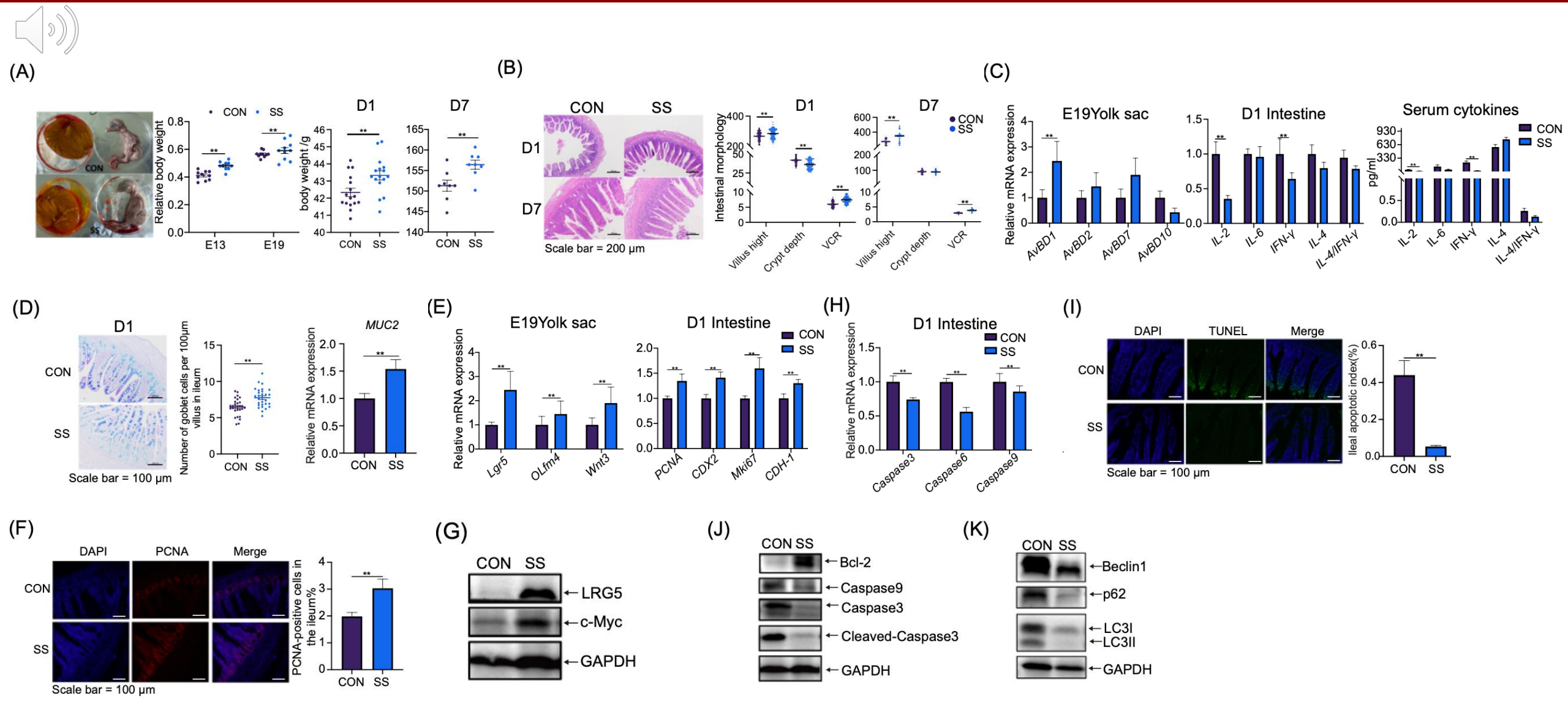



Figure 5 The embryonic stage is a key node for maternal nutritional intervention.

# Maternal SS activate GABA receptors in the offspring intestine

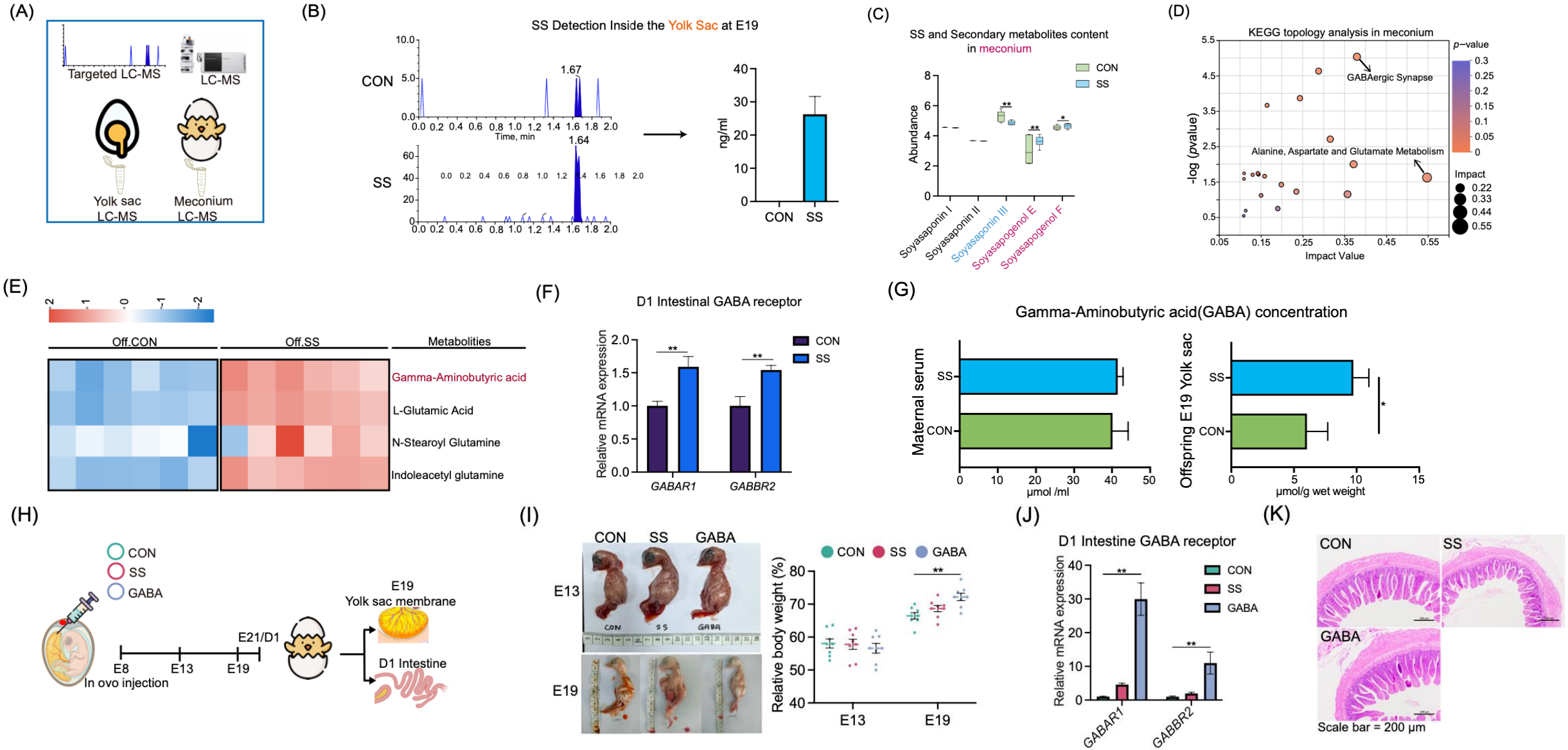



Figure 6 Dynamic changes in the content of SS in the yolk-meconium axis and identification of characteristic metabolites in the meconium.

# The biological effects of SS are mediated by maternally transmitted microbiota

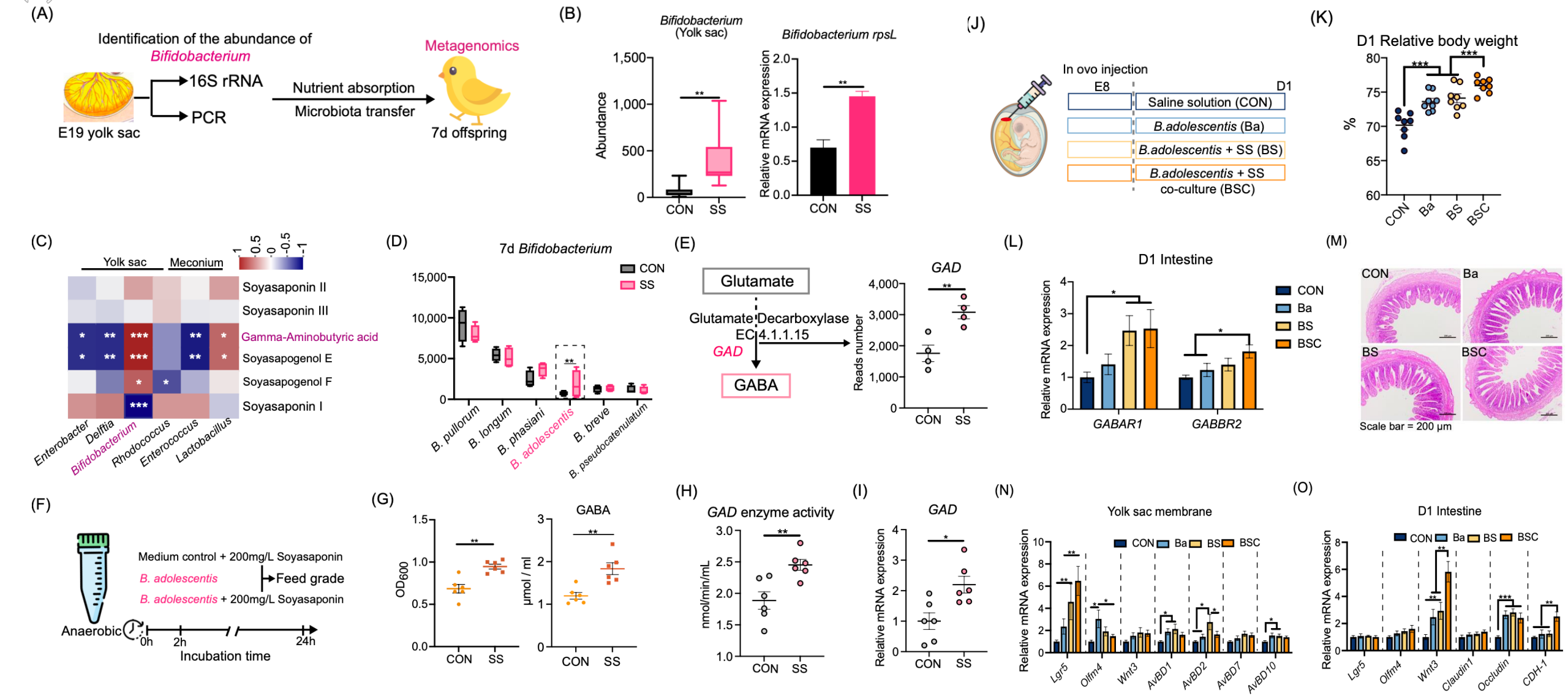



Figure 7 Increase of *Bifidobacterium* in offspring following maternal supplementation with SS, and the promotion of *Bifidobacterium adolescentis* proliferation by SS, resulting in the production of GABA.

# Summary

- In poultry, maternal gut microbiota can be vertically transmitted via the cloaca, with the yolk sac serving as a key colonization site.
- Soyasaponins co-metabolize with *B. adolescentis* to produce GABA, which promotes intestinal epithelial proliferation and differentiation.
- Soyasaponins act through a nutrition—microbiota—metabolite—host to shape offspring gut development.

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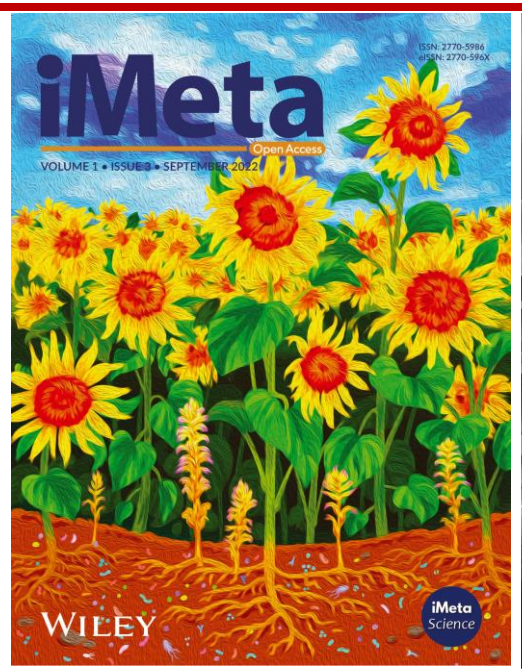


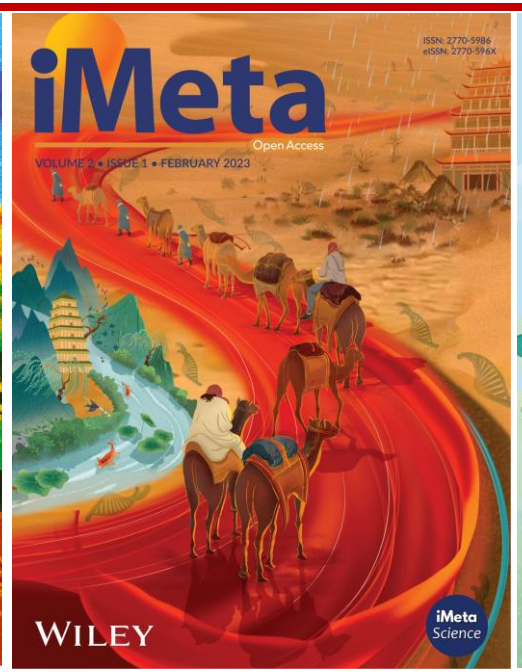


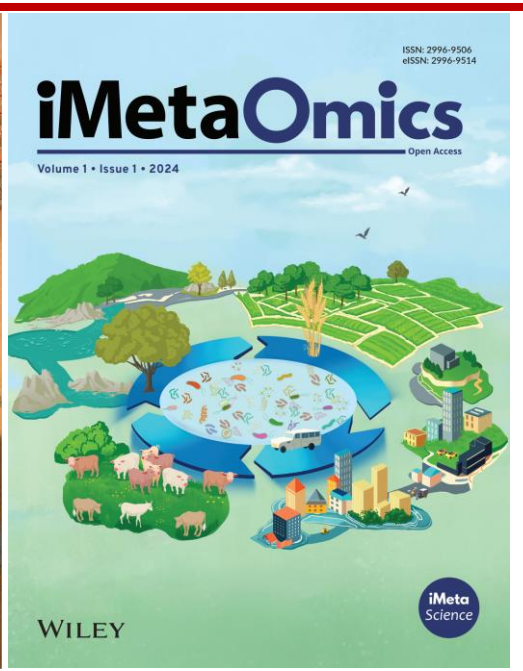



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