Dietary supplementation with *Forsythia suspensa* extract during late gestation improves reproductive performance, colostrum composition, antioxidant status, immunoglobulin, inflammatory cytokines and fecal microbiota composition in sows

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Introduction

- During gestation and farrowing, sows are faced with an increase in metabolic burdens, including the increased rate of digestion and absorption, tissue mobilization for mammary development, and fetal growth (Berchieri-Ronchi et al., 2011), which might lead to oxidative stress (OS) and a reduction in survival rate (Yin et al., 2013)
- Dietary medicinal herbs supplementation in sows might be effective in preventing stillbirth and mortality in piglets (Kim et al., 2010) and enhancing immune function and antioxidant status in their offspring through maternal transmission (Meng et al., 2018).
- *Forsythia suspensa* extract (FSE) could improve antioxidant capacity (Wang et al., 2008; Lu et al., 2010), intestinal microbiota composition (Han et al., 2012), anti-inflammatory functions (Zhao et al., 2017), and anti-allergic response (Hao et al., 2010) in broilers and weaned piglets. However, there are limited researches that have demonstrated the effects of dietary FSE supplementation on alleviating OS in sows from gestating to farrowing, and enhancing the anti-stress capacity in their offspring by maternal transmission.

Objective

- To investigate maternal effects of FSE in sows on reproductive performance, colostrum composition, nutrient digestibility, antioxidant status, immunoglobulin, inflammatory cytokines, and intestinal microbiota of sows and newborn piglets.

Materials and methods

Gestation d 85 — Farrowing

Colostrum, serum, feces, performance

- Forty Yorkshire × Landrace gestating sows (average parity of 3.28 ± 0.61; average body weight of 240.16 ± 6.81 kg) were assigned to 2 treatments with 20 sows per treatment based on body weight, back fat thickness and parity.
- From d 85 of gestation to farrowing, sows were supplemented with a control diet (basal diet, CON), and a FSE diet (basal diet + 100 mg / kg FSE).

Results and Discussion

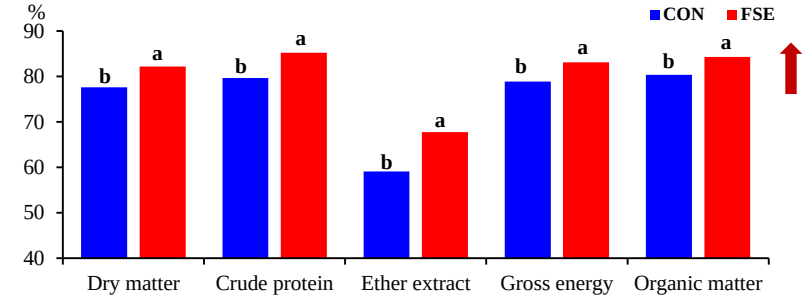
Reproductive performance

Items	CON	FSE	SEM	*P*-value
Sows				
Average parity	3.25	3.31	0.34	0.90
Average backfat thickness	20.20	20.30	0.80	0.82
Average body weight	239.73	240.58	7.32	0.94
Piglets				
Number of piglets born	11.69	11.75	0.63	0.94
Number of piglets dead	1.69^{a}	0.38^{b}	0.37	0.01
Litter weight	14.58^{b}	16.08^{a}	0.40	0.04
Average body weight of piglets	1.40	1.42	0.05	0.68

Colostrum composition

Item	CON	FSE	SEM	*P*-value
Fat	3.20^{b}	4.43^{a}	0.37	0.04
Protein	13.84^{b}	18.37^{a}	0.75	< 0.01
Lactose	2.54	2.14	0.20	0.19

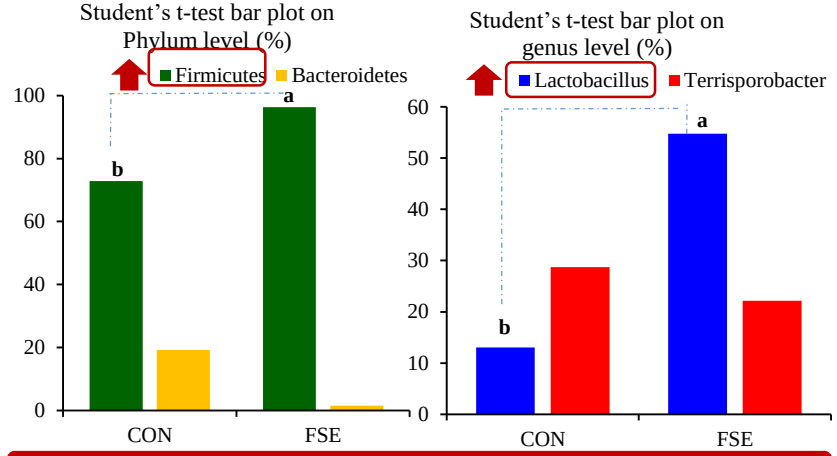
Apparent total tract digestibility of nutrients in sows



Immune function & antioxidant status

Items	CON	FSE	SEM	*P*-value
Serum in piglets				
GSH-Px, U/mL	409.00^{b}	489.00^{a}	20.08	0.02
IgA, g/L	0.48^{b}	0.66^{a}	0.06	0.05
IL-6, pg/mL	86.82^{a}	70.11^{b}	3.76	0.03
IL-8, pg/mL	17.03^{a}	14.51^{b}	0.76	0.05
Serum in sows				
GSH-Px, U/mL	754.00^{b}	790.00^{a}	11.02	0.04
IL-10, pg/mL	34.37^{b}	62.96^{a}	5.17	0.01
IL-6, pg/mL	75.50^{a}	56.93^{b}	4.31	0.03
Colostrum				
T-AOC, U/mL	3.40^{b}	5.08^{a}	0.33	< 0.01
SOD, U/mL	23.01^{b}	42.77^{a}	2.20	< 0.01
IL-10, pg/mL	56.71^{b}	77.96^{a}	5.85	0.03
IL-6, pg/mL	127.35^{a}	83.63^{b}	6.75	< 0.01
TNF-α, pg/mL	115.54^{a}	99.15^{b}	3.43	0.01
IgM, g/L	1.20	1.72	0.19	0.08

Fecal microbiota community



Conclusion

- ✓ Dietary supplementation with FSE in sows during late gestation improved reproductive performance, nutrient digestibility, colostrum composition, antioxidant status, immunoglobulin and inflammatory cytokines in both sows and newborn piglets.
- ✓ Dietary supplementation with FSE during late gestation can also potentially moderate fecal microbiota composition in sows.

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