

Savory (*Satureja montana*) by-product supplementation in broilers: effect in intestinal *Escherichia coli* and *Enterobacteriaceae* populations

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Introduction

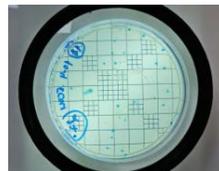
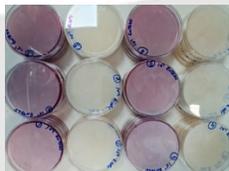
Winter savory (*Satureja montana*) is an aromatic and medicinal plant. Its extract is a good source of carvacrol and thymol, two compounds with several health benefits documented as anti-inflammatory, antioxidant, antimicrobial and antifungal (Movahhedkhah *et al.*, 2019). With the limitation of antibiotics use in animal production, plant-based products have gained interest as an alternative (Michiels *et al.*, 2010). Using this by-product in the raw physical form (only grinded) allows the protection of the cellular contents at the lower gut, allowing a greater potential use by bacteria. However, the mode of action of savory on the intestinal microbiota is not fully understood.

Main goal

Investigate the effects of *Satureja montana* by-product powder supplementation on gut *Escherichia coli* and *Enterobacteriaceae* populations of broiler chickens.

Material & Methods

- 192 Ross 308 (Aviagen) one-day old chicks, randomly distributed into 16 pens, with 12 animals each, were fed *ad libitum*
- **Treatments:** Control [C] and treatments (with savory by-product supplementation: 10 [T1], 20 [T2] and 40 [T4] g/kg)
- 2 animals were sacrificed (8 animals per treatment) and 4 aseptic samples of intestinal content were collected by each treatment (mixture from two animals per pen) and frozen in sterile vials at -18 °C
- *Escherichia coli* and *Enterobacteriaceae* populations were evaluated according to the ISO: 16649-2/2001 and ISO: 21528-2/2004 standards, respectively
- The results were expressed in Log CFU/ml (Logarithm of colony forming units per milliliter)
- ANOVA univariate and monofactorial analysis with Tukey post-hoc tests ($\alpha=0.05$)
- IBM SPSS v16.0 software.



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Results and Discussion

	C	T1	T2	T3	Sig.
<i>Escherichia coli</i> (log UFC/ml)	5.257±0.195	4.231±0.448	4.610±1.022	4.625±0.758	0.251
<i>Enterobacteriaceae</i> (log UFC/ml)	5.665±0.153	4.730±0.763	4.934±1.076	4.932±0.628	0.334
E Coli/Entero. Index (%)	92.8±1.6	90.1±5.7	93.4±1.4	93.5±3.6	0.513

Several studies indicate that carvacrol and thymol have bactericidal effects to pathogenic microorganisms, in particular to *Escherichia coli* (Chouhan *et al.*, 2017).

These results were similar with those reported by Mozafari *et al.* (2018) for *E. coli*. The reduction of *Enterobacteriaceae* population and consequently *E. coli* population, might have been a result of the increase of commensal bacterial population, that play a protective role in gut structure integrity and are the first line of defense against pathogenic bacteria as *E. coli*, avoiding the occurrence of dysbiosis.

Conclusions

Nevertheless, this study shows, at least, that the introduction of a new food supplement in the diet did not cause a deregulation or significant decrease in the intestinal microbiome of chickens. Thus, we understand as safe the use of savory by-product as supplementation in broiler chickens feed, indicating the dose of 10 g/Kg, with the most appropriate, regarding the size of the intestinal microbiome effects.

Acknowledgments

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