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Methane emission from poultry fed diets with fermented rapeseed cake*

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Introduction: According to the National Inventory Report (2013) on the production of greenhouse gases (GHG) in Poland for the years 1988–2012, the index of enteric methane emission for poultry amounts on average 40 mg/piece/year, which is not much in comparison to dairy cows producing 97 kg/piece/year. However, taking into account almost one billion poultry in Poland, we conclude that the total annual production of methane in Polish conditions is huge and amounts to approximately 0.718 million tonnes per year. Hence, the series of studies were conducted to examine the GHG emission from broiler chicken fed diets containing fermented rapeseed cake as a source of unsaturated fatty acids and consequently a methane mitigating factor.

Aim: The aim of this study was to evaluate the methane emission in commercial broiler chickens after feeding fermented rapeseed cake.

Material and methods: In the experiment 1, 108 broiler chickens were fed control diet composed of corn and wheat cake that contained 15% of crude rapeseed cake (CRC) or fermented rapeseed cake (FRC) from day 1 to 13. On the day 14, the animals were slaughtered and their caecum were removed immediately and cultured *in vitro* to measure methane production and methanogens population. In the experiment 2, 30 broiler chickens were randomly distributed to two respiration chambers and fed diets including 20% CRC or FRC. After 5 days of *in vivo* methane measurements, the animals were slaughtered and caecal fermentation was conducted as described above.

Results: Results indicated that fermented rapeseed cake have a potential to decrease enteric methane production from 0.24 to 0.20 and 0.19 mM measured *in vitro* in control, CRC and FRC groups, respectively, and from 12.13 to 8.16 mM when measured *in vivo*. The decrease in methanogen count, the sum (S-D-Arch-0915-a-A-20) and particular Methanomicrobiales (S-O-Mmic-1200-a-A-21) and Methanobacteriales (SF-Mbac-0310-a-A-22) was also stated.

Conclusions: Fermented rapeseed cake mitigated enteric methane production mainly by reducing the number of methanogens.

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