Effects of a specific blend of oleoresins of spices and essential oils on growth performance of broilers is influence by challenge acuity

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Some alternatives to antibiotics have been used in human medicine for centuries. Plant secondary compounds have recently been considered for use in animal production. Some studies have documented equivalent or even better responses than antibiotics but other reported no effect. The main goal of this study was to evaluate the effects of a blend of essential oils and spices, Oleo, with a specific focus on founding modulating factor of their response on growth performances of broilers from a meta-analysis approach. An exhaustive database including 25 trials with Oleo was built to quantify its impact on average daily gain (ADG) and feed conversion ratio (FCR) of broilers. Dietary treatments were either a positive control (C+) with antibiotic growth promoter, a negative control (C-) without antibiotic or a treatment with Oleo at 100 ppm. To test the hypothesis that Oleo response was influence by the challenge the bird experienced, when C+ and C- were both present in the same trial (n=9), the relative difference between them (C+/C-) was also calculated as Challenge Acuity Index and used as an X variable. Metabolizable energy and crude protein has been recalculated based on diet composition. Regarding the range of trial durations and slaughter ages of broilers, the Y variables were converted as relative difference in FCR and ADG expressed in percent between Oleo and C+ (ADG_Oleo/C+, FCR_ Oleo/C+) and Oleo and C- (ADG_Oleo/C-, FCR_ Oleo/C-). The mixed procedure of Minitab (Version 18.0) was used with the effect of the trial as random effect and the dose of Oleo and C+/C- as X variables. When comparing Oleo and C- treatments, results showed 2.8±0.70% ($P<0.001$; $R^2=65\%$) reduction of FCR and 3.6±1.2% ($P=0.006$; $R^2=56\%$) improvement of ADG with 100 ppm of Oleo. However, when comparing Oleo with C+ treatment there was no significant effect on FCR or ADG, indicating that Oleo and C+ are equal. The FCR_ Oleo/C- was negatively correlated (Linear, $P=0.03$; Quadratic, $P=0.02$; $R^2=85\%$) with the Challenge Acuity Index (C+/C-) indicating that in challenge condition (when C+ performed better than C-), the reduction of FCR with Oleo addition was higher. This work helps to better understand the variations observed between studies for the same alternative to antibiotics.

Keywords: Broilers, essential oils, oleoresins of spice, growth, challenge