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Poster abstract: The in vitro antibacterial effect of botanicals against *Campylobacter jejuni*, *Listeria monocytogenes*, *Escherichia coli* and *Salmonella enterica*

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decades of genetic selection (Hunton, 2006), but some misconceptions exist particularly about steroid and hormonal usage (Schumacher, Barrantes, Alpizar, & Corella, 2010). The perception of hormonal usage in poultry, which is being encouraged by the media, is misleading consumers. Several authors have reported that the application of steroids is not appropriate in broilers for many justifiable reasons. Most prominently, growth performance is not dependent on exogenous hormones (Schumacher et al., 2010), and secondly, in many countries using hormonal products for any such purpose is banned. Although muscle production can be increased with supplementation of anabolic steroids, such as anabol, this improvement is associated with regular physical activity. Since broilers have a relatively low physical activity, it is difficult to predict any potential benefit of steroid use in broilers. Therefore, a study was planned to investigate the possibility of steroid supplementation in broilers and to assess the growth performance, meat yield, immune status and overall economics in response to supplementation.

Materials and methods

The study was conducted at the Department of Poultry Production, University of Veterinary and Animal Sciences Lahore. Before the start of the experiment, ethical approval was taken from the Animal Ethics Committee at the University. Anabol (methandrostenolone) at 1.5mg/kg body weight was supplemented to drinking water during different phases of the 35-day trial. Straight run broilers of Cobb-500 strain were divided into four groups in such an arrangement that group A was not offered the steroid at any stage of life, group B received steroids from day one to day 17, group C received steroids from day 18 to 35, while, group D received steroids from day 1 to day 35. Each group was replicated six times with ten birds in each replicate; hence, a total of 240 broilers were subjected to experimentation. Broiler starter, grower and finisher rations were offered as per specific strain standards. The collected data were

analysed by ANOVA using SAS® (9.2), with significance accepted at $P < 0.05$ and significant means compared by Duncan's Multiple Range test.

Results

Statistical analysis showed significant treatment differences in growth performance and feed intake. Higher ($P < 0.05$) body weights of broilers at 5 weeks of age were observed in control group (A), while group D had the lowest body weights, highest feed intake and hence significantly poorer ($P < 0.05$) feed conversion ratio. Overall liveability and carcass yield did not show any significant variation with treatment. Antibody titer against Newcastle disease was unaffected by treatment, while, infectious bronchitis resulted in significant differences, with the lowest titers detected in group D ($P < 0.05$). In terms of overall economics, a loss of PKR Rs. 121/- per bird (0.9 US\$) was observed in group D.

Conclusion

It can be concluded that, in the current scenario, the use of steroids is not suitable in terms of cost-effectiveness. Secondly, their use did not show any positive effect on growth performance, but rather, poor growth and higher feed intake, resulting in a poorer FCR.

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References

- Hunton, P. (2006). *World's Poultry Science Journal*, 62, 417–428.
- Schumacher, H., Barrantes, S. Q., Alpizar, M. Z., & Corella, M. R. (2010). *Journal of Applied Poultry Research*, 19, 279–287.

The *in vitro* antibacterial effect of botanicals against *Campylobacter jejuni*, *Listeria monocytogenes*, *Escherichia coli* and *Salmonella enterica*

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Application

This research aims to determine the antimicrobial activity of a range of natural botanical supplements (phytogenics). Phytogenics which exhibit antimicrobial activity can potentially be used as sustainable alternatives to antibiotics to promote poultry health and performance. This could lead to a reduction in the use of antibiotics in agriculture.

Introduction

Governments worldwide are seeking alternatives to antibiotics in poultry feed such as phytogenics. These might reduce antibiotic resistance in poultry while maintaining health and performance (O'Neill, 2016). Phytogenics have antimicrobial properties exhibiting multiple modes of action to inhibit pathogens and target antibiotic resistant phenotypes (Chitemerere & Mukanganyama, 2014). The

Table 1. MIC and MBC values for three phytochemicals with greatest antibacterial activity against 20 isolates.

Strain	Phytochemical					
	<i>Agrimonia pilosa</i>		<i>Allium macrostemon bunge</i>		<i>Smilax china</i>	
	MIC (mg/L)	MBC (mg/L)	MIC (mg/L)	MBC (mg/L)	MIC (mg/L)	MBC (mg/L)
<i>C. jejuni</i> NCTC 11,322	31.25	500	125	>1000	250	1000
<i>C. jejuni</i> (n = 3)	31.25–125	500 – >1000	125–250	>1000	250	1000
<i>L. monocytogenes</i> NCTC 11,994	31.25	250	62.5	>1000	62.5	250
<i>L. monocytogenes</i> (n = 5)	31.25–125	250–1000	31.25–1000	1000 – >1000	31.25–125	250–1000
<i>S. enterica</i> NCTC 00074	500	1000	62.5	>1000	250	>1000
<i>S. enterica</i> (n = 3)	125	1000	62.5	>1000	125–250	>1000
<i>E. coli</i> ATCC 25,922	7.8125	31.25	31.25	500	125	500
<i>E. coli</i> (n = 5)	7.81–15.62	31.25–62.5	31.25–62.5	250–500	125	500

purpose of this research was to develop a screening process to select phytochemicals for *in vivo* study by testing the *in vitro* efficacy of plant extracts against pathogenic poultry bacteria.

Materials and methods

The broth microdilution method (CLSI, 2009) was used to measure *in vitro* antibacterial activity of 36 phytochemicals against reference clinical isolates of *C. jejuni*, *E. coli*, *S. enterica* and *L. monocytogenes*. A range of concentrations (0.98 mg/L to 1000 mg/L) of each phytochemical was added to a series of tubes with broth. Media used to support pathogen growth included: Mueller-Hinton broth (MHB) for *E. coli* and *S. enterica*; Tryptone Soya broth with 5% lysed horse blood for *L. monocytogenes*; and MHB with 5% lysed horse blood and 20 mg/L β -NAD for *C. jejuni* growth. Broths that supported pathogens' growth and reproducibility were chosen to improve the reliability of results. Tubes were inoculated with a standardised suspension of test pathogen. The experiment was set up in triplicate. A negative control included inoculated broth with no phytochemical – growth was expected. A positive control included inoculated broth with an antibiotic – no growth was expected. The well with the lowest concentration of phytochemical with no visible bacterial growth across three repeats was recorded as the minimum inhibitory concentration (MIC) of the phytochemical. The minimum bactericidal concentration (MBC) was determined by plating 10 μ L from each well and determining the

lowest concentration that reduced the initial viability of bacteria by $\geq 99.9\%$.

Results

The results are shown in Table 1.

Conclusion

Fifty-eight percent of phytochemicals showed antimicrobial activity. *A. pilosa* and *A. m. bunge* showed broad spectrum activity. These were selected for use in an *in vitro* poultry digest model to examine their effect on inhibition of pathogenic poultry gut bacteria and on their modulation of the composition of poultry gut microbiota (see Diaz-Sanchez, D'Souza, Biswas, & Hanning, 2015).

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References

- Chitemerere, T., & Mukanganyama, S. (2014). *BMC Complementary and Alternative Medicine*, 14, 278.
- CLSI. (2009). *Clinical and Laboratory Standards Institute*, 29, 1–149.
- Diaz-Sanchez, S., D'Souza, D., Biswas, D., & Hanning, I. (2015). *Poultry Science*, 94, 1419–1430.
- O'Neill, J. (2016). *The Review on Antimicrobial Resistance*, 1–84. London: HM Government and the Wellcome Trust.

Performance characteristics of laying hens fed diets supplemented with inorganic or chelated blends of copper, zinc and manganese in late lay

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Application

Copper, zinc and manganese supplementation, regardless of source, improved Hen-day egg production. Furthermore, chelated trace mineral supplementation led to better laying performance and feed conversion ratio.

Introduction

Egg production and eggshell quality decrease with hen age. This cannot be overlooked in poultry production as it can increase the incidence of cracked eggs and other malformations. Minerals are important components of egg and could be effective against this if supplemented