

Immunostimulatory Potential of Ingredient of PHYTOCEE® in Broilers : *Withania somnifera* (Ashwagandha)

OBJECTIVE

To evaluate the effects of hydroalcoholic leaf extract of *Withania somnifera* (WS) and α -tocopherol acetate (α -Toc) in the diets containing oxidized oil on the immune response, in the broiler chickens.

MATERIALS AND METHODS

A 3-way factorial design ($2 \times 3 \times 2$) was applied consisting of the oxidized oil (0 and 2%), WS (0, 100 and 200 mg/kg diet), and α -Toc (0 and 200 mg/kg). In total, 600 one-day-old male broilers were randomly subjected to 12 treatments with 5 replicates (10 birds/replicate). Sheep red blood cells (SRBC) were used as an antigen to evaluate the specific antibody responses to determine the humoral immunity response. While, cutaneous basophil hypersensitivity (CBH) response was used to determine the cell-mediated immune response.

RESULTS

Table 1 : Effect of Oxidised oil, *Withania somnifera* (WS), and α -tocopherol (α -Toc) on primary and secondary antibody responses

Oxidised oil (%)	WS (mg/kg)	α -Toc (mg/kg)	Primary antibody response			Secondary antibody response		
			IgG	IgM	Total	IgG	IgM	Total
0	0	0	2.00	5.60	7.60	2.40	5.40	7.80 ^e
0	0	200	2.20	5.60	7.80	2.20	6.40	8.60 ^{bcd}
0	100	0	2.20	6.00	8.40	3.00	6.80	9.80 ^{ab}
0	100	200	2.00	6.20	8.20	2.80	6.80	9.60 ^{abc}
0	200	0	2.80	6.00	8.80	3.00	7.00	10.00 ^a
0	200	200	2.60	5.60	8.20	3.00	6.80	9.80 ^{ab}
2	0	0	2.00	5.00	7.00	2.20	6.00	8.20 ^{de}
2	0	200	2.00	5.20	7.20	2.20	6.20	8.40 ^{cde}
2	100	0	2.00	6.20	8.20	260	6.00	8.60 ^{bcd}
2	100	200	2.00	5.20	7.20	2.40	5.60	8.00 ^{de}
2	200	0	2.00	5.40	7.40	2.20	5.80	8.00 ^{de}
2	200	200	2.00	5.00	7.00	2.40	6.80	9.20 ^{abcd}
SEM			0.200	0.316	0.336	0.230	0.378	0.380
Main effect								
Oxidised oil			2.30 ^a	5.83 ^a	8.16 ^a	2.73 ^a	6.53 ^a	9.26 ^a
WS			2.00 ^b	5.33 ^b	7.33 ^b	2.33 ^b	6.06 ^b	8.40 ^b
α -Toc			2.05	5.35 ^b	7.40 ^b	2.25 ^b	6.00 ^b	8.25 ^b
Oxidised oil \times WS			100	2.05	5.90 ^a	2.70 ^a	6.30 ^{ab}	9.00 ^a
Oxidised oil \times α -Toc			200	2.35	5.50 ^{ab}	7.85 ^{ab}	6.65 ^a	9.25 ^a
WS \times α -Toc			0	2.16	5.70	2.56 ^a	6.16	8.73
Oxidised oil \times WS \times α -Toc			200	2.13	5.46	2.50 ^a	6.43	8.93
P								
Oxidised oil			0.012	0.008	0.0001	0.004	0.037	<0.001
WS			0.059	0.048	0.040	0.015	0.091	0.001
α -Toc			0.774	0.207	0.129	0.619	0.228	0.367
Oxidised oil \times WS			0.059	0.905	0.246	0.195	0.084	0.012
Oxidised oil \times α -Toc			0.774	0.365	0.609	0.619	1.00	0.763
WS \times α -Toc			0.718	0.440	0.197	0.648	0.307	0.166
Oxidised oil \times WS \times α -Toc			0.718	0.248	0.543	0.939	0.152	0.134

^{a-e}Means within each column with no common superscript differ significantly ($p<0.05$).

Table 2 : Effect of oxidised oil, *Withania somnifera* (WS), and α -tocopherol (α -Toc) on swelling response to phytohemagglutinin

Oxidised oil (%)	WS (mg/kg)	α -Toc (mg/kg)	Swelling response (mm)	
			12 h	24 h
0	0	0	0.296	0.302
0	0	200	0.306	0.306
0	100	0	0.316	0.312
0	100	200	0.310	0.314
0	200	0	0.312	0.330
0	200	200	0.314	0.304
2	0	0	0.302	0.317
2	0	200	0.306	0.314
2	100	0	0.310	0.316
2	100	200	0.308	0.318
2	200	0	0.314	0.318
2	200	200	0.328	0.316
SEM			0.005	0.005
Main effect				
Oxidised oil			0.309	0.311
WS			0.311	0.316
α -Toc			0.302 ^b	0.309
Oxidised oil \times WS			0.311 ^a	0.315
Oxidised oil \times α -Toc			0.317 ^a	0.317
WS \times α -Toc			0.308	0.315
Oxidised oil \times WS \times α -Toc			0.312	0.312
P				
Oxidised oil			0.459	0.122
WS			0.003	0.215
α -Toc			0.273	0.247
Oxidised oil \times WS			0.314	0.358
Oxidised oil \times α -Toc			0.627	0.414
WS \times α -Toc			0.255	0.108
Oxidised oil \times WS \times α -Toc			0.513	0.143

^{a-e}Means within each column with no common superscript differ significantly ($p<0.05$).

CONCLUSIONS

- Antibody titres were significantly increased by the supplementary *Withania somnifera* ($p<0.05$), except for IgG ($p=0.059$), and IgM ($p=0.091$) during primary and secondary responses respectively.
- Dietary supplementation of WS at the concentrations of 100 or 200 mg/kg resulted in a higher cutaneous basophil hypersensitivity response ($p<0.01$) after 12 h.

OUTCOME

Hence, this study results implied that presence of *Withania somnifera* in the broilers diets as an alternative to α -tocopherol acetate exhibited the immunostimulatory effects.

Reference:

Azimi V, Mirakzehi M T, Saleh H. Hydroalcoholic extract of *Withania somnifera* leaf and α -tocopherol acetate in diets containing oxidised oil: effects on growth performance, immune response, and oxidative status in broiler chickens. Ital. J. Anim. Sci. 2020;19(1):917-28.

