Effects of dietary fat, vitamin E and Zinc on immune response and blood parameters of broiler reared under heat stress

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Objective:

Use of dietary fat, vitamin E and zink in heat stress of broilers

Improve immune response of broilers reared under heat stress

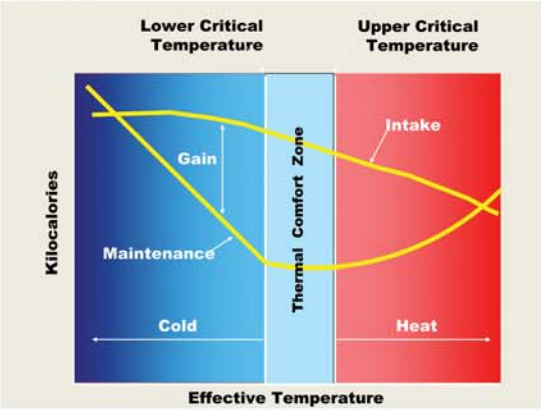
Effects dietary fat, vitamin E and zink in heat stress on blood parameters

Introduction:

Heat stress causes suppressive result on immune system. High ambient temperature during rearing is associated with an increase in the stress status of broilers, which is measured by hetrophil to lymphocyte ratio

The dietary manipulations are available to alleviate the negative effects of high environmental temperature on performance of poultry.

Supplemental zinc used in poultry diets is beneficial to layer hens during environmental stress.



The objective of this work was to evaluate of fat , vitamin E and zink on immune response and blood parameters in broilers reared under heat stress.

Methods:

Animals: The chicks were placed in floor pens equipped with stainless steel feeders, and automatic water drinkers. Effect of diet and temperature were studied using a 2×3 (temp × feed) factorial design of treatments: 6 treatments with 4 replications and 10 birds in each one. The temperatures was maintained at approximately 21 °C (normal) and 34°C (heat stress) using thermostatically controlled heaters and exhaust fans in two chambers.

Treatments: 1) basal diet with %5 Tallow, 2) basal diet with %5 fish oil, 3) basal diet with 5 % fish oil plus vitamin E and zinc (100 IU vitamin E and 50 mg/kg zinc)

Expriments: In order to evaluate the immunosuppressive effect,SRBC 5% was injected into breast muscle of the broilers. Antibody production in response to SRBC (sheep red blood cell) was measured at 5 and 10 days post inoculation by the micro titer haemagglutination method.

Delayed-type hypersensitivity, a measure of cell mediated immunity, was evaluated by the phytohemagglutinin-M induced wattle swelling assay as described by Klassing (1988). Measurement of cell-mediate immune responses to PHA-M (phytohemagglutinin M) carried out as explained by Li *et al*., (1999) and DNCB (2, 4-dinitrochlorobenzene), stimulate cell mediated immunity, used Thompson *et al*., (1980) method.

Blood characteristics included in the study were whole blood hematocrit, serum total protein, serum cholesterol, serum glucose, serum triglyceride and serum malondialdehyde. Hematocrit, expressed as blood percentage of packed cell (primarily red blood cell) volume, was determined through use of capillary tubes that were centrifuged in a micro-HCT centrifuge and were then read with a micro-capillary reader. Serum cholesterol, Serum triglyceride, serum protein, serum glucose were determined using enzymatic methods using diagnostic kit (Pars Azmon). Serum malondialdehyde was determined by the method of Chang *et a l*., (1998).

Results:

Table 1 The effect of temperature and diet on immune response of broiler

Treatments	SRBC		PHA-M		DNCB
	Primary	Secondry	12 h	24h	12 h
TH	1.13^{C}	2.13^{C}	0.38^{C}	0.54^{C}	0.41^{D}
TN	2.13^{B}	4.50^{B}	0.54^{A}	0.76^{B}	0.87^{A}
OH	1.63^{C}	2.25^{D}	0.34^{D}	0.55^{C}	0.65^{C}
ON	2.50^{B}	4.60^{B}	0.53^{AB}	0.81^{A}	0.89^{A}
AH	2.25^{B}	4^{B}	0.51^{AB}	0.56^{C}	0.35^{E}
AN	3.13^{A}	7^{A}	0.49^{B}	0.81^{A}	0.82^{B}
SEM	0.145	0.34	0.017	0.034	0.045

Table2 The effect of temperature and diet on blood parameters of broiler reared under heat stress

Treatments	Serum MDA nmol/dl	Protein mg/dl	Glucose mg/dl	Triglycerid mg/dl	Cholesterol mg/dl	Hematocrit%
TH	0.849C	2.99A	192.6D	73.6A	145.8A	28.2A
TN	0.64D	2.27B	187.7D	61.2B	118.5C	25C
OH	1.18A	2.93A	247.9A	62B	137.8B	27.7A
ON	1B	2.12B	220.1B	42.08C	96.7D	25.7BC
AH	0.96B	2.95A	202.3C	54.5D	116.7C	27.25AB
AN	0.753C	2.1B	196.3CD	36.38A	89.9E	25C
SEM	0.01	0.07	1.44	2.64	2.2	0.32

Values with different superscripts within columns differ at P<0.05

TH=Tallow and high tempertature , TN=Tallow and normal tempertature, OH=fish oil and high tempertature,ON=fish oil and normal tempertature ,AH= fish oil plus 100 IU vitamin E /kg and 50 mg zinc /kg *and high tempertature, AN=fish oil plus 100* IU vitamin E /kg and 50 mg zinc /kg *and normal tempertature*

Conclusions:

Heat stress decreased humoral and cell-mediate immune response and diet supplementation by vitamin E and zinc decreased the impact of heat stress on immune system and also heat stress increased serum cholesterol, triglyceride, glucose and MDA and blood hematocrit.