NUTRIGENETIC EFFECT OF *Centella asiatica* AND *Capsicum annum* ON BODY WEIGHT AND CARDIOVASCULAR RISK IN CHICKENS

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INTRODUCTION

- Broiler meat is popular because it is cheaper, more versatile and is perceived to give more health benefits than red meat.

- Effects of selection and breeding programmes (positive and negative)

- Combating the named effect through the use of natural products as against the synthetic is seen to be more attractive

OBJECTIVES

- To examine the singular and combined effects of two botanicals (*Centella asiatica* and *Capsicum annum*) on cardiovascular risk with emphasis on physiological markers of metabolic syndrome (obesity, inflammation, insulin resistance and lipidemia).

- To examine whether and to what extent the singular and combined effects of *Centella asiatica* and *Capsicum annum* were genotype dependent.

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JUSTIFICATION

- Centella asiatica was examined because it contains asiaticoside which has anti inflammatory and antioxidant properties through which it may possibly reduce cardiovascular risk.

- Cayenne pepper was examined because it has antioxidant activity of about 172.00mgGAE/100g and can serve as scavenger of free radicals

MATERIALS AND METHODS

- The research was conducted at the Teaching and Research Farm of the University of Ilorin and in accordance with the University's guideline for ethical treatment of experimental animals and complied with best practice within Institutional Animal Care and Use Committee (IACUC) guidelines.

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MATERIALS AND METHODS
CONT'D

- 80 birds
  - 40 Marshal broiler chicks (mixed sexes)
  - 40 Harco black chicks from the layer genotype (mixed sexes); divided into 4 groups each
- Completely randomized experimental design
- 2×2×2 factorial structure (genotype × cayenne pepper × *Centella asiatica*)
- 4 dietary groups

MATERIALS AND METHODS CONT'D

DATA COLLECTION

- Body weight
- Intraperitoneal glucose tolerance test (IPGTT)
- Body Mass Index was calculated using the formula:

$$BMI = \frac{Body\ weight\ (g)}{Body\ length\ (cm)^2}$$

(Mendeş *et al.*, 2007)

- Haematology and serum biochemistry
- **Statistical analysis**

  Factor effects (Genotype, *Capsicum Annum* and *Centella asiatica*) and the interactions were determined by statistical analysis of variance (ANOVA), within the General Linear Model (GLM) module of SPSS19. For each parameter measured, significantly different means was separated by the use of the Duncan's Multiple Range procedure (SPSS19, IBM).

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RESULTS AND DISCUSSIONS

TABLE 1 Effect of Genotype, *Centella asiatica*, Cayenne pepper and their 2- and 3-way interactions on cardiovascular risk related traits in chickens

Trait	Breed		Centelle asiatica		Cayenne pepper		Interaction			
	Marshall	Harco	0%	0.2%	0%	0.2%	G x Ca	G x Cy	Ca x Cy	G x Ca x Cy
Body weight (g)										
Body Weight wk1	179.74 ± 3.46*	75.79 ± 1.85	131.05 ± 9.09	125.9 ± 8.76	124.86 ± 8.06	131.75 ± 9.58*	NS	*	NS	NS
Body Weight wk4	1021.79 ± 18.15*	289.46 ± 10.33	711.08 ± 64.28*	621.79 ± 59	641.62 ± 57.52	687.69 ± 65.54*	NS	*	NS	NS
Body Weight wk7	2067.78 ± 55.97*	541.89 ± 15.79	1363.24 ± 131.47	1223.61 ± 136.24	1291.08 ± 125.34	1297.78 ± 143.19	NS	NS	NS	NS
Obesity/Fatness										
BMI_WK1	0.45 ± 0.02*	0.24 ± 0.01	0.36 ± 0.02	0.34 ± 0.02	0.36 ± 0.03	0.33 ± 0.02	NS	NS	NS	NS
BMI_WK4	0.79 ± 0.02*	0.39 ± 0.01	0.62 ± 0.03	0.58 ± 0.03	0.59 ± 0.03	0.61 ± 0.04	NS	*	*	NS
BMI_WK7	0.94 ± 0.02*	0.43 ± 0.01	0.7 ± 0.04	0.66 ± 0.05	0.69 ± 0.04	0.68 ± 0.05	NS	NS	NS	*

G= Genotype, Ca= Centella asiatica, Cy = Cayenne peeper (Capsicum annum), WK =Week, BMI = Body Mass Index, *=significant ($p < 0.05$), NS= Not significant ($p > 0.05$)

RESULTS AND DISCUSSIONS CONT'D
TABLE 2 Effect of Genotype, *Centella asiatica*, Cayenne pepper and their 2- and 3-way interactions on cardiovascular risk related traits in chickens

Trait	Breed		Centelle asiatica		Caynne pepper		Interaction			
	Marshall	Harco	0%	0.2%	0%	0.2%	G x Ca	G x Cy	Ca x Cy	G x Ca x Cy
TC (mmol/l)	3.02 ± 0.14	3.4 ± 0.11*	3.18 ± 0.12	3.24 ± 0.14	3.28 ± 0.13	3.14 ± 0.13	NS	NS	*	NS
LDL (mmol/l)	0.82 ± 0.05	0.94 ± 0.04	0.86 ± 0.05	0.9 ± 0.05	0.91 ± 0.05	0.86 ± 0.05	NS	NS	NS	NS
HDL (mmol/l)	1.42 ± 0.09	1.58 ± 0.05	1.52 ± 0.08	1.48 ± 0.06	1.54 ± 0.06	1.46 ± 0.08	NS	NS	NS	NS
TRIG (mmol/l)	0.64 ± 0.06	0.61 ± 0.05	0.63 ± 0.05	0.62 ± 0.06	0.56 ± 0.03	0.69 ± 0.07	NS	NS	NS	NS
HDL:LDL	1.77 ± 0.07	1.72 ± 0.06	1.79 ± 0.06	1.71 ± 0.07	1.75 ± 0.07	1.75 ± 0.06	NS	NS	NS	NS

G=Genotype, Ca=Centella asiatica, Cy=cayenne pepper(Capsicum annum), WK=Week, TC=Total Cholesterol, HDL=High Density Lipoprotein, TRIG=Triglyceride, *=significant (p<0.05), NS=Not significant (p>0.05)

RESULTS AND DISCUSSIONS CONT'D
TABLE 3 Effect of Genotype, *Centella asiatica*, Cayenne pepper and their 2- and 3-way interactions on cardiovascular risk related traits in chickens

Trait	Breed		Centelle asiatica		Cayenne pepper		Interaction			
	Marshall	Harco	0%	0.2%	0%	0.2%	G x Ca	G x Cy	Ca x Cy	G x Ca x Cy
Packed Cell Volume (%)	24.8 ± 0.87	22.6 ± 0.76	23.65 ± 1.02	23.75 ± 0.64	22.85 ± 0.65	24.55 ± 0.98	NS	NS	NS	NS
Hemoglobin (g/dL)	10.69 ± 0.23	10.37 ± 0.19	10.55 ± 0.24	10.5 ± 0.18	10.37 ± 0.21	10.69 ± 0.21	NS	*	NS	NS
White Blood Cell (×10^9 /L)	8.38 ± 0.2*	8.14 ± 0.14	8.35 ± 0.2	8.17 ± 0.14	8.26 ± 0.18	8.26 ± 0.17	*	*	*	*
Red Blood Cell (×10^{12}/ L)	5.64 ± 0.13*	5.27 ± 0.11	5.4 ± 0.16	5.5 ± 0.1	5.28 ± 0.13	5.62 ± 0.12	NS	NS	NS	NS
Neutrophil (%)	38.35 ± 1.14	37.45 ± 0.65	36 ± 0.92	39.8 ± 0.72*	37.15 ± 1.12	38.65 ± 0.65	NS	NS	NS	*
Lymphocyte (%)	60.3 ± 1.14	60.9 ± 0.68	62.5 ± 0.96*	58.7 ± 0.7	61.45 ± 1.11*	59.75 ± 0.68	NS	NS	*	*
Eosinophil (%)	1.61 ± 0.18	1.65 ± 0.13	1.68 ± 0.17	1.58 ± 0.14	1.47 ± 0.12	1.79 ± 0.18	NS	NS	NS	NS

G=genotype, Ca=Centella asiatica, Cy=cayenne pepper (Capsicum annum),*=significant (p<0.05), NS=Not significant(p>0.05)

RESULTS AND DISCUSSIONS CONT'D

TABLE 4 Effect of Genotype, *Centella* asiatica, Cayenne pepper and their 2- and 3-way interactions on insulin secretion and action as revealed in an Intraperitoneal Glucose Tolerance test

| Trait | Breed | | Centella asiatica | | Cayenne pepper | | Interaction | | | |
	Marshall	Harco	0%	0.2%	0%	0.2%	G x Ca	G x Cy	Ca x Cy	G x Ca x Cy
T 0 (mmol/l)	10.33 ± 0.25	11.52 ± 0.16*	10.75 ± 0.3	11.06 ± 0.21	11.29 ± 0.21*	10.54 ± 0.26	NS	NS	*(0.140)	*(0.139)
T 15 (mmol/l)	16.36 ± 0.52	19.09 ± 0.82*	17.96 ± 0.89	17.38 ± 0.59	17.53 ± 0.74	17.76 ± 0.74	NS	NS	NS	NS
T 30 (mmol/l)	17.98 ± 0.86	19.2 ± 0.73	19.14 ± 0.81	18.04 ± 0.81	17.98 ± 0.93	19.08 ± 0.7	NS	NS	NS	NS
T 75 (mmol/l)	13.11 ± 0.38	16.34 ± 0.75*	15.37 ± 0.89*	14.03 ± 0.4	15.2 ± 0.92	14.19 ± 0.36	NS	*(0.176)	*(0.195)	NS
CumG	1157.1 ± 34.43	1270.89 ± 34.16*	1225.58 ± 39.68	1200.15 ± 33.67	1186.82 ± 40.27	1236.98 ± 32.3	NS	NS	NS	NS
K15to75	-0.07 ± 0.01	-0.03 ± 0.03	-0.04 ± 0.03	-0.06 ± 0.01	-0.03 ± 0.03	-0.07 ± 0.01	NS	*(0.181)	*(0.209)	NS
K15to30	0.11 ± 0.05	0.01 ± 0.11	0.07 ± 0.11	0.04 ± 0.05	0.03 ± 0.11	0.09 ± 0.05	NS	NS	NS	NS
DeltaG	382.73 ± 34.2	407.21 ± 40.16	419.53 ± 39.92	371.03 ± 33.8	339.71 ± 37.88	446.85 ± 32.42*	NS	NS	NS	NS

G=Genotype, Ca=Centella asiatica, Cy=cayenne pepper (Capsicum annum), *=siginificant (p<0.05), NS=Not significant (p>0.05)

RECOMMENDATION

- *Centella asiatica* should be used as a nutraceutical dietary supplement in the diet of chickens (raised for meat) at the level examined, to reduce cardiovascular risk over a 7 week production cycle through its effect in transiently reducing body weight and improving insulin secretion and action as measured by glucose tolerance.

- Cayenne pepper should be used as a nutraceutical dietary supplement in the diet of chickens (raised for meat) at the level examined, to reduce cardiovascular risk over a 7 week production cycle through its effect in reducing inflammation.

- Given the Genotype x Nutraceutical interaction effects observed here, care should be exercised in use of *Centella asiatica* and Cayenne pepper for the prescribed purposes, ensuring that the desired effects are present within the genotype background context in which they are used.

THANK YOU