

EFFECT OF CHICKEN TYPES ON POLYUNSATURATED TO SATURATED FATTY ACID RATIO OF CARCASS FAT

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Introduction

- High intake of food having lower polyunsaturated to saturated (P/S) fatty acid ratio → cholesterol accumulation → arteriosclerosis (Hoenselaar, 2012).
- There has been reduction in the consumption of red meat (National Cholesterol Education Program, 1991) → Increase in consumption of chicken meat
- With increased consumption of broiler meat it is possible broiler fat consumption is on the increase.
- Therefore, there is need to determine the P/S ratio of fat in chickens as affected by sex, sampling site and type.

Specific objectives of the study:

- Determine the effect of sex on degree of unsaturation of chicken fat.
- Estimate the effect of sampling sites on (P/S) ratio of chicken carcass fat
- Determine the effect of type (meat, egg and dual purpose) on (P/S) ratio of chicken carcass fat.

Materials And Methods

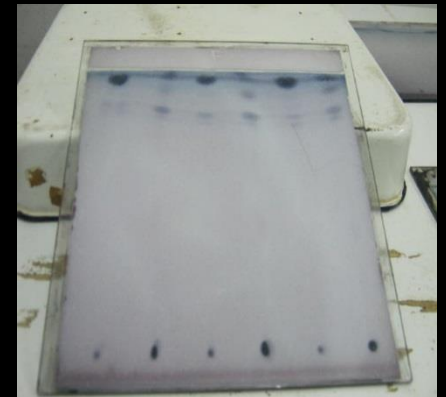
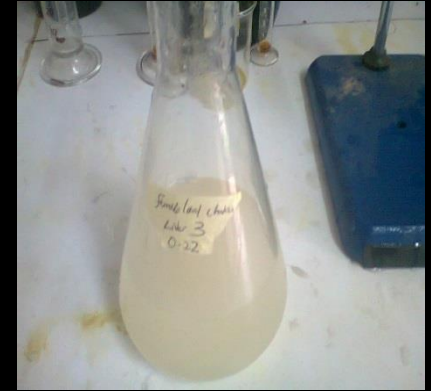
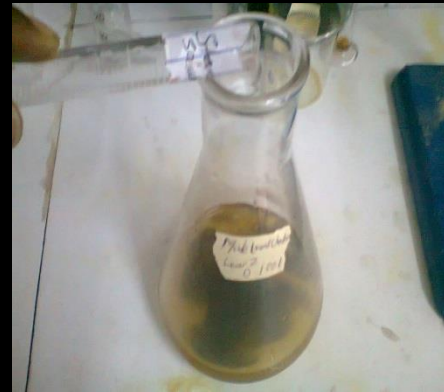
Experimental birds: 36 chickens were used; 12 Meat type, 12 Egg type, and 12 Dual Purpose type.

Experimental design: Complete Randomised Design

- Lipid was extracted and stored in the freezer (20 °C) following the procedure of Folch *et al.* (1957)
- Determination of the quantity of saturated and polyunsaturated fatty acids in lipid extract following the procedure Egan *et al.*, (1991)
- Iodine number determination (Hanus' procedure) and Thin Layer Chromatography analysis
- High Performance Liquid Chromatography analysis



Materials And Methods Cont'd



RESULTS AND DISCUSSION

Table 1: Percent lipid content, saturated and unsaturated fatty acids composition of lipid extracted from two sampling sites of three chicken types

Chicken type	Sampling Site	Lipid content (%)	Mean across Chicken type (Lipid content %)	SFA (%) (\pm SEM)	PUFA(%) (\pm SEM)	P/S ratio (\pm SEM)
Meat type	Abdominal fat	34.67 \pm 2.09 ^a	21.42 ^a \pm 4.19	2.3 \pm 0.10	0.9 \pm 0.02 ^{ab}	0.39 \pm 0.05 ^a
	Liver	8.17 \pm 1.66 ^c		2.2 \pm 0.00	0.9 \pm 0.05 ^{ab}	0.41 \pm 0.05 ^a
Egg type	Abdominal fat	30.50 \pm 3.89 ^{ab}	17.92 ^{ab} \pm 4.23	2.1 \pm 0.15	0.7 \pm 0.00 ^{ab}	0.33 \pm 0.45 ^a
	Liver	5.33 \pm 0.61 ^c		2.0 \pm 0.25	0.6 \pm 0.05 ^b	0.30 \pm 0.01 ^a
Dual purpose type	Abdominal fat	25.67 \pm 4.27 ^b	15.92 ^b \pm 3.60	2.2 \pm 0.35	0.9 \pm 0.25 ^{ab}	0.41 \pm 0.06 ^a
	Liver	6.17 \pm 0.79 ^c		2.4 \pm 0.35	1.1 \pm 0.00 ^a	0.46 \pm 0.04 ^a
Mean across sample site	Abdominal fat	30.28 ^a				0.38 \pm 0.03
	Liver	6.56 ^b				0.38 \pm 0.03

aa, b, ab Means in the same column having the same superscript do not differ significantly at P>0.05..

Meat type = broiler chicken, egg type = layer chicken, dual purpose = local chicken

Table 2: Saturation and Carbon numbers of lipids extracted from male and female of three chicken types

Chicken type	Sex	Iodine no ±SEM	Mean across Sex±SEM	SFA	PUFA
Meat type	Female	239±85.81 ^a	139.8±67.11 ^a	C12:0, C22:0	C18:2,C20:4,C20:5,C22:5,C22:6
	Male	41±5.13 ^b		C12:0, C22:0	C18:2,C20:4,C20:5,C22:6
Egg type	Female	122±20.05 ^{ab}	144.0±15.97 ^a	C20:0, C22:0	C18:2,C18:3,C20:4,C22:5,C22:6
	Male	166±11.74 ^{ab}		C14:0, C20:0, C22:0	C18:2,C18:3,C20:4,C20:5,C22:5,C 22:6,C28:6
Dual purpose	Female	203	111.6±49.91 ^a	C10:0, C20:0, C22:0	C18:3,C20:4,C20:5,C22:5,C22:6
	Male	122±6.36 ^{ab}		C20:0, C22:0	C18:2,C18:3,C20:4,C20:5,C22:5,C 22:6
Mean across types	Female		107.8±44.02 ^a		
	Male		109.6±23.53 ^a		

a, b, ab Means in the same column having the same superscript do not differ significantly at P>0.05. Meat type = broiler chicken, egg type = layer chicken, dual purpose = local chicken.

CONCLUSION

- Fat sample from the abdominal site had higher lipid extract than fat from the liver at $p < 0.05$.
- Meat type chickens had the highest lipid content followed by egg type chickens then dual purpose chickens at $p < 0.05$.
- There was no difference in the polyunsaturated to saturated fatty acid ratio of lipids extracted from abdominal fat and from the liver at $p > 0.05$.
- Across the three chicken types and sex considered, there was no difference in the degree of unsaturation of the lipids extracted from different chicken types and sexes at $p > 0.05$.
- Quantitatively, lipids extracted from egg type chickens had the highest carbon number polyunsaturated fatty acids as C28:6, while lipids extracted from meat type and dual purpose chickens had higher carbon number polyunsaturated fatty acids as C22:6 at $p < 0.05$.

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