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Oxytetracycline and sulfamethazine residues inchicken broiler's meat and giblets and their degradation

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Abstract

Two hundred samples from 50 whole broiler chickens carcasses (30 frozen and 20 fresh) represented by breast, thigh, liver and kidney samples (50 of each) were collected from Minofia governorate for detection their residual level of oxytetracycline (OTC) and sulfamethazine (SMZ). The detection and estimation of such antimicrobial were applied by FPT and HPLC. Then positive samples were cooked for detection of such antimicrobial residues. The result showed that in total the positive samples of FPT were 14%, 20%, 28% and 36% for OTC residues while they were 10%, 12%, 16% and 20% for SMZ residues for each sample of breast, thigh, liver and kidney respectively. The average concentration of OTC by HPLC in positive frozen samples by (mg/kg) were (0.198 ± 0.032), (0.348± 0.0617), (1.423 ± 0.303) and (1.932 ± 0.316) while in SMZ were (0.2625 ± 0.060), (0.427± 0.097), (0.686±0.1225) and (1.410 ± 0.275) for breast, thigh, liver and kidney respectively. Accurately, 3.33%, 13.33, 16.67% and 26.67% of the examined samples for OTC and 6.67%, 10%, 13.33% and 16.67% of the examined samples for SMZ were unaccepted concerning breast, thigh, liver and kidney respectively. The average concentration of OTC by HPLC in positive fresh samples by mg/kg were 0.417 ± 0.087, 0.665 ± 0.231, 2.07 ± 0.343 and 2.643 ± 0.597 while of SMZ they were 0.370 ± 0.090, 0. 5234 ± 0.13, 1.268 ± 0.226 and 2.0525 ± 0.333 concerning breast, thigh, liver and kidney respectively. Accurately, 15%, 20% and 30% and 35% of the examined samples for OTC and 15%, 15%, 20% and 25% of the examined samples for SMZ were unaccepted for breast, thigh, liver and kidney respectively. Cooking process have reduced effect on SMZ and OTC .but in OTC give degradation product have more toxic effect than the parent drug. The most target organ was liver in incidence of SMZ and OTC and their concentrations followed by thigh and then breast.

Introduction

With increasing the broiler meat production in Egypt (559.000 tons/ year) forming about 84% of total poultry meat production, broilers meat has become the first beef alternative for Egyptian consumers for their high nutritional value and low coast. However, the up uses of antimicrobial drug during broiler life cycle constitute a major risk facing broiler industry (**Cochrane et al., 1995 and Maged and Hamdey 2006).**

Antimicrobial residues that accumulate in broiler's tissues as a result of high dose and longtime administration or lake withdrawal time are the most significant hazard in consumption of broiler's meat (**Bevill, 1984 and Montanaro, 1998).** Moreover, these residues are different in their concentration among different tissues of the bird, where high level is present in fat as storage tissue, also kidney and liver contain higher amount for being execratory organs (**Booth, 1973**). It is worthy to mentionthat 10-15 percent of the human population is considered to be hypersensitive to antimicrobials especially sulfonamides and suffers allergic reactions like skin rashes, hives, asthma and anaphylactic shock (**Cochrane et al., 1995).** Sulfonamides and oxytetracycline are classes of antimicrobial drugs which widely used for therapeutic and prophylactic purposes in poultry farms, sometimes being used as additives in animal feed because prolonged ingestion of sulfonamides may have a growth-promoting effect (**Long et al., 1990; Kim and Park, 1998 and Schwarz and Chaslus-Dancla, 2001).** Although the excessive data available about oxytetracycline and sulfamethazine residues in raw broilers meat, low researches are present to investigate the effect of heat treatment during ordinary cooking on (OTC) and (SMZ) residues in broiler's meat have

been observed. It is essential to said that the effect of cooking and the cooking process be investigated to determine if the consumer being exposure to OTC and any breakdown products or not (**Kuhne et al., 2001a and Inzedine et al., 2003**). **Ismail-Fitry et al. (2008)** observed that , the longer the duration of deep frying and higher the temperature applied, the more reduction of sulfonamide residues was observed. Also **Abou-Raya et al. (2013)** found that the losses of tetracyclines(TCs) residues in chicken meat were depended upon the cooking procedure, cooking time and TCs residues amount, and the losses of TC residues increased with prolonged cooking time. Also several studies have demonstrated the rapid formation of degradation products of tetracycline in chicken meat following high-temperature treatment. These degradation products of tetracycline have been implicated in renal toxicity (especially the resultant products anhydrotetracycline and/or epitetracycline) can cause Fanconni syndrome(FS) manifesting as renal tubular disease (**Kuhne et al., 2001b; Inzedine et al., 2003 and Franje et al. 2010**). Therefore, the present study is designed to estimate OTC and SMZ residues in broiler's meat and giblets in Menofia governorate in addition to explore the effect of ordinary cooking on residues of OTC and SMZ in examined samples.

Material and Methods

1. Collection of samples: a total of 50 whole chicken broilers carcasses (30 frozen and 20 fresh) represented by breast, thigh, liver and kidney samples were collected from Minofia governorate local markets. Each sample was kept in a separate sterile plastic bag and transferredas quickly as possible to the laboratory in an insulated ice box. The collected samples were analyzed for their residual contents of oxytetracycline and sulfamethazine. In addition, the degradation substance of oxytetracycline residue in cooked samples were examined.

2. Evaluations of antimicrobial residues: two methods were used for the determination of antimicrobial residues in broiler examined samples.

2.1Qualitative evaluation: by usingfour plate test (FPT), microbiological inhibition assay using Bacillus subtilis reference strain as indicator organism. The level of antibiotics can be evaluated by measuring the diameter of inhibition zone observed on an agar layer seeded with a test organism according to **Heitzman (1994).**

2.2Quantitative evaluation: using High Performance Liquid Chromatography (HPLC)an Agilent Technologies HPLC Series 1200 (Germany) was equipped with an online vacuum degasser, a quaternary pump system, an auto sampler and UV detector.

2.2.1 HPLC was applied for quantitative analysis of oxytetracycline residues level in positive samples resulted from FPT according to **Senyuva et al. (2000).**

2.2.2 HPLC was applied for quantitative analysis of sulfamethazine residues level in positive samples resulted from the FPT according to **Mehtabùddin et al. (2012).**

3- Effect of cooking on residual content of oxytetracycline and sulfamethazine: The broiler's tissues were packed in polyethylene bags. Each sample immersed in a water bath at 100 °C for 20 min. and examined as follow:

3.1 FPT was performed on cooked samples for OTC and SMZ residues as in (2.1).

3.2 HPLC to detect the effect of cooking on OTCand SMZ residues in broiler's samples as in (2.2.1and2.2.2).

3.3 HPLC to detect the degradation products of oxytetracycline after cooking treatment according to (**Gratacós-Cubarsí et al. 2007 and Nguyen et al., 2014**).

Results

Table (1): incidence of OTC and SMZ residues in broiler's meat and giblets by FPT (n=200). N= number of samples

	Oxytetracycline								Sulfamethazine							
	Frozen			Fresh			Total		Frozen			fresh			Total	
	N	+ve	%	N	+ve	%	total	%	N	+ve	%	N	+ve	%	total	%
Breast	30	2	6.67	20	5	25	7	14	30	2	6.67	20	3	15	5	10
Thigh	30	4	13.33	20	6	30	10	20	30	3	10	20	3	15	6	12
Liver	30	5	16.67	20	9	45	14	28	30	4	13.33	20	4	20	8	16
Kidney	30	8	26.67	20	10	50	18	36	30	5	16.67	20	5	25	10	20
Total	120	19	15.83	80	30	37.5	49	24.5	120	14	11.67	80	15	18.75	29	14.5

Table (2): Mean value of OTC residues in the examined samples of frozen broiler's meat and giblets by HPLC (mg/kg) and the acceptability of samples based on their levels of OTC (n=120). Acceptability according to FAO/WHO (2014)

	oxytetracycline			MPL µg/kg	Un acceptable samples	
	Min	Max	Mean ± S.E		N	%
Breast	0.166	0.230	0.198±0.032	200	1	3.33
Thigh	0.201	0.502	0.348±0.0617	200	5	13.33
Liver	0.606	2.09	1.423±0.303	600	8	16.67
Kidney	1.250	3.01	1.932±0.316	1200	18	26.67

Table (3): Mean values of SMZ residues in the examined samples of frozen broiler's meat and giblets by HPLC (mg/kg) and the acceptability of samples based on their levels of SMZ (n=120).

Sulfamethazine				MPL µg/kg	Un acceptable samples	
	Min	Max	Mean ± S.E		N	%
Breast	0.202	0.323	0.2625 ± 0.060	100	2	6.67
Thigh	0.320	0.621	0.427 ± 0.097	100	3	10
Liver	0.560	0.903	0.686 ± 0.1225	100	4	13.33
Kidney	1.05	2.23	1.410 ± 0.275	100	5	16.6

Table (4): Mean value of OTC residues in the examined samples of fresh broiler's meat and giblets by HPLC (mg/kg) and the acceptability of samples based on their levels of oxytetracycline(n=80). Acceptability according to FAO/WHO (2014)

	oxytetracycline			MPL (µg/kg)	Un acceptable samples	
	Min	Max	Mean ± S.E		N	%
Breast	0.176	0.719	0.417 ±0.087	200	3	15
Thigh	0.190	1.67	0.665 ±0.231	200	4	20
Liver	0.580	3.30	2.07 ±0.343	600	6	30
Kidney	1.07	4.62	2.643 ±0.597	1200	7	35

Table (5): Mean value of SMZ residues in the examined samples of fresh broiler's meat and giblets by HPLC (mg/kg) and the acceptability of samples based on their levels of SMZ (n=80). Acceptability according FAO/WHO (2014)

	sulfamethazine			MPL (µg/kg)	Un acceptable samples	
	Min	Max	Mean ± S.E		Nr	%
Breast	0.101	0.670	0.370 ±0.090	100	3	15
Thigh	0.230	0.865	0.5234 ±0.13	100	3	15
Liver	1.04	2.12	1.268 ±0.226	100	4	20
Kidney	1.10	2.66	2.0525 ±0.333	100	5	25

Table (6): Mean values of the degradation products of oxytetracycline residues in cooked of broilers meat and giblets by HPLC (mg/kg).

	OTC before cooking ± S.E	α apooxytetracycline after cooking ± S.E	B apooxytetracycline after cooking ± S.E
Breast	0.535 ± 0.01845	0.00588 ± 0.001	0.00962 ±0.00328
Thigh	0.908 ± 0.0432	0.0107 ± 0.00125	0.01588 ± 0.0036
Liver	2.675 ± 0.525	0.0293 ±0.0057	0.0481 ± 0.0095
Kidney	NA	NA	NA

NA =not available

Table (7): Effect of cooking on OTC and SMZ residues in examined samples of broiler's meat and giblets by FPT.

	Oxytetracycline			Sulfamethazine		
	No. of positive samples		Reduction %	No. of positive samples		Reduction %
	before cooking	after cooking		before cooking	after cooking	
Breast	3	ND	100	3	ND	100
Thigh	4	ND	100	4	1	75
Liver	6	2	66.67	5	2	60
Kidney	7	3	57.14	7	4	42.85

Table (8):Effect of cooking on OTC and SMZ residues in broiler's ment and giblets by HPLC (mg/kg).

	Oxytetracycline(OTC)			Sulfamethazine(SMZ)		
	Before cooking Mean ± S.E	after cooking Mean ± S.E	Reduction percent%	Before cooking Mean ± S.E	after cooking Mean ± S.E	Reduction percent%
Breast	0.316 ± 0.02	ND	100	0.132 ± 0.02	ND	100
Thigh	0.460 ± 0.03	ND	100	0.204 ± 0.03	ND	100
Liver	2.1 ± 0.09	(0.302) ±0.02	85.61	1.80 ± 0.09	0.485 ± 0.04	73.05
Kidney	NA	NA	NA	NA	NA	NA

NA =not available

Discussion

Fifty broilers samples of each of breast, thigh, liver and kidney were examined by FPT for OTC and SMZ as show in table (1). For the breast meat samples, 7 samples were positive for OTC residues (14%), while 5 samples were positive for SMZ (10%). For the thigh meat samples, 10 samples were positive for OTC (20%) and 6 samples were positive for SMZ by (12%).Regarding liver samples, 14 samples were positive for OTC residues (28%) while 8 samples (16%) were positive for SMZ residues. Kidney samples showed 18 positive samples for OTC (36%), while 10 samples were positive for SMZ residues (20%).

It is evident from the results recorded in table (1) that oxytetracycline residues in examined samples of fresh broiler's meat and giblets by FPT detected in 25%, 30%, 45% and 50% for breast, thigh, liver and kidney respectively. So the total percent of OTC residues in fresh broiler's meat and giblets is 37.5%, similar results were recorded by **Gebre (2012)**. Higher results were obtained by **Darwish et al. (2013)** who reported that tetracyclines represent 41% of cases of all antibiotic-associated residues.

The obtained results were similarly near to those obtained by **Shareef et al. (2009)** who revealed that 28% of breast and 28% for the thigh muscle was positive for oxytetracycline residues. The current results were lower than those obtained by **Al-Ghamdi et al. (2000)** who found that 87% and 100.0% of raw muscle and liver respectively were positive for oxytetracycline residues. The present results are lower than those obtained by **Muhammed et al. (2007)** who recorded that (44.8%) had detectable residue levels for OTC and (20.7%) had higher residues levels than the maximum level (0.2mg/kg) for the broiler's musclesaccording FAO/WHO (2014).

These results are lower than those reported by **Salama et al. (2011)**found that (44%) of chicken samples (meat and liver) contained tetracyclines residues including (42%) of breast, (38%) of thigh and (52%) of liver samples. These results are higher than those reported by **Cetinkaya et al. (2012)** who reported that oxytetracycline was not detected in any of the tested chicken meat samples.It is evident from the results recorded in table (1) that sulfamethazine residues in examined samples of fresh broiler's meat and giblets by FPT detected in 15%, 15%, 20% and 25% of the of breast, thigh, liver and kidney respectively. So the total incidence of SMZ residues in fresh broiler's meat and giblets is 18.75%, similar results which recorded by **Gebre (2012)**

The obtained results were lower than those obtained by **Shareef et al. (2009)** who revealed that 28% of breast sampleswere positive for

sulfonamide residues.The current result are lower than those reported by **Mehtabuddin et al. (2012)** who noted that 43% poultry meat samples had detectable levels of sulfonamide residues.

The current results are agreed with those reported by **Salem (2004)** who found that sulfonamide residues were found in (12.5%) of chicken meat samples. On the other hand the obtained results are lower than his results which recorded that sulfonamide residues were found in (50%) of liver samples.The current results are lower than those obtained by **El-Gazzar and EL-lawendy (2005)** who reported that, all analyzed chicken samples (50 liver and 50 breast) have sulfamethazine residue by level extremely greater than the maximum residues limit 100µg/kg.

Also from table (1) it is recorded that the incidence of OTC residues (24.5%) was higher than the incidence of SMZ residues (14.5%) in all examined samples. This could be referred to excessive use of OTC in broilers farms than SMZ (**Companyó et al., 2009 and Sirdar, 2010**).The current results are agreed with those obtained by **Herenda and Franco (1996)**who recorded that oxytetracycline was the predominant antibiotic residue detected in poultry meat followed by Sulfonamide.These results are in harmony with those reported by **Charm (2002)** who reported thatoxytetracycline and sulfonamides were the antibiotics recovered through examining 7600 of meat samples including poultry.Also from table (1) it was noted that the highest level of residues (OTC and SMZ) was present in kidney samples followed by liver and thigh, while the lowest residues was noticed in breast samples.

The current results come in accordance with those reported by**Polujanski (1968), Black (1977), El-Mossalami (1986), Pavlov et al. (2008) and Salama et al. (2011)** whofound that the highest concentration of antibiotics was in liver than muscles. These results are in harmony with those found by **Al-Bahry et al. (2013)** who recorded that OTC values were significantly higher in kidney over the liver.

From table (1) it is observed that freezing has reduction effect on OTC residues in broilers meat samples, while little reduction effect on SMZ residues was found. Where,(15.83%) of frozen samples were positive OTC, while for fresh samples the incidence was (37.5%).On the other hand, SMZ residues was also reduced in frozen samples (11.67%) while, the incidence in fresh sample was (18.75%).The current result agreed with those reported by **Liman et al, (2015)** who investigate storing in the deep freezing in -20 C° for 30 and 45 days did not cause significant changes on SMZ residues in broiler's meat.

Result achieved in table (2) declared the level of oxytetracycline residues in frozen broiler's meat and giblets by using HPLC (mg/kg) ranged from 0.166 to 0.230 with an average of 0.198±0.032 for chicken breast, from 0.201 to 0.502 with an average of 0.348±0.0617 for chicken thigh, from 0.606 to 2.09 with an average of 1.423±0.303 for chicken liver and from 1.250 to 3.01 with an average of 1.932 ±0.316 for chicken kidney. Acceptability of the examined samples of frozen broiler's meat and giblets based on their levels of oxytetracycline were 3.33%, 13.33, 16.67% and 26.67% of the examined samples of breast, thigh, liver and kidney were unaccepted respectively according to **FAO/WHO (2014)**.

Result obtained in table (3) declared the level ofSMZ in frozen broiler's meat and giblets by using HPLC (mg/kg) rangedfrom 0.202 to 0.323 with an average of 0.2625 ± 0.060 for chicken breast, from 0.320 to 0.621 with an average of 0.427± 0.097 for chicken thigh, from 0.560 to 0.903 with an average of 0.686±0.1225 for chicken liver and from 1.05 to 2.23 with an average of 1.410 ± 0.275 for chicken kidney. Acceptability of the examined samples of

frozen broiler's meat and giblets based on their levels of SMZ were 6.67%, 10%, 13.33% and 16.67% of breast, thigh, liver and kidney were unaccepted respectively according to **FAO/WHO (2014)**.Table (4) declare the level of oxytetracycline residues in fresh broiler's meat and gibletsby using HPLC (mg/kg) ranged from 0.176 to 0.719 with an average of 0.417 ± 0.087 for chicken breast, from 0.190 to 1.67 with an average of 0.665± 0.231for chicken thigh, from 0.580 to 3.30 with an average of 2.07± 0.343 for chicken liver and from 1.07 to 4.62 with an average of 2.643± 0.597 for chicken kidney. Acceptability of the examined samples of fresh broiler's meat and giblets based on their levels of oxytetracycline were 15%, 20%, 30% and 35% of breast, thigh, liver and kidney were unaccepted respectively according to **FAO/WHO (2014)**.

The current results are lower than those obtained by **Salehzadeh et al. (2006)** who noticed that(27.77%) of muscle and (95.55%) of liver samples showed residues of oxytetracycline above MRLs. But the current results were higher than his result in kidney percent because he found (18.88%) of kidney samples have oxytetracycline above MRLs.

The obtained results were higher than those reported by **Salama et al. (2011)** who recorded that 8%, 7%, and 13% of samples of breast, thigh, and liver respectively had tetracyclines residues above the maximum residue limits.

Result observed in table (5) declared the level of SMZ residues in fresh broiler's meat and giblets by using HPLC (mg/kg) ranged from0.101 to 0.670 with an average of 0.370 ±0.090 for chicken breast, from 0.230 to 0.865 with an average of 0.5234±0.13 for chicken thigh, from 1.04 to 2.12 with an average of 1.268± 0.226 for chicken liver and from 1.10 to 2.66 with an average of 2.0525±0.333for chicken kidney.Acceptability of the examined samples of fresh broiler's meat and giblets based on their levels of sulfamethazine residues were15%, 15%, 20% and 25% of breast, thigh, liver and kidney unaccepted respectively according to **FAO/WHO (2014)**.

Result achieved in table (6) declared the level of the degradation product of oxytetracycline by HPLC (mg/kg) after cooking in examined samples of broiler's meat and giblets which show that the mean concentration of oxytetracycline before cooking process were 0.535± 0.01845, 0.908± 0.0432 and 2.675± 0.525 for breast, thigh and liver respectively. The mean of concentration of α-apo-oxytetracycline after cooking process were 0.00588 ± 0.001, 0.0107 ± 0.00125 and 0.0293±0.0057 for breast, thigh and liver respectively while, 0.00962 ±0.00328, 0.01588 ± 0.0036 and0.0481± 0.0095 were the mean of concentration of β-apo-oxytetracycline for breast, thigh and liver respectively.

These results are higher than those reportedby**Nguyen et al. (2014)** whofound that the thermal treatment resulted in the degradation of OTC and the concentrations of the degradation products α-apo-oxytetracycline (α-apo-OTC) and β-apo-oxytetracycline (β-apo-OTC) in muscle samples amounted to 0.7 to 1.2 % of the initial OTC content.The effect of cooking on oxytetracycline and sulfamethazine residues by using FPT showing in table(7) that the number of positive samples for OTC were 3, 4, 6 and 7 for breast, thigh, liver and kidney respectively before cooking and after cookingreduced by 100%, 100%, 66.67% and 57.14% for breast, thigh, liver and kidney respectively. While for SMZ the numbers of positive samples were 3, 4, 5 and 7 for breast, thigh, liver and kidney respectively before cooking and after cooking reduction by 100%, 75%, 60% and 42.85% for breast, thigh, liver and kidney respectively.

The obtained results in table (8) declared the effect of cooking on oxytetracycline and sulfamethazine residues using HPLC (mg/kg) which showing that the mean concentration of oxytetracycline residues before cooking were 0.316± 0.02, 0.460± 0.03 and 2.1± 0.09 for breast, thigh and liver respectively while, after cooking, they reduced by 100%, 100%, and 85, 61% for breast, thigh and liver respectively. While for SMZ the mean concentration before cooking were 0.132± 0.02, 0.204± 0.03 and

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الملخص العربي

لقد تم جمع 200 عينه من 50دجاجة كاملة (30 دجاجه مجمده و20 طازجه) ممثلة في الصدر والورك والكبد والكلى(50 عينه لكل منهم) من المحلات الخاصة بيع الدواجن بمحافظه المنوفية. للكشف عن بقايا الاوكسي تتراسيكلين والسلفاميثازين. وتم عمل الطهي لبعض العينات الايجابية لمعرفه تاثير عمليه الطهي علي بقايا المضادات الحيوية. أوضحت النتائج إن معدل انتشار متبقيات الاوكسي تتراسيكلين في عينات الدجاج المجمد بواسطة FPT كانت 6,67% و13,33% و16,67% و 26,67% لكل من الصدر والورك والكبد والكلية علي التوالي. وتم قياس متوسط تركيزه بواسطة HPLC في العينات الموجبه (بالميلي جرام/كيلو جرام) وكانت (0,032±0,198) للصدر (0,0617±0,348) للورك و(0,303±1,423) للكبد و(0,316±1,932) للكليه .وبذلك تم عدم قبول3,33% و 13,33% و 16,67% و26,67% لكل من الصدر والورك والكبد والكلية علي التوالي. كما أوضحت النتائج ان معدل انتشار متبقيات الاوكسي تراسيكلين في عينات الدواجن الطازجه بواسطه FPT كانت 25% و30% و 45% و 50% لكل من الصدر والورك والكبد والكليه علي التوالي. وتم قياس متوسط تركيزه في العينات الايجابيه (بالميلي جرام/كيلو جرام) بواسطه HPLC وكانت كالتالي (0,087±0,417) لصدر و (0,231±0,665) للورك و(0,343±2,07) للكبد و (0,597±2,643) للكلي. وبذلك تم عدم قبول 15% و 20% و 30% و 35% لكل من الصدر والورك والكبد والكلية علي التوالي.

وكذلك أوضحت النتائج ان معدل انتشار متبقيات السلفاميثازين في عينات الدجاج المجمد بواسطه FPT كانت 6,67% و 10% و13,33% و16,67% لكل من الصدر والورك والكبد والكليه علي التوالي. وتم قياس متوسط تركيزها بواسطه HPLC في العينات الموجبه (بالميلي جرام/كيلو جرام) وكانت (0,060±0,2625) للصدر و (0,097±0,427) للورك و(0,1225±0,686) للكبد و (0,275±1,410) للكليه. وبذلك تم رفض 6,67% و 10%و 13,33% و 16,67% لكل من الصدر والورك والكبد والكليه علي التوالي.

كان معدل انتشار متبقيات السلفاميثازين في عينات الدجاج الطازجه بواسطه FPT كانت 15%و 15% و 20% و 25% لكل من الصدر والورك والكبد والكلي علي التوالي. وتم قياس متوسط تركيزها بواسطه HPLC في العينات الموجبه (بالميلي جرام/كيلو جرام) وكانت (0,090±0,370) للصدر و (0,13±0,5234) للورك و (0,226±1,268) للكبد و (0,333 ±2,0525) للكلي. وبذلك تم رفض 15%و 15% و20% و 25% من الصدر و الورك و الكبد والكلي علي التوالي.

كما ان معامله عينات الدجاج (الصدر والورك والكبد والكلي) الايجابيه حراريا بعمليه الطهي لبقايا الاوكسي تتراسيكلين قد اسفرت ان ان هناك مواد اخري اكثر سميه منه تنتج من تاثير الحراره عليه (الالفا ابو اوكسي تتراسيكلين والبيتا ابو اوكسي تتراسيكلين) وهذه المواد تتكون بنسبه 1,1% و1,8% بالتوالي من الكميه الاوليه الاوكسي تتراسيكلين. كما ان المعاملة الحرارية لتلك الاجزاء بالطهي لبقايا الاوكسي تتراسيكلين قد اسفرت ان معدل انخفاض متبقيات الاوكسيتتراسيكلين كانت 100% و 100% و 66,67 % و57,14% لكل من الصدر والورك والكبد والكليه علي التوالي باستخدام FPT. وايضا باستخدام HPLC وجد ان معدل الانخفاض 100% و100% و55,61% لكل من الصدر والورك والكبد علي التوالي حيث كانت متوسط تركيزهم قبل الطهي هي(0,316±0,02) للصدر و (0,460±0,03) للورك و(2,1±0,09) للكبد. و ان هناك تاثير كبير للحراره علي هذه البقايا وخصوصا عندما يتم الكشف عنها في في تركيزات منخفضه. واوضحت النتائج ايضا ان معدل انخفاض متبقيات السلفاميثازين كانت 100% و75% و 60%و 42,85% للصدر والورك و الكبد والكلي علي التوالي بواسطه FPT. و بواسطه HPLC وجد ان 100 % و100% و73,05% لكل من الصدر والورك والكبد علي التوالي. حيث كانت متوسط تركيزهم قبل الطهي هي(0,132±0,02) للصدر و(0,204±0.03) للورك و(1.80±0,09) لكبد.

يمثل الطهيان دور ايجابي في خفض تركيزات بعض المضادات الحيويه مثل السلفاميثازين ودور سلبي في تكسير المضادات الحيويه الي مواد اكثر سميه مثل الاوكسي تتراسيكلين. واخيرا لقد توقشت اهميه بقايا الاوكسي تتراسيكلين والسلفاميثازين في لحم واحشاء الدجاج والمصادر المختلفه لوجودهم وكذلك التوصيات لتجنب وجودهم.