

## RESIDUES OF FURAZOLIDONE IN RAW AND BOILED EGGS AFTER ITS ADMINISTRATION TO LAYING HENS

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### ABSTRACT

Furazolidone residue in raw and boiled eggs were measured after administration of the prophylactic dose (20 mg/kg b. wt. for 10 successive days) and the therapeutic dose (35 mg/kg b. wt. for 7 successive days) to laying hens and the clearance time of the drug in the laid eggs was also estimated. The concentration of Furazolidone residue in raw eggs of the prophylactic group was zero in the first day of dosing, in the 2<sup>nd</sup> day of dosing the concentration was 0.12ug/gm albumin and 0.09 ug/gm yolk and increased gradually to the peak at the 10<sup>th</sup> day of drug administration (0.41 ug/gm albumin and 0.39 ug/gm yolk. This level declined gradually till reached zero after 6 days in egg albumin and 7 days in the egg yolk from last dosage. Meanwhile, the boiled eggs showed low Furazolidone residues than raw eggs . As far the therapeutic dose groups, Furazolidone residues were detected at the 2<sup>nd</sup> day of dosing at concentration of 0.18 ug/gm albumin and 0.13 ug/gm yolk and increased to the peak at 7<sup>th</sup> day (0.50 ug/gm albumin and 0.40 ug/gm yolk) and declined till reached zero after 6 days in the egg albumin and 7 days in egg yolk. In boiled eggs the residues of Furazolidone were lower than in raw eggs.

### INTRODUCTION

Many antimicrobial agents are used in poultry to overcome the bacterial infections. These agents may be eliminated through eggs as a way of excretion. Furazolidone is one of these agents which is widely used for controlling many pathogens as clostridia, salmonella, E. coli, staphylococci and streptococci (1-3) .

Recently, drug residues in edible tissues is a problem that exited mankind over the world. Drug residues in eggs is one of these problems that constitute a real hazard due to wide use of eggs for human consumption .

This study was conducted to throw a light on Furazolidone residues and its clearance in raw and boiled eggs after administration of the drug to laying hens .

### MATERIALS AND METHODS

#### Materials :

#### 1- Drug : Furazolidone (TAD, West Germany)

A yellow powder, insoluble in water, alcohol and carbon tetrachloride, slightly soluble in chloroform, A 1% Suspension in water has a pH of 4.5 to 7, its prophylactic dose is 20 mg/kg b. wt. and the therapeutic dose is 35 mg/kg b. wt. (4,5) .

#### 2- Chickens

Sixty healthy native breed laying hens (8 months old) fed on a balanced ration free from drugs, were employed for this study. They were divided into three equal groups each of 20 .

#### Group A- (Control Group)

It was kept without any medication

#### Group B- (Prophylactic Group)

Administred a prophylactic dose (20 mg of Furazolidone water suspension /kg b. wt.) /day intracrop for 10 successive days .

#### Group C- (Therapeutic group) :

Administred a therapeutic dose (35 mg of Furazolidone water suspension /kg b.wt.)/ day intracrop for 7 successive days .

#### Collection of eggs :

Eggs were collected daily from the first day of drug administration up to 7 days after drug withdrawal, eggs collected from each group were divided into two groups, the first one was kept raw and the other was boiled for five minutes to detect Furazolidone residues (6) .

Statistical analysis was carried out using Student's (t) Test. (7) .

### RESULTS

In this study, Furazolidone residues, in raw and boiled eggs collected from hens administred prophylactic and therapeutic doses, were estimated and special emphasis was directed for the detection of clearance period .

Concentration of Furazolidone residues in raw eggs of the prophylactic group was shown in Tables (1 & 2) and Fig. (1) . At the first day of administration, the residue was zero, meanwhile it began to appear at the 2<sup>nd</sup> day of administration at concentration of 0.12 ug/gm albumin and 0.09 ug/gm yolk .

**Table (1):** Concentration of furazolidone (ug/gm) in raw eggs of chickens administered a prophylactic dose (20 mg/kg b.w./day) for 10 successive days.

Administ. Day		1	2	3	4	5	6	7	8	9	10
Concentration of furazolidone	Albumin	-	0.12 ±	0.20 ±	0.24 ±	0.26 ±	0.30 ±	0.38 ±	0.40 ±	0.40 ±	0.41 ±
			0.008	0.008	0.005	0.008	0.007	0.006	0.009	0.008	0.010
x ± S.E	yolk	-	0.09 ±	0.15 ±	0.19 ±	0.22 ±	0.25 ±	0.31 ±	0.35 ±	0.39 ±	0.39 ±
			0.013	0.011	0.006	0.008	0.006	0.010	0.006	0.013	0.007

**Table (2):** Concentration of furazolidone (ug/gm) in raw eggs of chickens post administration of a prophylactic dose (20 mg/kg b.w. /day) for 10 successive days.

Clearance/day		1	2	3	4	5	6	7	8	9
Concentration of furazolidone	Albumin	0.41 ±	0.31 ±	0.20 ±	0.15 ±	0.10 ±	0.04 ±	-	-	-
		0.12	0.007	0.011	0.008	0.012	0.008			
x ± S.E	yolk	0.39 ±	0.32 ±	0.23 ±	0.18 ±	0.12 ±	0.07 ±	0.02 ±	-	-
		0.009	0.012	0.010	0.008	0.016	0.013	0.02		

**Table (3):** Concentration of furazolidone (ug/gm) in boiled eggs of chickens administered a prophylactic dose (20 mg/kg bw./day) for 10 successive days.

Administ. Day		1	2	3	4	5	6	7	8	9	10
Concentration of furazolidone	Albumin	-	** 0.06 ±	*** 0.15 ±	** 0.21 ±	** 0.22 ±	*** 0.24 ±	*** 0.29 ±	*** 0.32 ±	** 0.33 ±	** 0.34 ±
			0.010	0.006	0.007	0.010	0.011	0.012	0.015	0.014	0.014
x ± S.E	yolk	-	** 0.04 ±	*** 0.10 ±	*** 0.13 ±	*** 0.14 ±	*** 0.18 ±	*** 0.24 ±	*** 0.27 ±	** 0.30 ±	** 0.31 ±
			0.004	0.006	0.007	0.013	0.013	0.015	0.016	0.011	0.014

\*\* P ≤ 0.01    \*\*\* P ≤ 0.001

**Table (4):** Concentration of furazolidone (ug/gm) in boiled eggs of chickens post administration of prophylactic dose of a (20 mg/kg b.w./daay) for 10 successive days.

Clearance / day		1	2	3	4	5	6	7
Concentration of furazolidone	Albumin	*** 0.33 ±	** 0.24 ±	*** 0.12 ±	*** 0.08 ±	*** 0.03 ±	-	-
		0.011	0.016	0.011	0.007	0.003		
x ± S.E	yolk	*** 0.31 ±	** 0.25 ±	*** 0.16 ±	*** 0.09 ±	*** 0.04 ±	-	-
		0.011	0.015	0.010	0.015	0.004		

\*\* P ≤ 0.01    \*\*\* P ≤ 0.001

**Table (5):** Concentration of furazolidone (ug/gm) in raw eggs of chickens post administered a therapeutic dose (35 mg/kg bw./day) for 7 successive days.

Administ. Day		1	2	3	4	5	6	7
Concentration of furazolidone	Albumin	0.18 ± 0.009	0.28 ± 0.015	0.36 ± 0.012	0.41 ± 0.008	0.45 ± 0.013	0.50 ± 0.008	
	yolk	0.13 ± 0.009	0.24 ± 0.015	0.27 ± 0.011	0.32 ± 0.010	0.33 ± 0.007	0.40 ± 0.007	

**Table (6):** Concentration of furazolidone (ug/gm) in raw eggs of chickens administered a therapeutic dose (35 mg/kg. b.w./ day) for 7 successive days.

Clearance/day		1	2	3	4	5	6	7	8	9
Concentration of furazolidone x ± S.E	Albumin	0.50 ± 0.007	0.44 ± 0.015	0.36 ± 0.010	0.22 ± 0.009	0.15 ± 0.010	0.06 ± 0.006			
	yolk	0.40 ± 0.012	0.39 ± 0.018	0.36 ± 0.008	0.26 ± 0.011	0.18 ± 0.010	0.11 ± 0.011	0.05 ± 0.005		

**Table (7):** Concentration of furazolidone (ug/gm) in boiled eggs of chickens administered a therapeutic dose (35 mg/kg b. w. / dya) for 7 successive days.

Administ. Day		1	2	3	4	5	6	7
Concentration of furazolidone x ± S.E	Albumin	*** 0.10 ± 0.013	*** 0.19 ± 0.010	*** 0.27 ± 0.011	** 0.33 ± 0.016	** 0.38 ± 0.011	*** 0.14 ± 0.016	
	yolk	*** 0.07 ± 0.007	** 0.17 ± 0.007	*** 0.19 ± 0.017	** 0.22 ± 0.009	** 0.26 ± 0.14	*** 0.31 ± 0.008	

\*\* P ≤ 0.01      \*\*\* P ≤ 0.001

**Table (8):** Concentration of furazolidone (ug/gm) in boiled eggs of chickens post administration of a therapeutic dose (35 mg/kg b.w. / day) fo 7 successive days.

Clearance/day		1	2	3	4	5	6	7
Concentration of furazolidone x ± S.E	Albumin	*** 0.41 ± 0.015	** 0.36 ± 0.012	*** 0.29 ± 0.007	** 0.13 ± 0.011	*** 0.08 ± 0.009	*** 0.03 ± 0.003	
	yolk	*** 0.31 ± 0.007	** 0.30 ± 0.009	*** 0.30 ± 0.012	*** 0.19 ± 0.009	*** 0.10 ± 0.001	** 0.04 ± 0.004	

\*\* P ≤ 0.01      \*\*\* P ≤ 0.001

It reached its maximum concentration at the 10<sup>th</sup> day (0.41 ug/gm albumin and 0.39 ug/gm yolk). The residues disappeared from albumin after 6 days and 7 days from yolk after drug withdrawal .

Tables (3 , 4) and Fig. (2) show the effect of boiling 5 minutes on Furazolidone residues in eggs of therapeutic group, the drug residues decreased slightly than that of the raw egg (about 0.03 - 0.09 ug/gm). Tables (5 , 6) and Fig. (3) denote that on the first day of drug administration, there was no residue. On the 2<sup>nd</sup> day, residues increased gradually till nearly reached its maximum concentration at the 7<sup>th</sup> day of drug administration (0.5 ug/gm albumin and 0.40 ug/gm yolk). The residues disappeared from albumin after 6 days and from yolk after 7 days from the drug withdrawal . Tables (7 , 8) and Fig. (4) show the effect of boiling on concentration of Furazolidone. In eggs collected from chickens administered therapeutic dose, drug residues were slightly decreased than that of raw eggs.

**DISCUSSION**

Furazolidone is a widely used antibacterial and anticoccidial agent. The present study was carried out to detect the concentration and clearance period of Furazolidone in albumin and yolk of raw and boiled eggs of hens administered prophylactic and therapeutic doses of the drug. The drug concentration in eggs of prophylactic group was

detected in albumin and yolk at the 2<sup>nd</sup> day of administration (0.12 ug/gm albumin and 0.09 ug/gm yolk) and reached its maximum at the 10<sup>th</sup> day of drug administration (0.41 ug/gm albumin and 0.36 ug/gm yolk). These results agreed with those previously reported (8). He stated that Furazolidone residues were increased in the whole egg during the period of drug medication .

Hens given the therapeutic dose showed that Furazolidone residues increased gradually from the 2<sup>nd</sup> day of drug administration (0.18 ug/gm albumin and 0.13 ug/gm yolk) and reached its maximal level (0.50 ug/gm albumin and 0.40 ug/gm yolk) at the 7<sup>th</sup> day of drug administration. These results were previously documented (9). He found that the laid eggs of hens administered 50 mg/hen for 8 successive days contained 35 - 40 ug/egg, compared with 33 ug/egg when 36 mg/hen were given for 15 successive days .

Both prophylactic and therapeutic groups showed that elimination of drug residues completely disappeared 7 days from albumin and 6 days from yolk. Similar findings were previously reported(9) .

It is concluded that caution should be taken on administration of Furazolidone especially for laying hens due to its elimination through eggs as reported in this study .

Fig (1) Concentration of furazolidone (ug/gm) in raw eggs of chickens administered a prophylactic dose(20 mg/kg.b.w./day) for 10 successive days

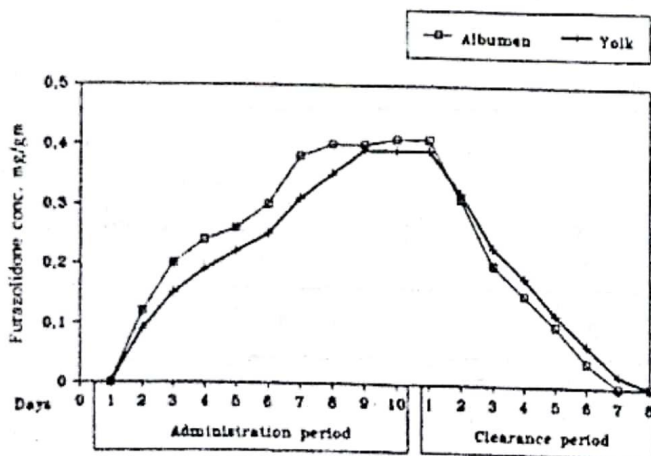


Fig (2) Concentration of furazolidone (ug/gm) in boiled eggs of chickens administered a prophylactic dose (20 mg/kg.b.w./day) for 10 successive days

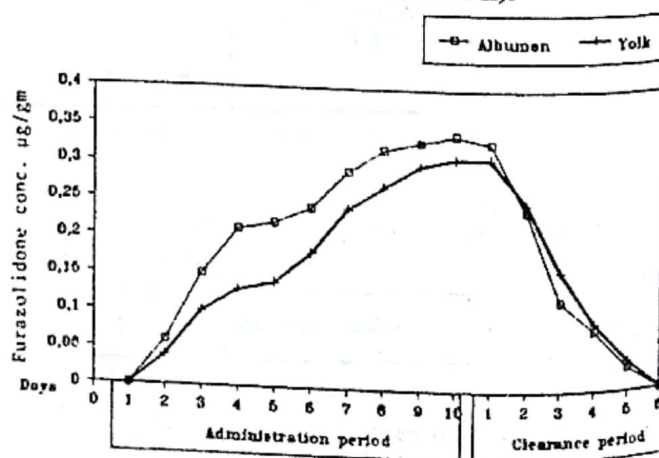


Fig (3) Concentration of furazolidone (ug/gm) in raw eggs of chickens administered a therapeutic dose (35 mg/kg b.w./day) for 7 successive days

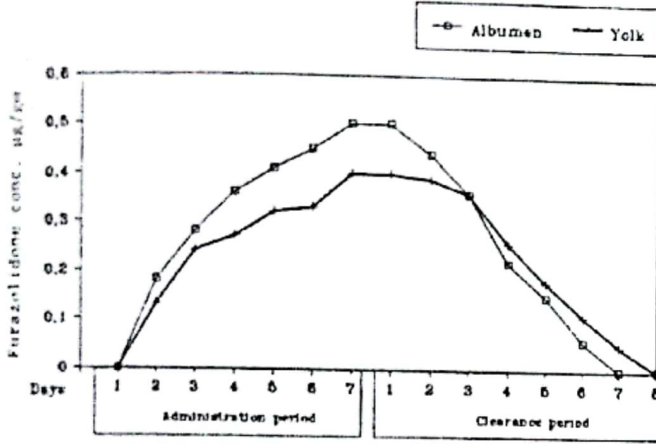
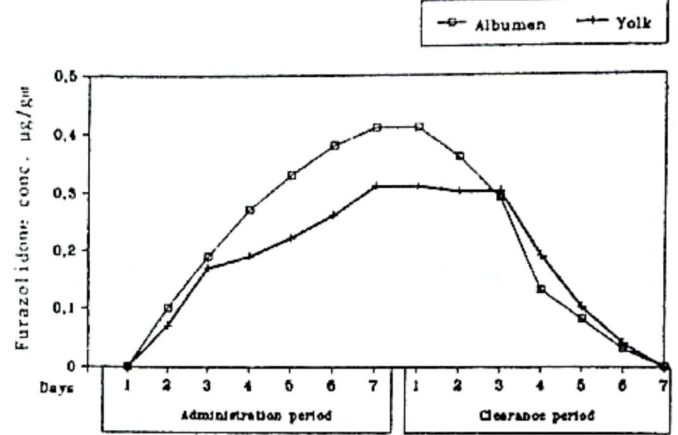


Fig (4) Concentration of furazolidone (ug/gm) in boiled eggs of chickens administered a therapeutic dose (35 mg/kg b.w./day) for 7 successive days



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### بقايا الفلورا زوليدون في البيض الخام والمغلي بعد اعطائه للدجاج البياض

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قسم الفارماكولوجى بطب بيطرى الزقازيق ومعمل بحوث صحة الحيوان بالدقى

- تم قياس بقايا دواء الفلورا زوليدون فى البيض الخام والمغلي بعد اعطاء جرعات وقائية (٢٠مجم/كجم وزن حر - يوميا) لمدة ١٠ ايام متتالية ، وجرعات علاجية (٣٥ مجم/كجم وزن حر) يوميا لمدة ٧ ايام متتالية وقد اتضح الآتى :-
- ١- بالنسبة للمجموعة الوقائية كان تركيز بقايا الدواء فى البيض الخام فى اليوم الاول من اعطاء الدواء لاشئ وفى اليوم الثانى كان بنسبة ١٢٪ ميكروجرام /جرام من الزلال و٠.٩٢٪ ميكروجرام/جرام من الملح وازدادت تدريجيا الى اعلى تركيز ٤١.٠ ميكروجرام /جرام من الزلال ، ٢.٣٩ ميكروجرام - جرام من الملح فى اليوم العاشر ، وبعد اخر جرعة استمر تركيز الدواء عاليا لمدة يوم واحد ثم بدأ يقل تدريجيا حتى وصل صفر فى الزلال بعد ٦ ايام ، وبعد ٧ ايام فى الملح فى البيض المغلى كانت بقايا الدواء فى البيض اقل منه فى الخام بنسبة ٠.٢ - ٠.٩ ميكروجرام/جرام فى البيض .
  - ٢- أما بالنسبة للمجموعة العلاجية كان تركيز بقايا الدواء فى البيض الخام فى اليوم الاول من اعطاء الدواء لاشئ وفى اليوم الثانى ظهر بنسبة ١٨.٠ ميكروجرام/جرام من الزلال ، ١.١٣ ميكروجرام/جرام من الملح وازدادت تدريجيا الى اعلى تركيز لها فى اليوم السابع وكانت ٥٠.٠ ميكروجرام/جرام من الزلال ، ٤.٠ ميكروجرام /جرام من الملح بعد اخر جرعة علاجية استمر تركيز الدواء لمدة يوم ثم بدأ يقل تدريجيا حتى وصل الصفر فى الزلال بعد ٦ ايام ، فى الملح بعد ٧ ايام . كانت بقايا الدواء فى البيض بعد الغليان اقل من الخام بنسبة ٠.٢ - ٠.١ ميكروجرام / جرام من البيض .