STUDIES ON PREVALENCE AND TREATMENT OF SALMONELLA ENTERITIDIS IN CHICKENS

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ABSTRACT

In a trial to investigate the prevalence of Salmonella enteritidis. A total of 207 samples were collected from chicken farms located in Dakahlia and Damietta governorates during December 2009 to December 2010 for isolation and identification of Salmonella enteritidis. The efficacy of commercial probiotic, Kimchi-originated lactic acid bacteria, synbiotics, acidifier and antibiotic in protecting male layer type chicks against challenge with Salmonella enteritidis was also examined experimentally. Out of 207 examined chicken farms the overall percentage prevalence of Salmonella was 7.7% (16 Salmonella isolates). S. kentucky was the most prevalent isolated serotype (37.5%), followed by S. typhimurium (31.25%), S. enteritidis (25%) and S. virchow (6.25%). The mortality rates were significantly decreased in all treated groups than positive group. The frequency of fecal shedding of S. enteritidis from all treated groups was significantly decreased in comparison to positive group except probiotics and antibiotic groups. The different treatments significantly lowered the frequency of S. enteritidis recovery from liver, spleen and cecum. Chicks in treated groups had significantly higher body weight gain and average feed intake and better feed conversion ratio than the positive infected group indicating the effective role of lactic acid bacteria, synbiotics and acidifier in the prevention of Salmonella infection in broiler chicks.

INTRODUCTION

There are 16 million annual cases of typhoid fever, 1.3 billion cases of gastroenteritis and 3 million deaths worldwide due to Salmonella infection (**Bhunia, 2008**). Therefore, the control of Salmonella in commercial poultry become a matter of concern since outbreaks of human salmonellosis caused by S. enteritidis were reported worldwide and the main source of infection in the outbreaks was meat, eggs and derived products of chickens (**Barrow, 2000**). A reduction in Salmonella infection in chicks will reduce public health risks associated with poultry products and will also likely improve growth of chickens (**Snoeyenbos et al., 1979**). Therefore, control programs are being currently looked for ways to reduce the amount of Salmonella in commercial poultry. These Salmonella intervention strategies can broadly be broken down into preslaughter and postslaughter interventions. Preslaughter Salmonella intervention strategies include biosecurity, therapeutic antibiotics, probiotics and competitive exclusion products, organic

acids, and vaccination **(Straver et al., 2007; White et al., 2007)**. Recent restrictions on the use of some antimicrobials as growth promoters in animal production have pressured the poultry industry to look for alternative methods to control pathogenic Salmonella. Defined or undefined anaerobic bacterial cultures of avian origin, as well as various carbohydrates and organic acids have been used experimentally and commercially for the prevention of salmonellosis in broiler chickens **(Stavric and D'Aoust, 1993)**. Competitive exclusion cultures and probiotic cultures consisting of live beneficial bacteria have been used to reduce levels of Salmonella in live poultry, with positive results **(Nurmi and Rantala, 1973; Waters et al., 2005)**. Probiotics are beneficial bacteria that influence the host by improving intestinal health **(Isolauri et al., 2001)**. This study was conducted to determine the prevalence of Salmonella enteritidis in different chickens farms located in Dakahlia and Damietta governorates during December 2009 to December 2010 and to evaluate the efficacy of different commercial available products in protecting male layer type chicks against challenge with Salmonella enteritidis.

MATERIAL AND METHODS

Sample collection: A total of 207 samples were collected from chicken farms located in Dakahlia and Damietta governorates during December 2009 to December 2010 for isolation and identification of Salmonella enteritidis.. Samples were inoculated in Selenite F broth and incubated at 37C for 18-24 hr. Subcultured were done on selective media (MacConkeys agar and S. S. agar) and incubated at 37C for 24 hr. Suspected colonies were picked up, purified and cultured on slope agar until recultured for morphological and biochemical criteria as described by **(Cruickshank et al., 1975)**.

Biochemical identification: Suspected colonies were tested for indole production, urea hydrolysis, sugar fermentation, H2S production on triple sugar iron (TSI), oxidase, citrate utilization, methyl red and Voges Proskaur tests as described by **Edwards and Ewing (1972) and Cox and Williams (1976)**.

Serological identification: Biochemically identified cultures were examined according to **Chairman et al. (1975)** using polyvalent and monovalent O and H Salmonella antisera and were done in Clinical Microbiology Department, Central Health Laboratories, Ministry of Health and Population, Egypt.

Experimental chicks: Three hundred, day-old, male white layer type chicks were kindly supplied by Misr Company for Poultry Production, Cairo, Egypt. Chicks were reared in a wire cages in well ventilated disinfected room. Chicks were provided with unmedicated Salmonella free commercial starter ration and water ad-libitum.

Commercial medicament products:-

Probiotics (AM Phi-Bact®): Concentrated source of probiotics and enzymes consisted of Lactobacillus acidophilus, Lactobacillus plantarum, Bifidobacterium bifidum, amylase, cellulase, beta-glucanase and hemicellulase (American Pharmaceutical Innovations Co. Darien, IL 60651, USA. Registration No 3697. Batch No 9006049.

kimchi-originated lactic acid bacteria (Mercofluforte®-L): This product contains new metabolic substance which is derived and cultivated from Kimchi probiotics (it was isolated from radish Kimchi which include Leuconostoc spp. and Lactobacillus spp). These bacteria are researched as one of genomic project of kimchi-originated lactic acid bacteria in the Seoul-National University (Potent Registered). It contain specific substance which has strong anti-bacterial and antiviral activities.

Synbiotics (Mercopro+C®): A combination of probiotic and prebiotic consisted of Enterococcus faecium, lactose, silica and ascorbic acid. (Mercordi Animal Care, Stadsbeemd 1215, 3545 Halen-Belgium. Registration No 1949, Batch No 06E09.

Acidifier (Free-dot®): It consists of lactic acid, formic acid, citric acid, propionic acid, tartaric acid, phosphoric acid, malic acid, potassium citrate, calcium lactate and propylene glycol (Amoun Vet. A. R. E).

Antibiotic (Panflor®): Panflor is a florphenicol antibiotic. It was chosen according to our in vitro sensitivity test which indicated that all of our isolated strains were highly sensitivity to it.

Challenge organism: Salmonella enteritidis that was isolated from broiler chicks with a history of whitish diarrhea, high mortality and inflamed unabsorbed yolk sac was used for challenge. S. enteritidis broth culture was centrifuged at 3000 rpm for 10 min. Sediment was diluted with sterile buffer saline and bacterial density was adjusted using MacFerland matching tube number 2 to contain 6×10^8 CFU/ml then 0.5 ml was dosed to each bird via crop by crop gavage.

Experimental design: Three hundred, day-old male layer type chicks were divided into 7 experimental treatments. Experimental design is shown in table (1). At arrival cloacal swabs were taken randomly from 20 chicks and 20 chicks were necropsied and cultured for salmonellae. All chicks were negative for salmonellae either in cloacal swabs and organ culture. Four chicks were randomly taken from each replicate, euthanatized, and necropsied at 7, 14, 21 and 28 days of age and any morbid chicks during these intervals were tested. Birds were observed twice daily for clinical signs of illness and mortality. Mortality rate, fecal shedding, internal organ colonization (liver, spleen and cecum) and growth performance were recorded at 7, 14, 21, 28 days of age.

Body weight: Chicks were individually weighed at weekly basis.

Body weight gain: Body weight gain of chicks (expressed in grams) was calculated as difference between two successive weekly weights.

Feed intake: Diets were provided daily every morning. Feed intake was recorded and calculated per week for each group.

Feed conversion ratio (FCR): Feed conversion ratio (g food intake / g weight gain) was calculated by dividing the amount of feed consumed (g) during the week by the gain in weight(g) during the same week **(Smith, 1999)**.

Cloacal swab: At 7, 14, 21 and 28 days of age cloacal swabs were taken from each live bird. A sterile cotton swab was inserted into the cloaca of each bird and rotated gently to collect a sample. The swab was transferred to a 9 ml tube of selenite F broth and incubated overnight at 37C. A loopful of broth was then streaked onto MacConkey agar for Salmonella isolation. The identity of suspected Salmonella isolates was confirmed biochemically and serologically as **(Gast and Beard, 1990)**.

Reisolation from internal organs: Reisolation of Salmonella enteritidis were done from internal organs including liver, spleen and cecum. Samples were inoculated into selenite F broth, incubated at 37°C for 24 hr, then streaked onto MacConkeys agar at 37°C for 24 hr. Suspected colonies were identified morphologically, biochemically and serologically.

Statistical analysis: The mean values and standard errors were calculated for the obtained data, and the significances for all means have been carried out by applying One-Way ANOVA using the SPSS computer program. The values have been calculated according to **Snedecor and Cochran (1989)**.

RESULTS AND DISCUSSION

In Egypt, consumption of poultry products has risen during the past two decades. Parallel Salmonella enteritidis infections in poultry have increased in recent years in Egypt with significant economic impact on the poultry industry and public health **(Kamelia et al., 2010)**.

During the present survey, out of 207 examined samples from chicken farms located in Dakahlia and Damietta governorates, a total of 16 (7.73%) suspected Salmonella isolates were identified biochemically. These isolates were serotyped by using slide agglutination test. Salmonella isolates were serotyped as one isolate (S. typhimurium) from commercial layer farms, one isolate (S. enteritidis) from breeder farms, ten isolates (three S. typhimurium, three S. enteritidis, three S. kentucky and one S. virchow) from commercial broiler farms, four isolates (one S. typhimurium and three S. kentucky) from SASO farms. S. kentucky composed the majority (37.5%) of the isolates followed by S. typhimurium (31.25%) then S. enteritidis (25%), while S. virchow (6.25%) was the lower of the isolates (Table 2). Most of these isolates (S. enteritidis, S. typhimurium and S. virchow) provoke human salmonellosis **(Anonymous, 2010)**.

The results of serotyping of Salmonella by using slide agglutination indicated that S. enteritidis prevalence in Egypt were agree with **Radwan (2007)** who recovered 9 Salmonella isolates from layer flocks, feed and feed ingredients and rodents of various types with S. enteritidis isolation rate (55.5%), and were agree with **Sleim (2003)** who recovered 14 Salmonella isolates from chicken flocks, fertile eggs, dead-in-shell embryos, duck eggs, duck farms, rats and feed samples with S. enteritidis isolation rate (21.5%). It well known that the incidence of different Salmonella serotypes differs from one locality to another and also between different species of birds.

The present experimental investigations were undertaken to investigate the effects of

various treatments on mortality, fecal shedding, organ colonization (liver, spleen and cecum) and performance of broiler chicks inoculated with Enteritidis at 3 days of age. From table 3 different treatments (Mercofluforte-L®, synbiotic, probiotic, acidifier and antibiotic) significantly reduced mortality rate (7.5%, 10%, 12.5%, 12.5% and 17.5% respectively) as compared with challenged-non treated group (30%), suggesting the effectiveness of above treatments in reducing mortality caused by S. enteritidis. The fact that treatment with Mercofluforte-L (lactic acid bacterial) significantly reduced mortality compared with challenged-non treated chicks suggests that lactic acid bacteria culture colonized the ceca of these chick. **According to Fuller (1997)**, young chicks were protected by Lactobacillus reuteri against death associated with exposure to a challenge with S. typhimurium. In treated birds, approximately 5% died after challenge, whereas in challenged-non treated chicks the proportion was about 40%. It has also been claimed that in ovo treatment with L. reuteri reduces chick mortality caused by Salmonella **(Dunham et al., 1993)**.

Our results in table (4) indicated that fecal shedding of S. enteritidis was significantly reduced from 88.6% in positive control chicks to 48.6%, 58.8% and 59.6% in Mercofluforte-L® treated chicks, in acidifier treated chicks and synbiotic treated chicks respectively, while the reduction of frequency was not significantly in probiotic treated chicks 67% and in antibiotic treated chicks 80%. These results are in agreement with **Deruyttere et al. (1997)** who reported that 24% of the control flocks were Salmonella positive compared with none recovered from competitive exclusion treated flocks. Similarly, **Line et al. (1998)** who reported a 50% reduction in yeast-treated birds compared with the positive control. Reducing fecal shedding will lead to reduce the overall level of environmental contamination and horizontal transmission of S. enteritidis within and between flocks.

The rate of reisolation of S. enteritidis from livers was decreased from 90.7% in challenged chicks to 59.4%, 56.3%, 53.2%, 46.9% and 31.3% in antibiotic, probiotic, acidifier, synbiotic and Mercofluforte-L® treated chicks, respectively. The rate of reisolation of SE from spleens was significantly reduced from 81.3% in challenged chicks to 43.8%, 43.8%, 40.6%, 28.1% and 15.6% in antibiotic, acidifier, synbiotic, probiotic and Mercofluforte-L treated chicks respectively. In addition to, the frequency of S. enteritidis colonization in ceca was significantly reduced from 100% in challenged chicks to 75%, 68.85, 62.5%, 59.4% and 34.8% in antibiotic, acidifier, synbiotic, probiotic, and Mercofluforte-L treated chicks, respectively (Table 5). The above results are consistent with **Nisbet et al. (1998)** found that commercial-defined competitive exclusion culture reduce cecal colonization by S. gallinarum also **Vicente et al. (2008)** reported that the administration of either a liquid or lyophilized Lactobacillus based probiotic (FM-B11TM) in the drinking water may significantly reduced cecal colonization by S. enteritidis.

Generally, mean body gain (MBG) throughout the whole experiment was significantly improved from 63.8±0.65g in challenged-non treated chicks to 75.5±0.75g in probiotic treated chicks, 78.7±0.56g in Mercofluforte-L® treated chicks, 77.1±0.78g in

synbiotic treated chicks, 75.5±0.67g in acidifier treated chicks, 72.3±0.87g in antibiotic treated chicks and 79.5 ±0.63g in non treated-non challenged chicks. Feed intake was improved from 240.5±62g in challenged-non treated chicks to 263±59g in probiotic treated chicks, 264.3±60g in Mercofluforte-L® treated chicks, 262.4±59g in synbiotic treated chicks, 259.7±59g in acidifier treated chicks and 251.7±62g in antibiotic treated chicks. From the above results, feed conversion ratio (FCR) was lower in non treated- non challenged group and all treatment groups than challenged-non treated group (Table 6). Overall, the non-challenged birds performed better than the Salmonella challenged birds. The non-challenged birds achieved higher feed intakes, and body weight gains than the challenged birds, which indicate that Salmonella affected the performance of the challenged birds. These results are in harmony with **Yang et al. (2009)** who found that treatment of broilers, both challenged and non-challenged, with probiotics in combination with a prebiotic improved the performance parameters of the birds and proved more effective than the supplementing Probiotics or Prebiotic alone. These results are also in agreement with the findings of **Awad et al. (2009)** which proved that birds supplemented with a synbiotic showed an increase in average daily gain compared to birds receiving no supplementation or only probiotics. In conclusion, the results presented here revealed a potential effect of using probiotic, Kimchi-originated lactic acid bacteria, synbiotics, acidifier and antibiotic in protecting male layer type chicks infected with S. enteritidis at 3 days of age and this effect was expressed by mortality reduction, reduction in S. enteritidis fecal shedding and internal organ colonization also, growth performance was improved.

Table (1): Experimental design.

Groups		Replicates	challenge	Remarks
a	(-ve control)	20 birds 20 birds	received 0.5 ml normal saline by oral gavage into the crop at 3 day of age.	Untreated D.W for the 1st week of age.
b	(+ve control)	20 birds 20 birds	All birds from group (b) to group (g) challenged with 0.5 ml of 6 x 10^8 CFU *S. enteritidis* by oral gavage into the crop at 3 day of age.	Untreated D.W for the 1st week of age.
c	(probiotic) AM phi-Bact	20 birds 20 birds		Dose 1 gm/4 L D.W for the 1st week of age.
d	(Mercoflufone-L)Kimchi-originated lactic acid bacteria	20 birds 20 birds		Dose 1ml/L D.W for the 1st week of age.
e	(Syubiotic) Merco pro+C	20 birds 20 birds		Dose- 0.2 g/L D.W for the 1st week of age
f	(Acidifier) Free-dot	20 birds 20 birds		Dose- 0.5 ml/L D.W the 1st week of age.
g	(Antibiotics) Florfenicol	20 birds 20 birds		Dose- 0.5 ml /L D.W for 5 days after challenge

Table (2): Frequency and serotypes of *Salmonella* isolated from different farms and samples.

Type of examined farms and samples .	No.	+ve	%	Serotype	No. of isolates
Laying farms	3	1	33.3%	*S. typhimurium*	1
Breeder farms	2	1	50%	*S. enteritidis*	1
Broiler farms	144	10	6.94%	*S. enteritidis* *S. typhimurium* *S. kentucky* *S. virchow*	3 3 3 1
SASO farms	56	4	7.14%	*S. typhimurium* *S. kentucky*	1 3
Chicken eggs (60)	1	0	0.0%	0	0
Dead- in-shell embryos (60)	1	0	0.0%	0	0
Total	207	16	7.73%		

No. = number of examined farms and samples.
+ve =number of *Salmonella* positive samples.

Table (3): Mortality rate of the different treatment groups orally challenged with *Salmonella enteritidis* at 3 day of age:

Groups		Replicate	Numbers of mortalities				Number of dead/total numbers	percentage
			Days of age					
			7	14	21	28		
a	(-ve control)	1	0	0	0	0	0/20	0.0%
		2	0	0	0	0	0/20	0.0%
		Total	0	0	0	0	0/40	0.0%[a]
b	(+ve control)	1	2	2	0	0	4/20	20%
		2	4	3	1	1	8/20	40%
		Total	6	5	1	0	12/40	30%[b]
c	(probiotic) AM phi-Bact	1	1	1	0	0	2/20	10%
		2	2	1	1	0	4/20	20%
		Total	3	2	1	0	6/40	15%[c]
d	(Mercofluforte-L)Kimchi-originated lactic acid bacteria	1	1	1	0	0	2/20	10%
		2	1	0	0	0	1/20	5%
		Total	2	1	0	0	3/40	7.5%[d]
e	(Synbiotic) Merco pro+C	1	1	1	0	0	2/20	10%
		2	1	1	0	0	2/20	10%
		Total	2	2	0	0	4/40	10%[cd]
f	Acidifier (Free-dot)	1	2	1	0	0	3/20	15%
		2	1	1	0	0	2/20	10%
		Total	3	2	0	0	5/40	12.5%[cd]
g	Antibiotics) Florfenicol	1	2	2	0	0	4/20	20%
		2	2	1	0	0	3/20	15%
		Total	4	3	0	0	7/40	17.5%[c]

Table (4): Recovery of *Salmonella enteritidis* from cloacal swabs of different treatment groups orally challenged with *Salmonella* Enteritidis at 3 day of age:

Groups		Replicate	Number of positive bird/ Total number of live birds. Days of age				Total (%)
			7	14	21	28	
a	(-ve control)	1	0/20	0/16	0/12	0/12	0/60
		2	0/20	0/16	0/12	0/12	0/60
		Total	0/40	0/32	0/24	0/24	0/120 (0.0%)^{a}
b	(+ve control)	1	16/18	10/12	6/8	8/8	40/46
		2	17/16	9/9	2/4	2/4	30/33
		Total	33/34	19/21	8/12	10/12	70/79 (88.6%)^{b}
c	(probiotic) AM phi-Bact	1	15/19	10/14	5/10	6/10	36/53
		2	11/18	11/13	4/8	5/8	31/47
		Total	26/37	21/27	9/18	11/18	67/100 (67%)^{bc}
d	(Mercofluforte -L)Kimchi-originated lactic acid bacteria	1	10/19	7/14	4/10	2/10	23/53
		2	12/19	7/15	6/11	5/11	30/56
		Total	22/38	14/29	10/21	7/21	53 /109 (48.6%)^{c}
e	(Symbiotic) Merco pro+C	1	10/19	7/14	7/10	7/10	31/53
		2	9/19	10/14	6/10	7/10	32/53
		Total	19/38	17/28	13/20	14/20	63/106 (59.6%)^{d}
f	Acidifier (Free-dot)	1	12/19	8/14	5/10	4/10	29/53
		2	10/18	10/13	6/9	5/9	31/49
		Total	22/37	18/27	11/19	9/19	60/102 (58.8%)^{c}
g	Antibiotics) Florfenicol	1	15/18	10/12	6/8	6/8	37/46
		2	14/18	10/13	8/9	7/9	39/49
		Total	29/36	20/25	14/17	13/17	76/95 (80%)^{b}

Traits measured as percentage have no associated stander error since they are retrains formed estimates and different letters within the same columns were significantly difference at ($P \leq 0.05$). Total numbers reduced due to mortality and necropsy.

Table (5): Colonization of challenging *Salmonella enteritidis* in internal organs of different treatment groups.

Groups		Organ culture	Days of age				
			7	14	21	28	Total (%)
a	(-ve control)	*liver*	*0/8*	*0/8*	*0/8*	*0/8*	*0/32 (0.0%)^{a}*
		spleen	*0/8*	*0/8*	*0/8*	*0/8*	*0/32 (0.0%)^{A}*
		Caecum	*0/8*	*0/8*	*0/8*	*0/8*	*0/32 (0.0%)^{1}*
b	(+ve control)	*liver*	*7/8*	*8/8*	*7/8*	*7/8*	*29/32 (90.7%)^{b}*
		spleen	6/8	7/8	7/8	6/8	26/32 (81.3%)^{B}
		Caecum	8/8	8/8	8/8	8/8	32/32 (100%)^{2}
c	(probiotic) AM phi-Bact	*liver*	*5/8*	*5/8*	*4/8*	*4/8*	*18/32 (56.25%)^{c}*
		spleen	4/8	2/8	2/8	1/8	9/32 (28.1%)^{C}
		Caecum	6/8	6/8	3/8	4/8	19/32 (59.4%)^{3}
d	(Mercofluforte-L)Kimchi-originated lactic acid bacteria	*liver*	*3/8*	*4/8*	*2/8*	*1/8*	*10/32 (31.3%)^{d}*
		spleen	2/8	2/8	1/8	0/8	5/32(15.6%)^{D}
		Caecum	5/8	4/8	4/8	1/8	14/32 (43.8%)^{4}
e	(Synbiotic) Merco pro+C	*liver*	*5/8*	*4/8*	*4/8*	*2/8*	*15/32 (46.9%)^{c}*
		spleen	4/8	4/8	2/8	3/8	13/32 (40.6%)^{C}
		Caecum	6/8	7/8	5/8	2/8	20/32 (62.5%)^{3}
f	Acidifier (Free-dot)	*liver*	*4/8*	*6/8*	*4/8*	*3/8*	*17/32 (53.2 %)^{c}*
		spleen	5/8	5/8	1/8	3/8	14/32 (43.8%)^{D}
		Caecum	6/8	6/8	4/8	6/8	22/32 (68.6%)^{35}
g	Antibiotics) Florfenicol	*liver*	*6/8*	*4/8*	*5/8*	*4/8*	*19/32 (59.4%)^{c}*
		spleen	5/8	6/8	2/8	1/8	14/32 (43.8%)^{C}
		Caecum	7/8	7/8	6/8	4/8	24/32 (75%)^{3}

Traits measured as percentage have no associated standard error since they are retrains formed estimates and different letters within the same columns were significantly difference at ($P \leq 0.05$).

Table (6): Mean weight gain, Average feed intake and Average feed conversion ratio of different treatment groups challenged with *Salmonella enteritidis* at 3 day of age.

Parameters	Days of age	Groups						
		a -ve control	b +ve control	c (probiotic) AM phi-Bact	d (Microencapsulated Kimchi-originated lactic acid bacteria	e (Synbiotic) Mutta pro+C	f Acidifier (Free-fed)	g (Antibiotic) Flavomycin
Mean weight gain(g)	0-7	63.4 ±0.54[a]	40 ±0.39[g]	57.6 ±0.39[c]	57.6 ±0.57[c]	55.8 ±0.63[e]	54.3 ±0.48[f]	58.6 ±0.62[b]
	7-14	73.3 ±0.67[a]	58.8 ±0.89[g]	68.7±0.56[c]	70.6±0.46[b]	68.4±0.049[d]	68.5 ±0.34[d]	65.3 ±0.78[e]
	14-21	89.2 ±0.85[a]	75.6±0.45[g]	86.9±0.78[c]	89.6±0.98[a]	88.9±0.92[b]	87.6±0.64[d]	86.6 ±0.78[e]
	21-28	92.2±1.4[a]	80.5 ±0.78[g]	91.6±0.89[c]	95.6 ±0.88[a]	95.2±1.8[a]	91.4±0.97[c]	91.6 ±0.98[c]
	0-28	79.5 ±0.63[a]	63.8±0.65[g]	75.5±0.75[d]	78.7±0.56[b]	77.1±0.78[c]	75.5±0.67[d]	72.3±0.87[f]
Average feed intake(g)	0-7	133.5 ±17[a]	100.3 ±13[g]	123.7 ±12[c]	128.6 ±16[b]	123.7 ±9[c]	125.6 ±11[c]	113.3 ±11[f]
	7-14	220.3 ±10[a]	190.4 ±6[g]	215.5 ±12[c]	215.6 ±13[c]	210.4 ±8[e]	209.2 ±5[f]	209.3 ±9[f]
	14-21	300.4 ±23[a]	280.6 ±25[g]	310.4 ±32[a]	300.3 ±43[a]	305.5 ±35[a]	302.8 ±25[a]	300.6 ±22[a]
	21-28	390.7 ±25[a]	390.4 ±35[a]	400.6 ±23[a]	402 ±30[a]	410.3 ±27[a]	401±15[a]	403.9 ±17[a]
	0-28	261.7±54[a]	240.5±62[g]	263±59[a]	264.5±60[a]	262.4±59[a]	259.7±59[a]	251.7±62[f]
feed conversation ratio(FCR)	0-7	2.13±0.46[a]	2.48 ±0.45[f]	2.39 ±0.63[c]	2.23±0.51[a]	2.21 ±0.46[a]	2.29±0.32[c]	2.26±0.35[c]
	7-14	3.00±0.67[a]	3.24±0.36[e]	3.14±0.45[c]	3.05±0.55[a]	3.03±0.54[a]	3.04 ±0.46[a]	3.2±0.34[e]
	14-21	3.36±.64[a]	3.71±0.77[g]	3.57± 0.54[f]	3.35±0.45[a]	3.43±0.34[a]	3.45±0.76[a]	3.47±0.58[a]
	21-28	4.23±0.79[a]	4.8 ±0.87[g]	4.27±0.66[a]	4.21 -0.68[a]	4.30±0.78[a]	439 ±0.86[a]	4.40±0.85[a]
	0-28	3.17±0.65[a]	3.57±0.45[g]	3.34±0.45[c]	3.22±0.48[a]	3.25±0.96[b]	3.29±0.43[d]	3.32±0.36[e]

*different letters within the same rows were significantly difference at (P<0.05).

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الملخص العربى

دراسات عن انتشار وعلاج السالمونيلا إنتريتديز فى الدجاج

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تم فى هذه الدراسة عمل مسح على مدى انتشار السالمونيلا إنتريتديز فى مزارع الدجاج. حيث تم أخذ ٢٠٧ عينة من مزارع الدجاج المختلفة المنتشرة في محافظتي الدقهلية و دمياط فى الفترة من ديسمبر ٢٠٠٩ إلى ديسمبر ٢٠١٠ تم خلالها أخذ عينات من الطيور الحية والنافقة وتم فحصها بكتريولوجيا وتم الإشتباه فى وجود ١٦ من معزولات السالمونيلا وتصنيفها سيرولوجيا بواسطة اختبار التلازن على الشريحة وجد معزولة واحدة من قطعان البياض التجاري (سالمونيلا تيفوميوريم)، معزولة واحدة من قطعان الأمهات (سالمونيلا انترتيدس)، ١٠ معزولات من قطعان التسمين التجاري (٣ عترات سالمونيلا تيفوميوريم ، ٣ عترات سالمونيلا انترتيدس ٣ عترات سالمونيلا كنتاكى و ١ عترة سالمونيلا فيرشو) و ٤ معزولات من قطعان السأسو (١ عترة سالمونيلا تيفوميوريم و ٣ عترات سالمونيلا كنتاكى).

وكذلك تم عمل تجربة لبحث كفاءة و مقارنة عدد من بدائل المضادات الحيوية التجارية (كيمشى بكتريا حمض اللبنيك، البروبيوتك، السين بيويك والأسيدفير) والمضاد الحيوي فلورفنيكول على كتاكيت عمر يوم ثم تم عمل عدوى صناعية بواسطة سالمونيلا انترتيدس عن طريق الفم في كتاكيت عمر ٣ يوم بجرعة ٨١ طائر وذلك لمدة ٢٨ يوم. وفى عمر ٧، ١٤، ٢١ و٢٨ يوم من العمر تم قياس معدل الوفيات، نسبة الإقراز و معدل كفاءة النمو مع أخذ ٤ كتاكيت من كل مكررة وقتلهم لقياس معدل استعادة الميكروب من الكبد، الطحال و الأعورين وكانت النتائج كالاتي:- المجموعات المعالجة بـ كيمشى بكتريا حمض اللبنيك، البروبيوتك، السين بيويك، الأسيدفير والمضاد الحيوي فلورفنيكول قللت عدد الوفيات، نسبة ومدة الإقراز ونسبة عزل ميكروب التحدى من الأحشاء الداخلية (الكبد، الطحال والأعورين) و أيضا أدت لتحسن أداء الكتاكيت من حيث(وزن الجسم المكتسب ، استهلاك العلف ومعدل تحويل العلف) مقارنة بالمجموعة الغير معالجة بعد العدوى الصناعية مما يدل على تحسن المقاومة العامة للجسم مع الأفضلية للمجموعة المعالجة بـ كيمشى بكتريا حمض اللبنيك مما يدل على كفاءة هذه العلاجات في حماية الكتاكيت من الإصابة بالسالمونيلا إنتريتديز.