Effect of Organic Acids and Probiotic On broiler Performance, Some Blood Parameters and Control of E. coli

Allam HH[*], Eman S Abd El Hamid[**] , Halla Salah[**], Riham M El-Rashidy[**] and Adel E M[**]

([*]Poultry , [**]Biochemistry and [***]Clinical pathology department)
Animal Health Research Institute (Zagazig branch)

ABSTRACT

One hundred, one-day old broiler chicks were divided into four equal groups (25 each). The 1st group kept as control, non infected,, chicks in 2nd, 3rd and 4th groups were experimentally infected with E coli (0.3 ml via nasal route of cultural suspension of E. coli O78 contain 3X107viable organism/ml) at 20 day of age. Chicks in 2nd, group infected with E coli only. Chicks in 3rd and 4th groups supplemented with 1ml formic acid, 1ml probiotic/ liter drinking water respectively from 1st to 35th day of age and infected with E coli. At 1st day post supplementation 5 chicks in all groups were weighted individually for calculation weight gain and feed conversion rate. Swabes from cloaca and trachea were collected from all chicks for reisolation of E coli. Study the effect of organic acids and probiotic in mortality rate. Blood samples were collected at 1st &7th day post supplementation for hemato-biochemical analysis

Broiler chicks infected with E coli showed typical clinical signs of colibacelosis and mortality rate 24%, A significant reduction in body weight, lymphocytes, monocyts, eosinophils, basophils, serum total protein, albumin, total, α & γ globulin and a significant rise in feed conversion rate, leukocytic count, heterophils β globulin, AST, ALT, ALP, uric acid and creatinine levels. Also, beside insignificant reduction in phagocytosis, killing%, IgG, IGA and IgM were recorded. E. coli was reisolated from all infected chicks

Chicks infected with E coli and supplemented with organic acid or probiotic show less clinical signs, mortality rate was 4% coupled with reduction in reisolation of E. coli associated with significant elevation in weight gain, phagocytosis, killing %, IgG, IGA, IgM, total protein, albumin, α, β and γ globulin beside significant reduction in feed conversion rate and insignificant increase in leukocytic count, heterophils, lymphocyte, monocyte, eosinophils, basophils, A/G ratio, AST, ALT, ALP, uric acid and creatinine.

It could be concluded that the use of organic acid and probiotic reduced E. coli in digestive tract of broilers and improve body performance, immune response and some biochemical parameters.

INTRODUCTION

Escherichia coli (E coli) are one of the main spp of bacteria that normal inhabitants lower intestines of birds and mammals and causing colibacillosis *(1)*. Colibacillosis,the affects poultry industry causing serious economic losses achieved by high mortality and loss of body weight *(2)*.

Organic acids inhibit growth of bacteria *(3)*. It has antimicrobial action in gastrointestinal tract of animal *(4)* and lowering pathogenic bacteria in intestine *(5)*.

Probiotic is live microbial feed additives that beneficially affect intestinal microbial balance, improved weight gain and feed

conversion rate and reduction of mortality rate in broiler *(6)*, decrease intestinal pathogenic bacteria *(7)*, increase natural defense mechanism of chickens *(8)*, promoting host defense mechanisms and modulating systemic immune system *(9)*. It stimulates immune system cells to produce cytokines, which play a role in the induction immune response *(10)*. Probiotic enhance intestinal health, stimulation of immunity and inhibition of epithelial invasion and production of antimicrobial substance *(11)*.

The present work was conducted to study the effect of organic acids and probiotic on body performance, blood parameters and intestinal E coli colonization in broiler.

MATERIAL AND METHODS

Birds

One hundred, one-day old, broiler chicks (Hubbard local breed) weighting 40.21-40.50 g obtained from a local hatchery were used in this study. Coloacal swabs were taken from all chicks for bacteriological examination to prove that all chicks free from bacterial infection. Chicks were fed a balanced commercial poultry ration. They were kept under hygienic conditions during experimental period.

Experimental design

Chickens were divided into 4 equal groups (25 each). The 1stgroup (healthy chicks) was used as control group. At 20 day of age, chicks of the 2nd, 3rd and 4th groups were experimentaly infected with E. coli (0.3 ml via nasal route of cultural suspension of E. coli O78 contain 3X107viable organism/ml) *(12)*. The infected chicks in the 3rd and 4th group were supplemented with 1ml organic acid (formic acids)/liter drinking water and 1ml probiotic (sambiogen)/liter drinking water respectively from the 1st to 35th day of age.

E. coli strain

E. coli strain used in this study was isolated from a field case, identified, classified and serotyped as O78 according *(13)*

Reisolation E. coli

Cloacal and tracheal swabs samples from all chicks at1st day post supplementation for reisolation of *E. coli.* Collected samples were incubated on nutrient broth at 37^{0}C for 24h., then subcltured into nutrient agar according to *(14)*, isolated bacteria were identified *(15)*.

Body weight

Chicken in all groups were weighted individually at start of the experiment and at 1st day post supplementation for calculation weight gain and feed conversion rate.

Sampling and analysis

At 1st and 7th day post supplementation, 5 chicks from each group were sacrificed and two blood samples were collected.

First blood sample was taken in tube contained EDTA as anticoagulant for.

Determination of total and differential leucocytic count *(16)*.

Determination of phagocytic and killing percentage. Blood was used to obtain polymorphonuclear cells *(17)*. Mixtures of Staph. aureus and polymorphonuclear cell were incubated at 37^{0}C for 2 hours with regular stirring and then the mixtures were centrifugated for 5 min at 4^{0}C. The supernatant were used to estimate bacteria phago-cytosed %. The mixture of bacteria and polymorphnuclear cell were treated with one cycle of freezing and thawing and the bacteria killed% was estimated *(18)*.

Second blood sample was used for obtain clear serum, for determination of serum total protein *(19)* and protein fractions were performed using cellulose acetate electrophoresis test *(20)*, IgG, IgM and IgA was performed using Sandwich Elisa *(21)*. Also, serum transaminases (AST and ALT) *(22)* alkaline phosphatase (ALP) *(23)* uric acid *(24)* and creatinine *(25)* were evaluated.

Statistical analysis

The obtained results were statistically analyzed using (T test) *(26)*.

RESULTS AND DISCUSSION

Our results tabulated in table (1) revealed that a clinical signs of colibacellosiss were appeared on chicks experimentally infected with *E. coli* as loss of appetite, ruffled feathers, depression, dropping of the wings, sneezing, frothy exudates in their eyes with conjunctivitis, yellowish watery diarrhea and mortality rate was 24% beside reisolation of *E. coli* from cloacal and tracheal swabes. Organic acid or probiotic supplemented to broilers induce reduction in clinical signs, mortality and reisolation of *E. coli* from cloacal and tracheal swabes. Same observation was recorded *(27-28)* in broiler chicks infected with *E. coli*. Formic acid treatment induces reduction in clinical signs and absence of mortality in broiler *(29)*. In addition, probiotic reduce intense of clinical signs of colibacellosiss and decrease mortality rate in broiler chicks *(30)*. Broiler infected with *E coli* and supplemented with probiotic and organic acid showed reduction in reisolation of *E. coli* organisms *(31, 32)*. Probiotic is effective in reducing *E. coli* colonization *(33)*. Antimicrobial activities of organic acids and probiotic may be due to pH reduction and dissociation capacity of their carboxyl groups so gut environment is too acidic and prevent growth pathogenic bacteria *(34)* and /or due to probiotic increase short-chain fatty acids with lowering pH of intestine and inhibition growth of pathogenic bacteria *(35)*.

Table 1. Effect of organic acid and probiotic on clinical signs, mortality rate and re-isolation of E. coli.

Parameters / Groups	Total No	Clinical signs		Mortality rate		Re-isolation of E. coli			
						Rectal swabes		Tracheal swabes	
		No	%	No	%	No	%	No	%
Control	25	00	00	00	00	00	00	00	00
E coli	25	23	92	6	24	17	89.47	11	57.89
Organic acid	25	4	16	1	4	3	12	1	4
Probiotic	25	3	12	1	4	2	8	2	8

Broilers infected with E. coli show a significant reduction in body weight gain and rise in feed conversion rate, but infected broiler and supplemented with organic acid or probiotic showed a significant increase in body weight gain and reduction in feed conversion rate (table, 2). Our findings were reinforced with previous report *(36)* in broiler infected with *E. coli*. Reduction in weight gain and raise in feed conversion rate in broiler infected with *E. coli* may be due to lower absorption of nutrient from inflammed intestinal tract *(37)*. The same improvement in body weight gain were recorded previously *(38)* in broiler chickens fed organic acid or probiotic. Organic acids or probiotic induce improvement in weight gain and feed conversion due to reduction intestinal pathogenic bacteria *(39)* beside improvement in bioavailability of nutrients *(40)*. Dietary acidification inhibits of intestinal bacteria and reduction of toxic bacterial metabolites, thus improving weight gain *(41)*.

Table 2. Effect of E coli , organic acid and probiotic on broiler performance (N =5 chicks)

Parameters / Group	Gp(1)	Gp(2)	Gp(3)	Gp(4)
IBW (20 day of age) gm/bird	.21±0.86	40.42±0.79	40.30±0.90	40.55±0.85
ABW gm/chick	1432.32±3.89	1261.43±2.63***	1470.07±2.95***	1479.16±2.75***
Absolute body gm	1392.11±3.87	1221.01±4.31***	1429.77±4.94***	1438.61±5.45***
weight gm/chick %	34.62±0.13	30.21±0.17	34.48±0.19	34.48±0.21
F.C. (gm/bird)	1431.43	1386.38	1405.45	1418.83
FCR	1.03	1.14	0.98	0.99

*** Significant at P < 0.001 IBW= Initial Body weight ABW= Absolute body weight gm/chick F.C. = feed consumption FCR = feed conversion rate

The present work revealed a significant reduction in lymphocytes, monocyts eosinophils, basophils beside significant leukocytosis and heterophilia in broilers infected with *E coli* but broilers infected with *E coli* and supplemented with organic acid and probiotic showed insignificant leukocytosis heterophilia, lymphocytosis, monocytosis, eosinophilia and basophilia (table, 3).similar results in leukogram was recorded in broiler infected with *E. coli* ***(42)***. Leukocytosis in infected broiler may be due to inflammatory response in intestinal tract ***(43)***. Same results were reported in broilers fed organic acid ***(44)***. Probiotic and organic acid induce leukocytosis due to lymphocytosis ***(45)***.

Table 3. Effect of E coli , organic acid and probiotic on leukogram of broiler (N =5 chicks)

	Group / Parameter	Total WBCs X103/µl	Differential count (X103/µl)				
			Heterophilis	Lymphocytes	Eosinophils	Basophilis	Monocytes
1 day	Gp(1)	13.08±0.15	4.11±0.16	6.07±0.07	1.40±0.15	1.15±0.08	1.26±0.14
	Gp(2)	13.63±0.16*	5.10±0.33*	5.80±0.09*	0.95±0.05*	0.90±0.06*	0.88±0.03*
	Gp(3)	14.29±0.99	4.15±0.22	6.20±0.31	1.45±0.29	1.18±0.42	1.31±0.32
	Gp(4)	14.22±0.82	4.20±0.18	6.15±0.19	1.41±0.31	1.17±0.19	1.30±0.26
7 day	Gp(1)	14.20±0.15	4.15±0.35	6.21±0.06	1.46±0.12	1.15±0.07	1.23±0.10
	Gp(2)	14.64±0.10*	5.56±0.32*	6.01±0.05*	1.15±0.06*	0.96±0.02*	0.96±0.04*
	Gp(3)	14.24±0.13	4.20±0.10	6.25±0.16	1.55±0.17	1.24±0.10	1.30±0.08
	Gp(4)	14.72±0.25	4.31±0.22	6.27±0.18	1.56±0.20	1.23±0.09	1.25±0.17

* Significant at P < 0.05

Broiler infected with *E coli* showed insignificant reduction in phagocytosis %, killing %, IgG, IGA and IgM. Broilers infected with *E coli* and supplemented with organic acid and probiotic showed significant elevation in phagocytosis %, killing % IgG, IGA and IgM (Table, 4 &5). Nearly similar results were recorded in broiler chickens infected with *E coli* ***(46)*** and in mice fed organic acid ***(47)***. Organic acids induce rise immunity response due to its activation of immune cells ***(48)***. Probiotic induce significant rise in phagocytosis and killing%, IgG, IGA and IgM ***(49)***. Probiotic stimulate immune system due to rise of T cells and serum protein ***(50)***. These effects were mediated by cytokines secreted by immune system cells stimulated with probiotic ***(51)***.

Table 4. Effect of E coli , organic acid and probiotic on immunoglobulin of broiler (N =5 chicks)

Parameters \ Group	1 day			17day		
	IgG (gm/100ml)	IgM (gm/100ml)	IgA (gm/100ml)	IgG (gm/100ml)	IgM (gm/100ml)	IgA (gm/100ml)
Gp(1)	969.10±4.95	248.05±3.28	76.41±3.18	971.07±5.12	250.21±3.89	78.04±3.55
Gp(2)	960.93±5.64	242.12±4.79	72.29±4.05	967.15±4.21	247.32±3.49	77.41±2.16
Gp(3)	983.55±3.16*	257.11±2.17*	85.25±2.24*	974.31±3.47	254.84±2.54	81.13±1.41
Gp(4)	984.07±3.42*	258.05±2.32*	85.97±2.19*	975.16±3.83	253.38±1.78	80.59±1.62

* Significant at P < 0.05

Table 5. Effect of E coli, organic acid and probiotic on phagocytosis and Kiling % (N =5 chicks)

Parameters \ Group		Gp(1)	Gp(2)	Gp(3)	Gp(4)
Phagocytosis	1 day	48.18±1.47	44.31±1.94	54.79±2.36*	55.05±2.41*
	7 day	49.31±1.39	47.42±2.17	52.06±1.72	51.42±1.84
Killing %	1 day	39.42±1.41	37.08±1.21	45.22±1.51*	45.82±1.34*
	7 day	39.65±1.52	38.84±1.72	42.05±1.28	43.15±1.93

* Significant at P < 0.05

Broiler chicks infected with *E coli* showed significant reduction in total protein, albumin, total, α and γ globulin, significant increase in β globulin but broilers infected with *E coli* and supplemented with organic acids and probiotic show significant increase in total protein, albumin, total, α,β and γ globulins (Table, 6). Our results were confirmed by previous findings in broilers infected with *E coli (52)*. Reduction in protein profile may be due to liver damage by *E coli* and its toxin *(53)*. Also same results were obtained in broiler chicks fed organic acid or probiotic *(54)*. Improvement in protein profile was recorded in broiler fed organic acid *(55)* and in laying hens fed probiotic *(56)*. Increase in protein profile in broiler fed probiotic may be due to improvement in the intestinal environment which leads to an improvement in digestion and absorption of nutrients with increase amino acids and protein *(57)* and/or due to proteolytic activities of bacillus spp. in probiotic that increase protein digestibility *(58)*.

Table 6. Effect of E coli , organic acid and probiotic on protein profile of broiler (N =5 chicks)

Parameter \ Group		T.P	Alb	Globulin (Gm/dl)				A/G ratio
				α	β	γ	Total	
1 day	Gp(1)	4.66±0.39	2.78±0.21	0.76±0.02	0.41±0.09	0.71±0.11	1.88±0.15	1.48±0.15
	Gp(2)	3.09±0.38*	1.66±0.37*	0.39±0.15*	0.67±0.08*	0.37±0.06*	1.43±0.11*	1.16±0.20
	Gp(3)	6.44±0.55*	3.91±0.35*	0.83±0.02*	0.61±0.03*	1.06±0.10*	2.50±0.20*	1.56±0.23
	Gp(4)	5.84±0.20*	3.53±0.21*	0.84±0.04*	0.62±0.04*	0.95±0.03*	2.33±0.12*	1.52±0.18
7 day	Gp(1)	4.26±0.14	2.67±0.10	0.69±0.07	0.35±0.05	0.61±0.04	1.61±0.04	1.66±0.16
	Gp(2)	3.82±0.10*	2.36±0.08*	0.47±0.05*	0.51±0.04*	0.48±0.03*	1.48±0.04*	1.48±0.14
	Gp(3)	4.84±0.56	3.65±0.49	0.79±0.12	0.57±0.15	0.73±0.16	2.09±0.24	1.74±0.21
	Gp(4)	4.49±0.45	2.77±0.20	0.66±0.08	0.45±0.09	0.61±0.09	1.72±0.15	1.61±0.27

* Significant at P < 0.05

Broilers infected with *E coli* show a significant increase in serum liver enzymes (AST, ALT and ALP) uric acid and creatinine levels but broilers infected with *E coli* and supplemented with organic acid and probiotic revealed insignificant increase in these previous parameters (Table, 7). Similar results were reported in broilers infected with *E coli* ***(59)***. Elevation liver enzymes reflect liver damage induced by infected E coli and its toxin these damage leads leakage of enzymes into the blood stream ***(60)***. Increase in uric acid and creatinine in broiler infected with *E coli* may be due to degenerative changes in kidney tubules preventing excretion of uric acid and creatinine ***(61.)***. Organic acid and prebiotic induce insignificant rise in serum AST, ALT, ALP, uric acid and creatinine in broilers fed organic acid(***54***) and in broilers fed periodic(***62***).

Table 7. Effect of E coli , organic acid and probiotic on liver and kidney functions of broiler (N =5 chicks)

Group	Parameter	AST (u/ml)	ALT (U/ml)	ALP (U/L)	Uric acid (mg/dL)	Creatinine (mg/dL)
1 day	Gp(1)	38.48±0.98	28.03±1.05	29.14±1.79	6.23±0.97	1.42±0.27
	Gp(2)	45.03±1.95*	32.68±1.48*	34.29±1.24*	9.03±0.59*	2.49±0.33*
	Gp(3)	40.30±0.95	30.19±1.13	31.05±1.42	6.89±0.89	1.64±0.26
	Gp(4)	42.08±1.18	31.21±1.69	33.14±1.97	6.95±0.61	1.77±0.19
7 day	Gp(1)	38.37±0.64	27.98±0.87	29.59±0.90	6.58±0.48	1.44±0.21
	Gp(2)	44.14±2.13*	32.17±1.30*	32.05±0.40*	7.94±0.21*	2.60±0.40*
	Gp(3)	39.72±1.84	28.38±1.94	30.39±1.87	6.68±0.78	1.58±0.25
	Gp(4)	40.13±1.49	29.23±1.73	31.25±1.23	6.87±0.40	1.69±0.26

* Significant at P < 0.05 UA= Uricacid

It could be concluded that the use of probiotic and organic acid resulted in reduction in *E. coli* microorganisms in digestive tract of broilers, which can help to improve body performance, immune response and some biochemical parameters

REFERENCES

1.Ewers C, Janssen T and Wieler L (2003): avian pathogenic *Escherichia coli.* Berl. Munch. Tierarztl. Wochenschr, 116: 381-395.

2.Saif Y (2003): Disease of poultry.11th Ed Lowa State, A Black well pub. comp. 63

3.Celik K, Ersoy E and Erturk M (2003): using of organic acids in Turkey chicks and its effects on performance before pasturing. Inter. J. Poult. Sci., 2(6): 46-48.

4.Hinton M, and Linton A (1988): Control of Salmonella infection in broiler chickens by the acid ***treatment*** of ***their*** feed. Vet.Rec. 123:416-421.

5.Thompson J and Hinton M (1997): Antibacterial activity of formic and propionic acids in diet of hens on Salmonellas. Br. Poult. Sci., 38:59-65.

6.Panda A, Reddy M and Praharaj N (2006) growth, immunocompetence and response to E coli of broilers fed diets with probiotic. Archiv für Geflügel. 64:52-66

7.Patterson A and Burkholder M (2003): Application of prebiotics and probiotic in poultry production. Poult Sci. 82(4):627-631.

8.*Chiang S and Hsieh W (1995)*: Effect of direct fed microorganism on broiler growth performance. Asian-Aust. J. *Anim.* Sci., 8:159-162.

9.*Dallout R, Shelem R and Doerr A (2003)*: Enhanced mucosal immunity *against* Eimeria acervulina in broilers fed a probiotic. Poultry Sci., 82: 62-66.

10.*Leblanc I, Fliss J and Matar C (2004)*: Induction of humoral immune response following *E. coli* infection with Lactobacillus. Clin and Diag. Lab Imm, 11(117) 181

11.*Rolfe R (2000)*: The role of probiotic cultures in the control of gastrointestinal health. Journal Nutrition Feb.; 130 (25): 3965-4025.

12.*Nakamura K, Cook J and Narita M (1992)*: multiplication of E. coli in chickens inoculated with E. coli. Avian dis., 36:881-890.

13. *Edwards P and Ewing W (1972)*: *Identification* of Enterobacteriaceae 3rd Ed., Burger Publ. Co. Minnecopolis, Minnesota, USA, PP, 103-104.

14.*Woldchiwet Z, Mamach B and Rowan T (1990)*: effects of age, environmental temperture and relative humidity on the bacterial flora of the upper respiratory tract in calves. Br. Vet. J., 146: 211-218.

15.*Quinn P, Carte M, Markeryo B and Carter G (1994)*: Clinical Veterinary Microbiology. Year book-wolf publishing-Europe Limited.

16. *Jain N (2000)*: Schalm's vet Hematology 4thEd p 55-96 Lee and Philadelphia

17.*Rouse B, Babiuk L and Henson P (1980)*: Neutrophils in antiviral inhibition of virus replication of mediator produced by bovine neutrophils. J Inf Dis, *141* (2)23–32

18.*Woldehiwet Z and Rowan T (1990)*: Effects of age of calves on phagocytosis and killing of Staph aureus by *polymorphonuclear* leucocytes. Br Vet J., 146: 65–70.

19.*Doumas B, Cartor R, Peers T and Schafer R (1981)*: A candidate reference method for determination of total *protein* in serum Clin Chem, 27, 1642.

20.*Henry R, Cannon D and Winkelman J (1974)*: Clinical Chemistry: Principals and techniques p 437 – 440, Harper and Row, Hagerstown.

21.*Erhard M, Vonquistrp l and Kinlmann R (1992)*: Development of specific enzyme linked immunosorbent antibody assay for detection immunoglobulin. using monoclonal antibodies.Poltry Sci., 71,302–310.

22.*Ritman S and Frankle S (1957)*: A colormetric *determimation* of GOT and GPT activity. Am. J. Clinic. Path. 28: 56.

23.*John D (1982) Determination* of Alkaline Phosphates. 9th Ed. 580-581.

24. *Coalombe J and Faurean l (1963)* A *simple* method for colorimetric determination of urea. Clin. Chem., 9:102-108.

25.*Husdan H and Roporpot A (1968) Estimaton* of creatinin. Clin.Chem14, 22

26.*Petrie A and Watson A (1999)*: Statistical for Vet. and Animal Sci. Ltd U K.

27.*Hofstad M, Clank B, Red W and Yader H (1984)*: Citted in disease of poultry. 8th Ed. Iowa State Univ. Press. Ames, Iowa. U.S.A.

28.*Shawky Nesreen A (2006)*: Antibacterial efficacy of *cefoperazone* and sulbactam in chickens. Ph.D.Thesis presented to Fac. of Vet Med., Zag Uni.

29.*Pirgozliev V, Murphyt B Owens J and Mccann M (2008): Formic* and sorbic acid as additives in broiler feed. Res. Vet. Sci., 84: 387.

30.*La Ragione R, Casula G and Woodward M (2001)* : Bacillus subtilis spores competitively exclude E coli O78:*K80* in poultry. Vet. Micro, 79: 33–42

31.*Lee M (2005)*: Molecular basis for AGP effects in animals, 37-38 Antimicrobial

Growth Promoters: Worldwide Ban on the Horizon. Noordwijk and ***Zee*** Netherlands

32.Garcia V, Catala P, Hernandez F and Madrid J (2007): Effect of Formic Acid on Growth and Digestibility of ***Broilers***. J. Appl. Poult. Res., 16: 555 –562.

33.Henderson S, Gaona G and Harg B (2007): Effect of probiotic on intestinal macrophage and phagocytosis of ***colibacelosis*** in broilers. Poult Sci., 86 (11):15-21

34.Rezende C, Mesquita A and Minafra C (2008): Ácidos orgânicos ***experimental*** contaminadas com Salmonella Enteritidis. Degree Dis. Uni Federal de Goiás, Brazil.

35.Huang K, Choi J, Houde R and Zhao X (2004): Effects of ***probiotic*** on prod-uction performanc and immune responses in broiler chicken. Poul. Sci., 83:88– 95

36.Kamel M (2004): Interaction between ***danofloxacin*** and insofluperdone acetatate in chickens. M.V.Sc. Thesis presented to Fac. of Vet. Med., Zag. Univ.

37.Abd El-Aziz M (2002): Handbook of Veterinary Pharmacology, 5th Ed.

38.Ján K, Cyril H and Ján W (2012): Effect of organic acids on performance of broiler chickens. Animal Sci and Biotech, 45(1)51- 63

39.Afsharmanesh M and Pourreza J (2005): Effect of citric acid on ***performance*** and digestibility, Inter J. of Poultry Sci, 4, 18-24

40.Novak R, Bogovi C and Rogelj I (2010): Affects of probiotic additives on blood lipids and cecal volatile fatty acids ***in*** meat type chicken. Poult. Sci., 89: 36–42

41.Hassan H, Mohamed A Amani W and Eman R (2010): effect of organic acids to substitute antibiotic growth promoters on performance and intestinal microflora of broilers. Asian-Aust. J. Anim. Sci., 23(10) 1348-1353

42.Umesha B. and Shambulingappa B. (2010): Efficacy of ***apramycin*** in prevention and treatment of E. coli infection in broilers. Mysore J of Agri Sci., 44 (4): 84-87

43.Doxey D (l983) Clinical pathology and ***diagnostic procedure2nd Ed.*** London

44.Yakhkeshi S, Rahim S and Gharib K (2011): Effect of comparison of probiotic and organic acid on immune response, GIT microbial population, intestinal morphology and performance of broilers. J of Medicinal Plants, 10 (37):143-152.

45.Abd-El-Rahman Azza H, Kamel H, Walaa M, Olfat S and Amira H(2012): Effect of ***Probiotic*** on Growth Performance, Hemato-biochemical Parameters and Humoral Immune Response of Broiler Chickens. World Applied Sci J., 18 (3): 35-39

46.Kariyawasam S, Wilkie B, Hunter D, Gyles C (2002): Systemic and mucosal antibody responses to selected cell surface antigens of avian pathogenic E. coli in experimentally infected chickens. Avian Dis., 46(3):668-78.

47.Shu Q and Gill H (2002): Immune protection mediated by organic acid against E coli O157:H7 infection in mice. Immunology ***and*** Medical Microb, 34: 59–64.

48. Roser U (2006) : Effects of organic acids in liquid and solid forms on survival rate of Salmonella in pelleted compound feed . J ***Immunol.***, 82: 12- 19

49.Higgins G Higgins S and Hargis B (2007): Effect of probiotic on ***macrophage*** numbers and phagocytosis of salmonella enteritidis in broilers. Poultry Sci., 86:35–39

50. Koenen M, Karmer J, Heres S and Boerma W (2004): Immunomodulation by probiotic lactobacill in ***layer*** and meat type chickens. Br. Poult. Sci., 45: 355 - 66.

51.Christensen H, Frokiaer H and Pestka J (2002): Lactobacilli modulate cyto-kines and maturation surface marker in murine Dendritic Cells J Immunol., 168: 71- 81

52.*Sefer D, Sinovec Z and Markovic R (1999):* Blood serum protein *status* of broilers infected with E. coli. Acta Veterinaria (Beograd), 49: 139-148.

53.*Latimer K, Mahaley E and Prasse K (2003):* Duncan and Prasse's Laboratory Vet Med and Clinical *Pathology*. 4thEd, lowa state Uni. press. Ames. Iowa USA.

54.*Kim D, Kim S, and Kang G (2009) :* Growth performance; cecal microflora; *Blood* biochemical parameter. Journal of Animal Sci and Technology, 51(3) 27-32.

55.*Ghazalah1 A, Atta1 M, Kout Elkloub M and Riry F (2011):* Effect of *organic* acids on performance and digestibility of broilers. Inter J of Poult Sci., 10 (3): 76-84,

56. *Mohammad S, Behrouz D and Saeed H (2011)* effect of dietary protein levels and prebiotic on performance parameters of quail. Italian J. of Ani Sci., 10 (4) 84-92.

57.*Mariam G, Eman M and Stino R (2010):* Effect of prebiotic on reduction of ochratoxicosis, enhancement of immunity in quail hen. Amer Sci J., 6(11): 35-42

58.*Alkhalfa A, Alhajb M and Al-homidanc I (2010):* Influence of probiotic on blood parameters and growth performance in chickens

59.*Collin M, Anuar B and Murch O (2005):* Inhibition of endogenous hydrogen sulfide formation reduces organ injury caused by endotoxemia. *Br* J Phar., 146(4) 94

60.*Joan F and Pannal P (1981):*Clinical chemistry in diagnosis and treatment.3rd ed. Liayed- Luke, London.

61.*Kaneko J (l980):* Clinical biochemistry of domestic animals. 4th Ed. *Academic* Press, Inc., New York, London, 365 -39

62.*Sena C, Ayla O and Guler K (2009):* Effects probiotic on serum *cholesterol*, total lipid, AST and ALT in chicks. Med. Wet., 64 (2) 68-75

الملخـــــص العربى

تأثير الأحماض العضوية والبروبيوتك على وزن الجسم بعض مكونات الدم والتحكم فى الميكروب القولوني العصوي في كتاكيت التسمين

حسام حسن علام* ، إيمان سعودى عبد الحميد**، هاله صلاح**

ريهام رضا الرشيدى***، عادل السيد مصطفى**

معهد بحوث صحة الحيوان- فرع الزقازيق (أقسام الدواج*, الكيمياء** والباثولوجيا الاكلينيكيه***

استخدمت في هذه الدراسة مائة كتكوت تسمين هبرد عمر يوم واحد يتم تقسيم الكتاكيت إلى اربع مجموعات متساوية كلا منها يحتوى على 25 كتكوت, كتاكيت المجموعة الأولى غذيت على عليقه بدون اى اضافات (مجموعه ضابطه) والكتاكيت فى المجموعات الثانية والثالثة والرابعة في اليوم العشرين من العمر تم اجراء عدوى اصطناعية بالميكروب القولونى O78 بجرعه 1/2سم$10x^{7}$عن طريق الفم . كتاكيت المجموعه الثانيه مصابه بالميكروب القولونى فقط اما كتاكيت المجموعه الثالثه والرابعه كتاكيت تم إعطائهم حمض الفورميك بجرعة 1سم/لتر والبروبيوتك بجرعة 1سم/لتر في مياه الشرب على التوالى ابتدا من اليوم الأول وحتى اليوم الخامس والثلاثون من العمر وفى اليوم العشرين من العمر تم اجراء عدوى

اصطناعية بالميكروب القولونى. عند اليوم الاول من نهايه اضافه حمض الفورميك والبروبيوتك تم وزن الكتاكيت فى كل المجموعه لدراسه تاثيرهما على وزن الجسم ومعامل التحويل الغذائى وكذلك تم اخذ مسحات من فتحه المجمع والقصبه الهوائيه لفحصها بكتريولوجيا لمحاوله أعاده عزل الميكروب القولونى وتم أخذ عينات دم من كل المجموعات عند اليوم الأول والسابع من نهاية المعاملات وذلك لدراسة تاثير البروبيوتك والاحماض العضويه على صوره الدم وبعض مكونات الدم.

أوضحت النتائج أن بدارى التسمين المصابه بالميكروب القولونى أدت إلى ظهور اعراض المرض على عدد 23 كتكوت من اجمالى 25 كتكوت بالمجموعه ومعدل الوفيات 24% وتم اعاده عزل الميكروب القولونى من كل الكتاكيت وعلاوة على ذلك وجد نقص معنوى فى وزن الجسم المكتسب, الخلايا الليمفاويه, الخلايا الملتهمه الكبيره, الخلايا الحامضيه, الخلايا القاعديه, البروتين الكلى ,الزلال ,الجلوبيولين الكلى, الفا وجاما جلوبيولين وزياده معنويه فى معدل التحويل الغذائى, العدد الكلى لكرات الدم البيضاء, الهيتيروفيل, البيتا جلوبيولين الأسبرتيت امينوترانس راز,الالنين امينوترانسفيراز, الفوسفاتيز القاعدى,حمض اليوريك والكرياتينين مصحوبه بنقص غير معنوى فى قوه اللالتهام والقتل ونسبه IgG, IGA IgM والنسبه بين الزلال والجلوبيولين.

واسفرت النتائج ان الكتاكيت المصابه بالميكروب القولونى وتم امدادها بالاحماض العضويه والبروبيوتك ادي الى تقليل ظهور اعراض المرض ونقص فى نسبه الوفيات بجانب تقليل تركيز الميكروب القولونى فى مسحات المجمع والقصبه الهوائيه ووجود زياده معنويه فى وزن الجسم المكتسب, قوه اللتهام والقتلIgG, IGA IgM ,البروتين الكلى ,الزلال ,الجلوبيولين الكلى, الفا ,بيتا جاما جلوبيولين, مصحوبا بنقص معنوى فى معدل التحويل الغذائى وزياده غير معنويه فى العدد الكلى لكرات الدم البيضاء, الهيتيروفيل, الخلايا اللمفاويه, الخلايا المالتهمه الكبيره, الخلايا الحامضيه, الخلايا القاعديه وفى نسبه الأسبرتيت امينوترانس فيراز ,الالنين امينوترانس فيراز, الفوسفاتيز القاعدى,حمض اليوريك والكرياتينين.

وخلاصة هذه الدراسة أن البروبيوتك والاحماض العضويه لهما القدره على تقليل نمو الميكروب القولونى فى الامعاء ولهما تأثير محفز مناعى بالإضافة إلى كونه محفزا لمعظم الوظائف الحيويه فى بدارى التسمين