



Effect of utilization organic acid supplement on broiler (ROS-308) feeding at pre-starter and starter period breeding on chemical organic content of main, secondary carcass and edible parts parameters

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Abstract

The objective of the present study was to evaluate the utilization effect of different types of organic acid with natural acid in pre-starter and starter of breeding period broiler (Ross-308) on chemical organic parameters of main, secondary carcass and edible parts. A total number of 200 one day old straight run broiler Ross-308 hybrid chicks were distributed to four dietary treatments each of treatment has 5 replicates each of replicates has 10 chicks, the control group without any supplement source of organic acid, treatment 1 (T1) received acetic acid, treatment 2 (T2) received citric acid, treatment 3 (T3) received mixing of juice and lemon cortex. Treatments (1, 2, and 3) were supplement source of organic acid by drinking water concentration 0.25% from 1 day till 10 days. The analyzed replicates samples were done in Shaqlawa nutrition laboratory using digital instruments for estimation moisture (M), ether extract (E.E), crude protein (C.P) and Ash for main carcass parts (Thigh and breast), secondary carcass parts (Back and wings) further edible parts (Heart, liver and Gizzard). All parts were analyzed and compared by Duncan one way under significant ($P < 0.01$) finally. The results showed insignificant effects with addition of organic acid ($p > 0.01$) for all treatments with in thigh for (E.E), breast for (C.P and Ash), wing for (E.E), heart for (M and C.P), liver and gizzard for (C.P) among treatments for one hand and in other hand significant ($P < 0.01$) among all other parameters. Supplement of lemon cortex increases mostly for value parameters affected positive and bit negative by different local parameters levels in pre-starter and starter of broiler chick feed.

Keywords: chicks, organic acids, neutral acid, main, secondary carcass and edible parameters.

Introduction

Poultry sector is one of the most vibrant segments of agriculture sector in most countries of world. It generates direct or indirect employment for about many million people. Poultry meat contributes about 19% of the total meat production in these countries (Sohail and Javid Iqbal, 2016). And is one of the best available sources for the production of high biological value animal protein. Commercial poultry farming in

world is expanding day by day. However, this sector is still confronted with many problems (Lückstädt, 2014). Poultry production can play an important role in poverty.

Alleviation and in the supply of quality protein to rural people (Pedersen, 1998). The high demand for chicken meat, low capital input required, early market

age, rapid return over invested capital and the small space required for poultry production have increased awareness that chicken farming is a profitable venture in the Limpopo province. However, high fat deposition in broiler chickens does affect the industry (Zubair and Leeson, 1996). Allowing birds an unlimited supply of food results in consumption in excess of the bird's requirements for maintenance and production and the excess energy is converted into fat (Fontana et al., 1992; Cuddington, 2004). Excessive fat is one of the main problems faced by the broiler industry these days, since it not only reduces carcass yield and feed efficiency but also causes rejection of the meat by consumers (Kessler et al., 2000) and causes difficulties in processing (Chambers, 1990). Recent reports on food restriction during the growing period in broiler chickens indicate that restricting food intake lowers body weight and carcass fat and improves food efficiency with compensatory growth during refeeding (Plavnik et al., 1986; Fontana et al., 1993; Al-Taleb, 2003). However, contrary results have also been reported elsewhere (Summers et al., 1990; Leeson et al., 1991; Robinson et al., 1992). Broiler chickens undergoing compensatory growth, also, exhibit greater than normal feed intake relative to body weight and may exhibit some associated digestive adaptations (Zubair and Leeson, 1994b). The use of this concept to address problems of high carcass fat requires more studies on the nutrition of the broiler chicken during the period of growth compensation. The main objective of this study was to determine the effect of sex, level and period of feed

restriction during the starter stage on productivity and carcass characteristics of Ross 308 broiler chickens.

The goal of this study was conducted in order to evaluate acetic acid and citric acids with natural source acid as lemon juice mixing with cortex in pre-starter and starter period on chemical organic content parameter of meat in main, secondary and edible parts of broiler chicks carcass strain (Ross 308).

Materials and Methods

The experiment was conducted by cooperation of one private farm in closed Erbil city with 200 one day old straight run broiler chicks (Ross-308) for a period 10 days in pre-starter and starter diet. The chicks were randomly divided into 4 equal treatment groups (C, T1, T2 and T3) each having 50 chicks. Each treatment was subjected to 5 equal replications of 10 chicks each. The diets were formulated with commonly available feed ingredients is shown in Table 1. The dietary treatments were C (control diet) without any additive; T1, T2 and T3 were supplemented with 0.25% acetic acid, 0.25% citric acid and 0.25% mixing juices with cortex of lemon respectively with drinking water. Dry mash feed was supplied on *ad libitum* basis. Fresh clean drinking water was made at all the times. Adequate sanitary measures were taken during the experimental period. The birds were housed in cages of 120cm x 76cm.

Table 1. The ingredients and chemical composition of

control diet Ingredients	Amount in the diet (%)
Maize	51.75
Soybean meal	42.00
Soybean oil	4.00
Salt	0.25
Di- Calcium Phosphate	0.50
Calcium premix	1.00
Vitamin-Mineral premix	0.75
DL-Methionine	0.15
Choline Chloride 60%	0.05
Chemical composition	Amount (%)
Dry matter	85.00
Crude protein	23.21
Crude fibre	5.88
Ether extract	1.76
Nitrogen free extract	48.41
Ash	6.96
ME(kcal/kg DM)*	3241.22

Calculated according to Wiseman (1987)

Birds' management

Statistical analysis

Broiler chickens were kept under the Ross recommended procedure. Water and rations distributed ad libitum and uniform light provide 24 hours daily. The temperatures of the house and vaccination programmer applying are basing on broiler live breeding period raisers' recommendations. At the age of day 4 and 8, birds were vaccinated against Infectious Bursal Disease (IBD) using Bursine-2. Chicks were also vaccinated with B.C.R.D.V on 8th day. To evaluate the treatment effect, weight gain, feed conversion ratio, mortality, dressing percentage, economy of broiler production were recorded and calculated. At the end of experiment, two birds from each treatment were selected randomly to record the dressing yield, organs weight and cut up parts. Feed samples were analyzed for dry matter (DM), crude protein (CP), ether extract (EE), nitrogen free extract (NFE), and total Ash by following the method of AOAC(2000).

For the statistical design and data analyses, complete random design of experiment with 4 treatments were determined. Data in all experiments were subjected to ANOVA procedures appropriate for a completely randomized design and the significance of differences between the means estimated using Duncan test (Duncan's new multiple range test). Probability level of $P < 0.01$ was considered for Significance in all comparisons. Values in percentage were subjected to transformation of $\text{Arc sin } \sqrt{100}$. All statistical analyses were performed using the software SPSS 17.5 for Windows® (SPSS Inc., Chicago, IL).

Results and Discussion

Main carcass chemical organic parameters

Effect of organic acids inclusion on percentage of Main carcass chemical organic parameters clear show in table (2).

Table (2) Mean ±SD of chemical composition of breast and thigh muscle

Attribute % / treatments	C	T1	T2	T3	
Thigh	Moisture	70.89±1.19bc	72.15±1.25b	70.24± 0.96c	78.43±0.01a
	Either extract	2.90±0.94*	2.2760±0.37	3.00±1.48	1.89±0.01
	Crude protein	16.29±0.08b	18.99±2.42b	19.30±1.77b	22.86±1.83a
	Ash	1.09±0.06b	2.29±0.72a	1.23±0.03b	1.12±0.08b
Breast	Moisture	74.60±0.95ab	76.24±1.01a	72.94±1.42b	74.61±1.01ab
	Either extract	1.09±0.01b	1.70±0.35ab	2.30±0.86a	2.29±0.88ab
	Crude protein	20.96±0.91*	18.76±2.32	18.76±2.44	20.50±1.20
	Total Ash	1.09±0.06*	1.29±0.27	1.29±0.06	1.22±0.11

*Insignificant ($P .01$), a, b,c Mean values with common superscript in the same column are significantly different from each other ($p < 0.01$).for duplicate randomly samples for 5 replicates each treatments.

Values are $x \pm$ Std. Deviation of 50 birds

Effects of supplement source of organic acids in diets on chemical composition of thigh muscle.

The supplementation of dietary mixtures for poultry with different type of source organic acids has been practiced for some time. However, due to consumer requirements, the physico-chemical characteristics of the meat should also be considered, not just the production effects on breeding. Chicken meat is very important in the human food industry. Chemical compositions of thigh and breast muscle for trial groups are present in (Table 2). The alimentary value of poultry meat is higher than that of large slaughter animals' meat, since it includes

less cholesterol, collagen and total fat (Kroliczewska et al., 2008). Obtaining proper quality poultry meat depends not only on genetic potential but also on alimentary factors (Kang et al., 2001).

The % of moisture in thigh muscle observed that significant ($P 0.01$) and higher value in T3 (78.43) than other treatments while insignificantly ($P > 0.01$) affected by the group C among T1 and T2 treatments. This can be attributing as clearly show the percentage of (E.E) in T3 is lower value although just mathematical differences among treatments ven insignificant ($p 0.01$) because there is a negative relationship between percentage of fat and moisture.

These results agree with result of Kadem et al. (2008).Crud protein Compatible harmony with increasing percentage of moisture and decreased percentage of (E.E). This can be explain by using natural source of lemon as source acid not effect on osmotic pressure of muscles cell and keep more of amino acids in mitochondria with moisture versus than industrial source of acids such as citric acid and acetic acid make contraction and loss of water(Sturkie, 1986). Total Ash significant (P 0.01) among treatments but the higher value clear in T1.This also explained by using industrial acids and keep most of dry matters inside cell this made rising of Ash. Ash as known is equal of silica plus minerals and there is no silica in meat so percentage of minerals increase and kept as ion.

Effects of supplement organic acids in diets on chemical composition of breast muscle.

The breast muscle has affected significantly (P<0.01) by supplement source of organic acids and mixing cortex with juices lemon in the case of (M and E.E), crude protein and total Ash were observed in (Table 2) insignificantly (P>0.01) affected by the treatments.Mathematical differences were observed among treatments for all treatments regarding (C.P

and total Ash) respectively. Moisture in T1 observed high value (76.24).Ether extract in T2 was clear high value (2.30).Total Ash compatible and harmonious relatedwith same data of thigh chemical composition, these result agree with result of Mohammed et al., (2005) and AL-ASWAAD, (2000).

Effects of supplement organic acids in diets on chemical composition of Back and Wing.

Food safety is the foundation of the future of the poultry industry and the total food chainissue bears great responsibility to consumers (Grundy, 1986). Table 3 observed effect supplement different type source of organic acid on secondary part of carcass Back muscle as another parts affected Significant (P<0.01) by all organic chemical content for all treatment higher value for (M) observed in T3 (77.76) versus lower in T1 as we explained before the same reason of source organic acid but in back accumulation of fat clear in T2 higher value this differs as in thigh and breast muscles because back not like them for moving body and burn energy. Crud protein and total Ash clear high value in T1 (21.15, 1.21) respectively. This is regarded with higher of protein mean more of Ash (Sanz et al., 2000).

Table (3) Mean ±SD of chemical composition of back and wing muscle

Attribute % / Treatments	C	T1	T2	T3	
Back	Moisture	73.29±3.88b	68.83±1.67c	71.81±0.61ab	77.7650±0.01a
	Either extract	1.00±0.01c	2.22±0.30b	2.87±0.54a	1.78±0.02b
	Crude protein	22.43±3.88ab	18.30±2.39bc	23.58±2.53a	16.55±0.01c
	Total Ash	1.02±0.01c	1.49±0.35a	1.33±0.12ab	1.66±0.01a
wing	Moisture	77.98±0.01a	74.97±0.64b	72.19±1.11c	73.98±0.01b
	Either extract	1.88±0.01*	1.87±0.18	2.60±1.08	1.87±0.01
	Crud protein	16.91±0.02b	21.15±0.43a	17.60±2.07b	17.78±0.01b
	Total Ash	0.98±0.01b	1.21±0.11a	1.20±0.08a	0.96±0.02b

*Insignificant (P .01), a,b,cMean values with common superscript in the same column are significantly different from each other (p<0.01).for duplicate randomly samples for 5 replicates each treatments

Effects of supplement organic acids in diets on chemical composition of heart, liver and gizzard.

Table 4 viewed that insignificant (p 0.01) among all treatments for (M and C.P) in heart but on other side significant for (E.E and total Ash)higher value was in C group even mathematical differ with other treatments for (E.E), but for total Ash high value clear in T1 (1.30) this result agree with foundation experiment of Sanz et al.(1999). Liver as one of main organic in digestive system all time full of blood this mean percentage of (M) is higher compared with other organic body but as shown in table 4 the higher value

prominent clearlyin T1(84.66) may be the acetic acid as soluble promote to increase the blood in liver but still this theory under study. For protein insignificant (P 0.0.1), this related of combination of amino acids were in liver. Results of total Ash compatible with results of (E.E), because liver is center of creating of fatty acids. Gizzard as a strong muscle is lower percentage of (M) compared with other muscles higher value was in T2 (74.18) for (E.E) higher value was control group. Automatically (C.P) is insignificantly (P>0.01) this attribute of nature gizzard muscle, number value of total Ash rise in T1 (1.45) versus all treatments.

Table (4) Mean \pm SD of chemical composition of heart,liver andgizzard

Attribute % / Treatments		C	T1	T2	T3
Heart	Moisture	70.90 \pm 1.19*	73.49 \pm 3.63	73.38 \pm 0.81	70.89 \pm 1.18
	Either extract	3.99 \pm 0.62a	3.64 \pm 0.25a	0.88 \pm 0.17b	3.98 \pm 0.62a
	Crud protein	21.77 \pm 0.8*	18.72 \pm 4.46	17.73 \pm 4.72	21.77 \pm 0.77
	Total Ash	1.09 \pm 0.06b	1.30 \pm 0.08a	1.11 \pm 0.08b	1.09 \pm 0.05b
Liver	Moisture	82.54 \pm 0.01ab	84.66 \pm 2.58a	74.91 \pm 1.40c	80.77 \pm 0.02b
	Either extract	2.45 \pm 0.01a	2.11 \pm 0.02c	1.08 \pm 0.01b	2.44 \pm 0.02a
	Crud protein	12.11 \pm 0.03*	18.96 \pm 6.94	10.63 \pm 6.05	13.89 \pm 0.01
	Total Ash	0.64 \pm 0.01c	1.32 \pm 0.03a	1.13 \pm 0.08b	0.66 \pm 0.02c
Gizzard	Moisture	70.89 \pm 1.18b	67.40 \pm 2.10c	74.18 \pm 0.83a	67.88 \pm 0.01c
	Either extract	3.54 \pm 0.01a	2.43 \pm 0.01b	2.17 \pm 0.62b	1.98 \pm 0.01b
	Crud protein	21.98 \pm 1.19*	25.04 \pm 1.99	27.23 \pm 1.93	18.88 \pm 0.01
	Total Ash	1.33 \pm 0.01ab	1.45 \pm 0.24a	1.15 \pm 0.08c	1.33 \pm 0.01ab

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References

- Plavnik, I., J.P. McMurtry and R.W. Rosebrough, 1986. Effect of early feed restriction in broilers. I. Growth performance and carcass composition. *Growth*, 50: 68-76.
- AL-ASWAAD, Maged, Basheir. 2000. The Laboratory Examination in meats technology E2 Ministry of high education and scientific research, Books house service for print and publisher .Mosul University, Iraq,2000.125.P. ISBN. 02-648512-10.
- Al-Taleb, S.S., 2003. Effect of an early feed restriction productive performance and carcass quality. *On Line J. Biol. Sci.*, 3: 607- 611.
- AOAC., 2000. Official Methods of Analysis 17th Edn.Association of Official Analytical Chemists, Washington, DC.
- Chambers, J.R., 1990. Genetics of growth and meat production in chickens. In: Poultry breeding and genetics Crawford, R.D. (Eds.). Elsevier Science Publishers B.V., Amsterdam, Netherlands, pp: 599- 643.
- Cuddington, S., 2004. High energy diets affect broiler chicken welfare. http://www.facs.sk.ca/pdf/animal_care_award/articles_2004/cuddington_chickens.
- Fontana, E.A., W.D. Weaver, B.A. Watkins, Jr. and D.M. Denbow, 1993. Early feed restriction of broilers. Effect of abdominal fat pad, liver and gizzard weights, fat deposition and carcass composition. *Poult. Sci.*, 72: 243-250.
- Fontana, E.A., W.D. Weaver, B.A., Watkins Jr. and D.M. Denbow, 1992. Effect of early feed restriction on growth, feed conversion and mortality in broiler chickens. *Poult. Sci.*, 71: 1296-1305.
- GRUNDY, S. 1986. Comparison of monounsaturated fatty acids and carbohydrates for lowering plasma cholesterol. In *Journal of New England. Medeical*, vol.314. 1986, p.745-748.
- Kadim IT, Al-Marzooqi W, Mahgoub O, Al-Jabri A, Al-Waheebi SK. 2008. Effect of acetic acid supplementation on egg quality characteristics of commercial laying hens during hot season. *Int J Poultry Sci.* 7(10):1015-1021.
- KANG, K. – Cherian, G. –Sim, J. 2001. Dietary palm oil alters the lipid stability of polyunsaturated fatty acid-modified poultry products. In *Journal of Poultry Science*, vol. 80, 2001, p. 228-234.
- Kessler, A.M., P.N. Snizek Jr. and I. Brugalli, 2000. Manipulacao da quantidade de gorduranacarcaca de frangos. In: *Anais da Conferencia APINCO de Ciencia e TecnologiaAvicolas*. APINCO, Campinas, SP, Brazil, pp: 107-133.

13. KROLICZEWSKA, B. –Zawadzki, W. – Skiba, T. –Kopec, W– kroliczewski, T. – 2008. The influence of baical skullcap root (Scutellariabaicalensis radix) in the diet of broiler chickens on the chemical composition of the muscles, selected performance traits of the animals and the sensory characteristics of the meat. In Journal of VeterinarniMedicina, vol. 53, 2008, no. 7, p. 373–380.
14. Lückstädt C. 2014. Effects of dietary potassium diformate on growth and gastrointestinal health in weaned piglets in Vietnam. Conference
15. MOHAMMED, H. – Sardary, S. –Miran, D. 2005. The effect of utilization vegetable fat and oil of sunflower seeds and marketing age on production performance and chemical composition of broiler’s carcass. MSc. Thesis, 2005. Salahaldeen University, Erbil, Iraq.
16. Robinson, F.E., H.L. Classen, J.A. Hanson and D.K.Onderka, 1992. Growth performance, feed efficiency and the incident of skeletal and metabolic disease in full-fed and feed-restricted broiler and roster chickens. J. Appl. Poult., Res., 1: 33-41.
17. SANZ, M. – Flores, P. – Perez, D. – Ayala, E. – LOPEZ- Bote, C. 1999. Higher lipid accumulation in broilers fed on saturated fats than in those fed on unsaturated fats. In British Journal of Poultry Science, vol. 40. 1999, p. 95-101.
18. SANZ, M. –lopez-bote, C. Menoyo, D. Bautista, J. 2000. Abdominal fat deposition and fatty acid synthesis are lower and $\hat{\alpha}$ -oxidation is higher in broiler chickens fed diets containing unsaturated rather than saturated fat. In Journal of Nutrition vol.130. 2000, p.3034-3037.
19. Sohail Hassan Khan and JavidIqbal,(2016) Recent advances in the role of organic acids in poultry nutrition journal of applied animal research, 2016 VOL. 44, NO. 1, 359–369 <http://dx.doi.org/10.1080/09712119.2015.1079527>
20. SPSS INC. ARMONK, NY - 02 Oct 2009: IBM (NYSE: IBM) announced it has completed its acquisition of SPSS Inc. (Nasdaq: SPSS), a publicly-held company headquartered in Chicago. IBM announced a definitive agreement to acquire SPSS on July 28, 2009.
21. STURKIE, P.D. 1986. Avian Physiology. 4th ed. Berlin: Springer-Verlag. New York/Berlin/Heidelberg/Tokyo.1986. 516 p.
22. SUMMERS, J.D., D. Spratt and J.L. Atkinson, 1990.Restricted feeding and compensatory growth for broilers. Poult. Sci., 69: 1855-1861.
23. WISEMAN, J. – Salvador, F. 1989. Influence of age, chemical composition and rate of inclusion on the apparent metabolisable energy of fats fed to broiler chicks. . In British Journal of Poultry Science, vol.30. 1989, p.653–662.
24. Zubair, A.K. and S. Leeson, 1994. Effect of early feed restriction and realimentation on metabolicheat production and changes in digestive organs in broiler chickens. Poult. Sci., 73: 529-538.
25. Zubair, A.K. and S. Leeson, 1996. Compensatory growth in the broiler chicken: A rev. World's Poult. Sci., 52:189-201.

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