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# ADDING SOME OF ORGANIC ACID IN BROILER 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 role utilization effect different type 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 replicate each of replicate has 10chicks, 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 supplements source of organic acid by drinking water concentration0.25% from 1 day till 10 days. The analyzed of replicates samples were done in Shaqlawa nutrition laboratory using digital instruments for estimation moisture(M), either 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 ($P \leq 0.01$) finally. The results showed insignificant effects with addition of organic acid ($p \leq 0.01$) 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 ($P \leq 0.01$) among all another parameter. 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 counties 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 counties (Sohailand and JavidIqbal, 2016), 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 re-feeding (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 in take 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

### Design of the experiment

The experiment was conducted with 150 one-day old broiler chicks (Ross-308) for a period of 10 days' starter phase, the chicks were randomly divided into 3 equal treatments (C, T1 and T2) 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 shown in Table 1. Treatments were C (control diet) without any additive; T1, T2 were supplemented with 0.25% acetic acid, 0.25% citric acid respectively by adding 25 ml/100 liter drinking water. Mash feed was supplied on ad libitum basis. Fresh clean drinking water was offered during the experiment time. The birds were housed in cages of 120 cm×76cm.

**Table 1 :** The ingredients and chemical composition of the diet

| Control diet Ingredients | Amount in the diet (%) |
|---|---|
| Maize | 51.30 |
| Soybean meal | 42.00 |
| Soybean oil | 4.00 |
| Salt | 0.25 |
| Di- Calcium Phosphate | 0.50 |
| Calcium | 1.00 |
| Vitamin-Mineral premix1 | 0.75 |
| DL-Methionine | 0.15 |
| Choline Chloride 60% | 0.05 |
| Chemical composition* | Amount (%) |
| Dry matter | 89.00 |
| Crude protein | 23.32 |
| Crude fiber | 2.87 |
| Ether extract | 2.16 |
| Nitrogen free extract | 48.41 |
| Ash | 5.75 |
| ME(kcal/kg feed) | 2995 |

1 active substances per kilogram of premix: vitamin A 2 500 000 IU; vitamin E 50 000 mg; vitamin D3 800 000 IU; niacin 12 000 mg; d-pantothenic acid 3 000 mg; riboflavin 1 800 mg; pyridoxine 1200 mg; thiamine 600 mg; menadione 800 mg; ascorbic acid 50000 mg; folic acid 400 mg; biotin 40 mg; vitamin B12 10.0 mg; choline 100000 mg; betaine 50000 mg; Mn 20 000 mg; Zn 16 000 mg; Fe 14 000 mg; Cu 2 400 mg; Co 80 mg; I 200 mg; Se 50 mg [Calculated according to Wiseman (1987)]

**Birds' management**

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 was 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).

**Statistical analysis**

For the statistical design and data analyses, complete random design of experiment with 4treatments 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 Arc sin v100. 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 treatment. Values are X± 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 even insignificant (p≥0.01) because there is a negative relationship between percentage of fat and moisture. These results agree with results 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 of 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 construction 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 is no silica in meat so percentage of minerals increase and kept as ion.

### 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. High value (76.24). Ether extract in T2 was clear high value (2.30). Total Ash compatible and harmonious related with 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 chain issue 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 fatclearinT2 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 |
| | Crude 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,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 treatment.
Values are x ± Std. Deviation of 50 birds

### 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 clearly in 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 ±SD of chemical composition of heart, liver and gizzard

| Attribute % / Treatments | | C | T1 | T2 | T3 |
|---|---|---|---|---|---|
| Heart | Moisture | 70.90± 1.19* | 73.49± 3.63 | 73.38± 0.81 | 70.89± 1.18 |
| | Either Extract | 3.99± 0.62a | 3.64± 0.25a | 0.88± 0.17b | 3.98± 0.62a |
| | Crud Protein | 21.77± 08* | 18.72± 4.46 | 17.73± 4.72 | 21.77± 0.77 |
| | Total Ash | 1.09± 0.06b | 1.30± 0.08a | 1.11± 0.08b | 1.09± 0.05b |
| Liver | Moisture | 82.54± 0.01ab | 84.66± 2.58a | 74.91± 1.40c | 80.77± 0.02b |
| | Either Extract | 2.45± 0.01a | 2.11± 0.02c | 1.08± 0.01b | 2.44± 0.02a |
| | Crud Protein | 12.11± 0.03* | 18.96± 6.94 | 10.63± 6.05 | 13.89± 0.01 |
| | Total Ash | 0.64± 0.01c | 1.32± 0.03a | 1.13± 0.08b | 0.66± 0.02c |
| Gizzard | Moisture | 70.89± 1.18b | 67.40± 2.10c | 74.18± 0.83a | 67.88± 0.01c |
| | Either Extract | 3.54± 0.01a | 2.43± 0.01b | 2.17± 0.62b | 1.98± 0.01b |
| | Crud Protein | 21.98± 1.19* | 25.04± 1.99 | 27.23± 1.93 | 18.88± 0.01 |
| | Total Ash | 1.33± 0.01ab | 1.45± 0.24a | 1.15± 0.08c | 1.33± 0.01ab |

*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

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