**Jilin Daxue Xuebao (Gongxueban)/Journal of Jilin University (Engineering and Technology Edition)**
ISSN: 1671-5497
E-Publication: Online Open Access
Vol: 42 Issue: 01-2023
DOI 10.17605/OSF.IO/2YB8G

# EFFECT OF SYNERGISTIC DOSES OF ZINC AND VITAMIN E ON CARCASS CUTS AND MEAT QUALITY CHARACTERISTICS OF AWASSI LAMBS

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**Abstract:**

This experiment was conducted in field of sheep breeding, College of Agriculture and Forestry / University of Mosul. Twenty Awassi lambs were used in this experiment and was similar in age and weight at the beginning of experiment. This experiment was lasted for 90 days and was preceded by a two-week acclimatization period. This study included randomly distributing their lambs into four treatments. The first treatment (control) without dose. While the second treatment of lambs were dosing by zinc (30 mg zinc / head) for three times per week. The third treatment were given vitamin E (20 mg of vitamin E / head) for three times a week. As for fourth treatment the lambs were doses a mixture of zinc and vitamin E per three times a week. The results of the current study indicated that there was a significant effect of doses of zinc or vitamin E, or both on average weights of proportions of the main and secondary carcasses and separated fats among treatments. The results indicated that there were significant differences between the groups treated with zinc and vitamin E and interaction between them compared to the control treatment.As for physical inventory of components of three-ribs region (9-10-11) the results of the current experiment showed that there was a significant effect of dossing with zinc and vitamin E or mixture between them on the proportions of muscle and fats,rates of moisture content, percentage of crude protein and a highly significant effect (P≤ 0.01)) in proportion of ether extract in favor of the experimental treatments over the control treatment when compared to the control treatment that was not treated with zinc and vitamin E.The results indicates that dosing of Awassi lambs with zinc ,vitamin E or their mixture which led to a significant improvement in rates of weights percentages of main and secondary carcasses, and significant increase in percentages of muscle tissue sedimentation and crude protein and significant decrease in percentages of fats and ether extract in favor of the groups of lambs treated with zinc , vitamin E or a mixture together compared to the control group.

**Keywords:** zinc, vitamin E, carcass cuts, meat quality, separated fats.

## Introduction:

The sheep constitute is a large important and vital aspect in sustaining the national income in our country as income received from them is estimated at about 50% of the agricultural production revenues whether in terms of numbers or productivity (Enjalbert et al., 2006). In the local industry sheep nutrition is one of the important and main factors to show their genetic ability to grow, produce milk,wool and reproductive ability. There are three main breeds in Iraq, which are Awassi, Kardi, and Arabiya sheep (AL-Sayegh and AL-Kass 2006). The process of fat oxidation is one of the processes that caused damage on meat quality and accompanying changes in color and meat rancidity. Therefore, using of natural antioxidants had shown efficiency in hindering fat

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oxidation, as well as its contribution to providing meat that meets the aspirations and desires of consumers (Mitsumoto et al., 1998) and in order to obtain healthy animal products suitable for human consumption to reduce the risk of diabetes, obesity, cancer, vascular and heart diseases, and foot rot disease (Enjalbert et al., 2006 and Kilic et al., 2007). Numerous studies have been conducted (Grundy 1999, Voight and Hagemeister, 2001) to obtain high quality of animal products with high levels of unsaturated acids in food such as ruminant meat that contains a high concentration of unsaturated linoleic acid. Moreover, the meat occupies a special position as a protein source. It is a main meal in human feed because its flavour, texture, palatability and high nutritional value (Al-Aswad 2000, Bessa et al., 2000).There are some factors that determine quality of meat acceptance, namely fat oxidation, cholesterol concentration, saturated fatty acids and long-chain of unsaturated fatty acids including polyunsaturated linoleic acid (Morrissey et al., 1998). It was found that zinc that activates of enzymes action that contribute to creation of new red blood cells instead of damaged ones.Also, it is associated with enzymes that work as a bioactivator that stabilizes the composition of DNA, RNA and ribosomes (McDowell, 1996). At the same time, zinc is one of the essential elements that needed ruminant animals to perform their vital functions in growth, reproduction, immune system, and genetic mutations (Underwood and Suttle, 1999).Also, Zinc participates in the cell defense system against oxidative stress, and therefore animals need it because of its effectiveness in activating enzymes and proteins that contribute to the synthesis of vitamin A and excretion of carbon dioxide outside of body. Also.it destroys free radicals and maintains the stability of membranes of red blood cells (RBC).While other studies indicated (Powell, 2000, McCall et al., 2000, McDonald 2000, Stefanidou et al. 2006, Rubio et al. 2007) that presence of zinc in cells plays an essential role in the processes of representation of fatty acids, carbohydrates, nucleic acids and formation of proteins. In addition, zinc has other vital functions that are very necessary for it which it activates processes of growth,cell division and maintenance of the epithelial cells of genital organs that are necessary for embryonic development (Hostetler et al. 2003, Robinson et al. 2006) and contributes to formation of sperm in males, maintenance of uterine vitality, and the repair of uterine tissues. After childbirth especially when returning to a state of estrus (Apgar,1985) it stimulates reproductive performance, perpetuation of pregnancy, and milk production in females (Smith and Akinbamijo, 2000).As for vitamin E it is one of the most antioxidants for fats in tissues and plasma as it hunts free hydroxyl radicals and thus provides first line of protection against lipid peroxides (McDowell et al., 1996).Also, vitamin E works to prevent the oxidation of unsaturated fatty acids, especially those present in the cells membranes and tissues. For from free radical attack (Morrissey et al., 1998). It was found that this vitamin prevents decomposition and destruction of hemolysis of red blood cells. Therefore, need for vitamin E is commensurate with amount of unsaturated fatty acids present in food intake, especially unsaturated linoleic acid, which is one of the essential acids for the body (AL-Zuhairy, 2000). Grundy (1999) showed that giving vitamin E in animal diet contributes to improving animal immunity, reproductive performance and fertility, and helps to form and develop embryos during pregnancy in females. Also, it stimulates sexual ability and increases percentage of sperm formation

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in males (AL-Zuhairy, 2000).Therefore, the two elements zinc and vitamin E under the current study are among the nutrients necessary for humans and animals as the first enters into synthesis of enzymes that contribute to creation of red blood cells, while the second works to prevent decomposition and destruction of red cells present in the cells membranes and tissues. It participates in protection of vital membranes and enzymes from risk of free radicals, oxidative stress, cholesterol and triglycerides (Choct et al., 2004).The current study aimed to investigate effects of doses of zinc and vitamin E for lambs on weights and proportions of carcass cuts and specific characteristics of carcass for lambs treated with zinc and vitamin E compared to that lambs group was fed control ration not treated with zinc and vitamin E.

## Materials and Methods

### 1. Experimental animals:

An experiment was conducted to fattening twenty of Awassi lambs breed that were homogeneous in age (post-weaning age) and very close in average of initial weight (20-21 kg) to ensure that there were no significant differences in average of initial weights.The lambs were housed in the sheep breeding hall in field of animal production ,College of Agriculture and Forestry/University of Mosul.This barn contained small compartments equipped with troughs and drinking fountains.The experiment lasted for ninety days and preceded which was introductory period for 14 days (acclimatization period).The lambs were placed in a preventive program to ensure their safety from diseases.All lambs were dosed with bendazole against liver, roundworms, tapeworms and lungworms.This process was repeated after 45 days during the study period.

### 2. The experiment plan :

The lambs were randomly distributed into four treatments as follows:

The first treatment (control): animals without doses.

The second treatment: the animals were dosed with zinc (30 mg/head) each for three times per week.

The third treatment: Lambs were given vitamin E at a dose of (20 mg/ lamb) each for three times per week .

The fourth treatment: the animals were dosed with a mixture of zinc and vitamin E in the same previous doses each for three times per week.

### 3. The Nutrition

The kind of feeding was ad lib and all lambs were feeding on concentrated diet consisting of barley, wheat bran, wheat straw, urea, salts and limestone. The diet was provided to the lambs in two meals per day and to accustom their lambs to consume it and then increasing quantities of daily feed. The first meal at eight in morning and the second meal at five in afternoon. On the next day before serving morning meal the remaining fodder is collected from animals of each group separately and weighed with a scale designated for fodder to calculate amount of daily fodder consumed.This process

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continued throughout of the duration experiment. In addition, the animals was going out for daily grazing for four hours to ate on short grasses as coarse green fodder and to obtain vitamin A from grazing green fodder in the pastures of the animal field.

**4. Operations of animal slaughtering and studying the carcass characteristics:**

At the end of the experimental period all lambs fasted for 12 hours before slaughtering and on next day the lambs were slaughtered.The weights of separate fats were recorded which are mesenteric fat, fat surrounding the heart, kidneys fat, and fat of the buttocks. Then the carcasses were cutting into main pieces (thigh, lumbar, ribs, and shoulder) and secondary pieces (neck, breast, loin, and forearm) according to the cutting shown by Abdul Rahman et. al.,(2013). The tail was calculated within the separated fats.The carcass parts and the separated fats were calculated as a percentage of attributed to the weight of cold carcass.

**5. Physical inventory of three ribs area (9-10-11).**

The piece of three ribs (9-10-11) was removed from the right side of the carcass, its was weighted recorded a physical inventory process was carried out on piece by separating its components of muscle, fat and bone by using dissection knives (connective tissues were added to the bones). Then, the muscle, fat, and bone were weighed separately by an electronic scale and was calculated on the basis of percentage of each of them relative to the weight of three ribs, after excluding the bones and obvious connective tissue in the three ribs area of the left longitudinal side then smashing the tissues.The remainder of the mixture of meat and fat was using an electric meat grinder with a net with holes of 3 mm of diameter.Then it was re-minced again by using the same meat grinder after that the meat was mixed well for purpose of homogeneity and mixture was re-minced a third time were using above meat grinder and mixture was kept in the freezer until chemical analysis was performed.

**6. Chemical analysis of three ribs area (9-10-11):**

The chemical analysis methods of samples was carried according to mentioned of **A.O.A.C. (2016)** to estimate the percentage of moisture, ash, crude protein and crude fat.

**7. Experiment design and statistical analysis:**

The data were analyzed statistically by using a Complete Randomized Design (C.R.D.) according to AL-Zubaidy and AL-Falahy (2016) in order to find out effects of zinc and vitamin E dosses on the studied traits.

The following mathematical model was used: $Yij=\mu+ti+eij$

Yij = The value observed (j) in the diet (i.(

μ = The overall average of all observations.

$t_i$ = Effect of treatment i, this represents dosing of effect of zinc and vitamin E.

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eij= the random experimental error of the experimental units which is normally and independently distributed with average of zero and a variance of one.

The statistical analysis was carried out and significant differences were compared by using Duncan test (1955) polynomial between means of the studied traits through application of the statistical program (SAS, 2016) by using of an electronic computer.

## Results and discussion

### 1. Carcass cuts:

When we examining the results of experiment presented in table (1), it was noted that there were significant differences (P≤0.05) between fourth treatment that was containing synergestic of zinc plus vitamin E compared to the first treatment (comparison treatment) in average percentages of thighs, loin, shoulders and ribs as major cuts in the carcass on one hand and another hand the results showed emergence of significant differences in average weights of the neck, chest, and loins between the first treatment (control) and the last treatment (zinc + vitamin E). The results of percentages of weights of the major pieces of carcass which were percentages of thighs weights was 20.69, 22.04, 23.99, 25.00%, loin 10.96, 12.30, 15.78, 20.12%, shoulders 14.60, 17.05, 19.35, 20.10%, ribs 12.21, 12.88, 18.08, 20.24% for control,zinc, vitamin E and zinc mixture with vitamin E respectively. As well as the results of minor cuts percentages in the carcass as follows the percentage of neck weights was 6.46, 7.86, 8.86, 11.87%, chest 4.53, 7.26, 9.36, 12.24%, and the loin 4.79, 5.77, 7.16, 7.82% for four transactions. While the results presented in table (1) did not showed any significant differences between four treatments in average of forearm weight percentage, which amounted to 8.62, 8.87, 10.14, and 14.64%, respectively. From the above results it was observed significant improvement in proportions of major cuts weights and secondary carcasses in favor of the joint synergistic treatment between zinc and vitamin E in the last treatment when compared to the control treatment. The reason is due to the activity of zinc as a catalyst in the deposition of protein tissues in the body of lambs treated with zinc compared to the control treatment (Elokil et al. 2019).There is an explanation for the significant increase (P≤0.01) in average weights percentages of thighs, loin, shoulders, ribs, chest, neck, chest and flank in favor of the zinc, vitamin E and mixture between them which due to presence of positive and highly significant correlation coefficient (P≤0.01) between weight of the cold carcass of lambs and percentages of the weights of the major and secondary parts of the Awassi lambs (Table 2), which amounted to (0.95, 0.85, 0.88, 0.86, 0.87, 0.94, 0.92, 0.75), respectively.This results were agree with results of Elokil et al.,(2019) and Mahmood et al.,(2018) who found significant differences in rates of primary and secondary pieces weights between lambs treated with zinc compared to the control treatment.This results were consistent with results of ATAY et al.,(2009) who noticed a significant effect of vitamin E on average weights of the main and secondary carcasses when were adding different levels of vitamin E in feeding diets of lambs.The results were consistent with the results of Mohammed et. al.,(2015) who did not find any significant effect in weights of the main

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and secondary carcass parts between the groups treated with vitamin E for the comparison group.

**Table 1: Effect of dossing zinc, vitamin E and combination between them on weights of major and minor cuts.**

| Traits | First treatment (Control) | Second treatment (Zinc) | third treatment (Vitamin E) | fourth treatment (Zinc +Vitamin E) |
|---|---|---|---|---|
| 1.Thigh percentage (%)*. | 20.69 ± 0.50 B | 22.04 ± 0.46 AB | 23.99 ± 0.07 AB | 25.00 ± 1.82 A |
| 2.Loin percentage (%)*. | 10.96 ± 0.75 B | 12.30 ± 0.39 B | 15.78 ± 2.72 AB | 20.12 ± 1.57 A |
| 3.Shoulder percentage (%)* | 14.60 ±1.09 B | 17.05 ± 1.01 AB | 19.35 ± 0.54 A | 20.10 ± 1.60 A |
| 4.Ribs percentage (%)*. | 12.21 ± 1.49 B | 12.88 ± 2.05 B | 18.08 ± 0.35 AB | 20.24 ± 1.93 A |
| 5.Neck percentage (%)* | 6.46 ± 0.80 C | 7.86 ± 0.04 BC | 8.86 ± 0.55 B | 11.87 ± 0.23 A |
| 6.Chest percentage (%)**. | 4.53 ± 0.16 B | 7.26 ± 2.42 B | 9.36 ± 0.32 AB | 12.24 ± 0.01 A |
| 7.Forearm percentage NS. | 8.62 ± 0.16 A | 8.87 ± 0.20 A | 10.14 ± 0.78 A | 14.64 ± 3.09 A |
| 8.Flank percentage (%)* | 4.79 ± 0.05 B | 5.77 ± 1.16 AB | 7.16 ± 0.34 AB | 7.82 ± 0.38 A |

Adjectives whose averages bear different letters within one line indicate that there are significant differences at the probability level of 0.05 or 0.01.

NS: Non-significant. * Significant differences at 0.05. ** Highly significant differences at 0.01.

**Table 2: Correlation coefficients between cold carcass weight and percentage of major, minor carcass cuts of Awassi lamb carcasses**.

| Studied traits | Correlation transactions |
|---|---|
| 1.Carcass weight x carcass weight | 1.0000 |
| 2. Carcass weight x thighs** | 0.95 |
| 5.Carcass weight x cotton (back)** | 0.85 |
| 6. Carcass weight x ribs ** | 0.88 |
| 7. Carcass weight x shoulders** | 0.86 |
| 8. Carcass weight x neck ** | 0.87 |
| 9. Carcass weight x breast** | 0.94 |
| 10. Carcass weight x forearm** | 0.92 |
| 11. Carcass weight x flank* | 0.75 |

*Significant differences at probability level of 0.05. ** Highly significant differences at probability level of 0.01.

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## 2. Seperates of fats:

Through the results presented in tables (3, 4) it was found that there were significant differences (P≤0.05) in average weights of mesenteric membrane fat, fat enveloping the heart, percentages of pericardial fat, tail fat and total fat between the first treatment (control) and the last treatment (zinc + vitamin E).While there were no significant differences between the first three treatments on the one hand and another hand between the last three treatments. Where the weights of mesenteric membrane fat were 272.50, 20.00, 451.00, 540.00 gm , fat surrounding the heart 202.50, 126.00, 88.00, 85.00 gm , percentage of fat enveloping the heart was 1.21, 0.68, 0.45, 0.39% , percentage of tail fat was 12.39, 11.29, 12.39, 12.39% and percentage of total fat was 18.01,15.40,14.93,15.22% for the first,second,third,fourth treatments respectively. As for the weights and percentages of other separate fats the results of statistical analysis showed that there were no significant differences in weights and percentages of separate fats between four treatments (tables 3 and 4). The weights of fat surrounding the kidneys were 147.50, 120.00, 103.00, 101.50 gm,mechanism fat 2.36, 2.33, 2.26, 2.58 kg, total fat 2.982, 2.896, 2.902, 3.306 kg and percentage of fat surrounding the mesenteric membrane 1.64, 2.319, 2.319, 2.47% and percentage of fat surrounding the kidneys was 0.87, 0.63, 0.53, 0.46% for four treatments. The results of the current experiment indicate that there were significant decrease in most of weights and percentages of separated fats in the last three treatments of Awassi lambs, which were dosed with zinc, vitamin E and a mixture between them, compared to the control treatment. Perhaps the reason is due to the fact that all lambs were small age in the phase of growth and fattening because of operation dosed of zinc, vitamin E, or both together which led to deposition of muscle growth at the expense of fat deposition in body tissues and thus led to appearance of a significant and arithmetic decrease in weights and proportions of separate fats deposited in the body tissues of Awassi lambs groups. The results of this study was agree with results of ATAY et al., (2009) who noted that there was no significant effect of zinc and vitamin E on average weights and percentages of kidney fat, tail fats and total fat among groups of lambs that were dosed with zinc or vitamin E for lambs group that were not dosed with zinc or vitamin E (control group).The result of this experiment did not agree with findings of Suari (2000) and Mahmood et al.,(2018) who showed no significant effect on weights of deposited tissue around the mesenteric membrane of the stomach, around the heart, kidneys, and around the pelvis among groups of lambs when were addition a mixture of selenium and vitamin E at different levels in fattening rations of lambs.

That addition level of selenium to the diet

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**Table 3: Effect of dossing zinc, vitamin E and its combination on weights of fats separates of Awassi lambs**

| Traits | First treatment (Control) | Second treatment (Zinc) | third treatment (Vitamin E) | fourth treatment (Zinc +Vitamin E) |
|---|---|---|---|---|
| 1. Weight of mesenteric fats (gm)*. | 272.50 ± 37.50 B | 320.00 ± 30.00AB | 451.00 ± 70.00 AB | 540.00 ± 83.00A |
| 2. Weight of fat surrounding with heart (gm)*. | 202.50 ± 7.50 A | 126.00 ± 5.00 AB | 88.00 ± 51.00 B | 85.00 ± 10.00B |
| 3. Weight of fats surrounding of kidneys (gm)**NS.** | 147.50 ± 67.50 A | 120.00 ± 35.00 A | 103.00 ± 0.30 A | 101.50 ± 37.50 A |
| 4. Weight of tail fats (gm)NS. | 2.36 ± 0.01 A | 2.33 ± 0.29 A | 2.26 ± 0.15 A | 2.58 ± 0.08A |
| 5. Weight of total fats (gm)NS. | 2.982 ± 0.05 A | 2.896 ± 0.46 A | 2.902 ± 0.15 A | 3.306 ± 0.01A |

Adjectives whose averages bear different letters within one line indicate that there are significant differences at the probability level of 0.05 or 0.01.

NS: Non-significant. * Significant differences at 0.05. ** Highly significant differences at 0.01.

**Table 4: Effect of zinc and vitamin E doses on percentages of separate fats according to the cold carcass weight among groups of Awassi lambs.bs.**

| Traits | First treatment (Control) | Second treatment (Zinc) | third treatment (Vitamin E) | fourth treatment (Zinc +Vitamin E) |
|---|---|---|---|---|
| 1. Percentage of mesenteric fats (%)NS. | 1.64 ± 0.21 A | 1.69 ± 0.11A | 2.31 ± 0.32 A | 2.47 ± 0.32A |
| 2.Percentage of fat Surrounding with the heart (%)*. | 1.21 ± 0.03 A | 0.68 ± 0.02 B | 0.45 ± 0.26 B | 0.39 ± 0.03B |
| 3. Percentage of fats kidneys (%)**NS.** | 0.87 ± 0.39 A | 0.63 ± 0.17 A | 0.53 ± 0.12 A | 0.46 ± 0.18 A |
| 4.Percentage of tail fats (%)NS. | 14.29 ± 1.01 A | 12.39 ± 0.99 AB | 11.64 ± 0.04 B | 11.90 ± 0.04B |
| 5. Percentage of total fats (%)NS. | 18.01 ± 0.61 A | 15.39 ± 1.30 AB | 14.93 ± 0.10B | 15.22 ± 0.21AB |

Adjectives whose averages bear different letters within one line indicate that there are significant differences at the probability level of 0.05 or 0.01.

NS: Non-significant. * Significant differences at 0.05. ** Highly significant differences at 0.01.

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### 3. Physical Inventory of three Ribs Region (9-10-11).

A review of results presented in table (5) showed significant level (P≤ 0.05) differences between treatments in average of muscle percentage between the first three treatments compared to the last treatment.The rates of muscle percentage were 43.97, 44.73, 45.23, 46.93% for the first, second, third and fourth treatments respectively.Also, this results showed significant differences (P≤ 0.05) in percentage of fat between the first treatment (control) and the last treatment (a mixture of zinc and vitamin E). The percentage of fat was 25.29, 24.34, 23.22, 21.26% for four treatments in the three-ribs region (9-10-11). While there were no significant differences between four treatments in percentage of bone, which were 30.49, 30.93, 31.56, 31.82% respectively. From careful observation of above results (table 5) we find that there were a significant increase in muscle percentage of treatments in which there lambs were dosed with zinc, vitamin E and a mixture between them compared to the control treatment. This is due to inverse relationship between the percentage of muscle and percentage of fat (Al-Aswad 2000). The results of this study indicates significantly of decreased fats percentage in the experimental treatments compared to the control treatment thatwere gives confirmation that percentage of muscle in treatments was increasing significantly and its offset by a significant decrease of the percentage of fat due to inverse relationship between them (Al-Aswad,2000).As for the bone percentage it mathematically increases in four transactions and this is due to increase in muscle percentage because there lambs are in stage of growth and fattening because they were ages was less than a year old.Thrugh this age the growth increases at rapid rates due to bone growth. While the fat percentage that is deposited in a small percentage of the body tissues.This result was supported by Gabryszuk et al., (2009) who indicated a significant decrease in percentage of fat tissues for body lambs treated with zinc, selenium and vitamin E than for control group.These results contradicted with results of Mohammad et al.(2015), Mahmood et al. (2018),Turner et al. (2002), Maict et al. (2003), Mairorao et al. (2007), Zhao et al. (2013) who did not found any significant differences in proportions of components of physical inventory of carcasses when they were using of zinc, selenium and vitamin E.

**Table 5: Effect of zinc and vitamin E doses on percentages of physical inventory for the three-rib region (9-10-11) of Awassi lambs.**

| Traits | First treatment (Control) | Second treatment (Zinc) | third treatment (Vitamin E) | fourth treatment (Zinc +Vitamin E) |
|---|---|---|---|---|
| 1. Percentage of muscle (%)*. | 43.97 ± 0.43 B | 44.73 ± 0.03 B | 45.23 ± 0.23 B | 46.93 ± 0.65 A |
| 2. Percentage of fats (%)*. | 25.29 ± 0.50 A | 24.34 ± 0.21 AB | 23.22 ± 1.78 AB | 21.26 ± 0.14 B |
| 3. Percentage of bone (%)NS. | 30.49 ± 0.32 A | 30.93 ± 0.24 A | 31.56 ± 1.55 A | 31.82 ± 0.02 A |

Adjectives whose averages bear different letters within one line indicate that there are significant differences at the probability level of 0.05 or 0.01.

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$^{NS}$: Non-significant. $^{*}$ Significant differences at 0.05. $^{**}$ Highly significant differences at 0.01.

4. **Chemical analysis for three ribs region (9-10-11)**:

The statistical analysis showed that there was a significant effect (P≤0.05) of dosing of zinc, vitamin E and mixture between them in terms of moisture content between the first treatment (comparison) than for fourth treatment (zinc + vitamin E) in three ribs region (9-10-11) . The result was in favor of the last treatment in terms of moisture. While there were no significant differences in rates of this characteristic between the first, second and third treatments and on the other hand between the second, third and fourth treatments.The moisture reached 58.28, 60.13, 60.37, 61.02% respectivelly. As for percentage of crude protein the results showed that there was a significant increase (P≤0.05) in rates of crude protein percentage in lambs carcasses of experimental treatments in which lambs were dosed with zinc, vitamin E and a mixture between them compared to the first untreated treatment (table 6).The results of this experiment did not observed any significant differences in percentage of crude protein between the first and second treatments, as well as between the third and fourth treatments. The percentage of crude protein in the three ribs region (9-10-11) were 16.39, 17.21, 17.66, and 18.38% respectively. The results indicated that dose of zinc and vitamin E and mixture between them had a highly significant effect (P≤0.05) on percentage of ether extract of the lambs carcasses between the first treatment compared to the last three treatments. While there were no significant differences between the second and third treatments on the one hand and between third and fourth transactions on the other hand.The percentage of ether extract was 24.34, 21.74, 21.06, and 19.69% for aforementioned treatments respectively (table 6).It was observed from this results a significant decrease in percentage of crude fat for lambs were dosed with zinc , vitamin E and mixture between them than for comparison treatment.This is consistent with what Al-Aswad (2000) mentioned who explained that relationship is an inverse between the percentages of moisture and crude fat in meat t in meat.`.As for the percentage of ash in the three ribs region (9-10-11).The results showed that there was no significant effect of doses of zinc, vitamin E or a mixture between them in percentage of ash which amounted to 0.93, 0.92,0.91,0.90% among treatments respectively (table 6).This results were confirmed with results of a number of researchers including Gabryszuk et al., (2009), Kinal and Slupczynska, (2011) regarding a presence of significant differences in percentage of moisture, crude protein, and crude fat between animals treated with zinc and vitamin E compared to non-treated animals.Also, this results do not agree with the results of Kellogg et al. (2004), Mahmood et al. (2018) and Sushma et al.,(2015) who did not notice significant differences in proportions of moisture, crude protein and ether extract between groups of animals treated and untreated with zinc and selenium.

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**Table 6: Effect of doses of zinc and vitamin E on percentages of chemical analysis meat for three ribs region (9-10-11) of carcasses of Awassi lambs.**

| Traits | First treatment (Control) | Second treatment (Zinc) | third treatment (Vitamin E) | fourth treatment (Zinc +Vitamin E) |
|---|---|---|---|---|
| 1.Percentage of moisture (%)*. | 58.28 ± 0.02 B | 60.13 ± 1.08AB | 60.37 ± 0.03 AB | 61.02 ± 0.48 A |
| 2.Percentage of ash (%)NS. | 0.93 ± 0.01 A | 0.92 ± 0.01 A | 0.91 ± 0.01 A | 0.90 ± 0.01 A |
| 3.Percentage of crude Protein (%)*. | 16.39 ± 0.38 C | 17.21 ± 0.39 BC | 17.66 ± 0.03 AB | 18.38 ± 0.06 A |
| 4. Percentage of ether Extract (%)**. | 24.34 ± 0.45 A | 21.74 ± 0.71 B | 21.06 ± 0.05 BC | 19.69 ± 0.38 C |

Adjectives whose averages bear different letters within one line indicate that there are significant differences at the probability level of 0.05 or 0.01.

NS: Non-significant. * Significant differences at 0.05. ** Highly significant differences at 0.01.

We conclude from this results of the study that dosing groups of Awassi lambs with zinc and vitamin E or with both resulted significant improvement in rates of percentages of major and secondary carcasses in favor of groups of lambs treated with zinc and vitamin E or a mixture together compared to the control group.Also, it was noted from this results of the physical and chemical inventory of three ribs segment (9-10-11) that groups of experimental lambs treated with zinc and vitamin E or mixed together were significantly superior in muscle, moisture and crude protein ratios. While on the other hand, it was offset by significant decrease in percentages of fat and ether extract in favor of the groups of lambs treated with zinc and vitamin E or mixture together compared to the control group.Also,It was found that overlap between zinc and vitamin E contributes to enhancing activity of the body's immune system and activating of lymphocytes (T. Lymphocytes) to protect the body from cancerous diseases of pregnant animals.

**Acknowledgements:**

We extend our thanks and appreciation to College of Agriculture and Forestry, Uiversity of Mosul, for providing research requirements and continuous support for us that helped us to complete this research.

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ISSN: 1671-5497
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**Jilin Daxue Xuebao (Gongxueban)/Journal of Jilin University (Engineering and Technology Edition)**
ISSN: 1671-5497
E-Publication: Online Open Access
Vol: 42 Issue: 01-2023
DOI 10.17605/OSF.IO/2YB8G

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