

## Impact of Weekly Dosages of Different Levels of Vitamin E and Selenium on Milk Productivity and its Components for Local Goats in Al-Muthanna Governorate

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### Abstract

*This experiment was conducted in one of the private fields of goat farmers in Muthanna Governorate, from 13/12/2024 to 24/1/2025 for a period of 6 weeks, to know the effect of weekly dosing with different levels of vitamin E and selenium on milk productivity and its components for local goats in Muthanna Governorate. As 12 goats (with newborns) were selected at the age of 4-5 years. The animals were divided into four treatments (each treatment had 3 animals), as the treatments were T1 (control treatment). As for the treatments T2, T3 and T4, the goats were dosed weekly with vitamin E (at a dose of 1, 1.5 and 2 mg) with selenium at a dose of 30, 45 and 60 µg). The results indicated that all treatments of vitamin E and selenium doses were significantly superior in all studied characteristics, except for the percentage of lactose in milk, did not have a significant effect. The best level of vitamin E and selenium doses was 2 mg vitamin E and 60 µg selenium (T4).*

**Keywords:** dosages, vitamin E, selenium, milk productive, milk components, local goats, Al-Muthanna Governorate

### Introduction:

Vitamin E plays an important role in increasing milk production and protecting milk fat from oxidation, which unsaturated fats in milk are exposed to. Giving vitamin E and selenium to dairy cows, especially in the period before calving sustains the immune system of cows, and causes an increase in the level of globulins in the blood and milk, while a decrease in the level of vitamin E and selenium leads to an increase in the incidence of retained placenta and mastitis [1].

It increases the value of milk by improving the quality of milk [2]. Giving selenium and vitamin E to pregnant cows led to enhancing the effectiveness of neutrophils [3,4]. Milk production also decreased in ewes suffering from selenium deficiency [5].

Yang *et al* [6] indicated that vitamin E is important as an antioxidant in the entire body, especially in protecting the mammary glands in dairy goats, it did not affect the quantity and quality of milk produced by goats treated with vitamin E. The percentage of milk fat was not affected by the addition of vitamin E. The effect of antioxidants in the udder is greater during the lactation period, due to the increased release of free radicals related to the increased metabolic activity of the body. The decrease in the level of selenium in the diet of female goats led to a decrease in the pregnancy rate by about 33% and a decrease in the number of lambs

born by 50%, milk production by 23%, milk fat by 11% and protein by 12%, compared to animals that got their sufficiency of selenium and vitamin E [7].

An increase in the density and fat content of goat milk was found when goats were fed diets containing an appropriate amount of selenium compared to the control group [8]. Increasing selenium in the diet led to an increase in the percentage of milk protein [9]. Al-Karkhi [10] reported a significant increase in milk production when pregnant ewes were treated with selenium and vitamin E by intramuscular injection at a rate of 900 mg of vitamin E and 3 mg of selenium.

Falkowska *et al.* [11] indicated an increase in daily milk production, as well as an increase in the percentage of fat and protein in cows treated with vitamin E. Injecting buffaloes with selenium at a dose of 5 mg/animal and vitamin E at a dose of 500 mg/animal and in two doses on the 15th and 30th day, before the expected date of birth led to an increase in colostrum production by 22% and milk by 7% compared to the control group. The weights of calves at birth were 3% higher and the weights of calves were 12% higher at the age of 4 months compared to the calves of the control group [12].

Colostrum and milk production increased significantly in cows treated with selenium and vitamin E in the late pregnancy period [13]. Selenium supplementation led to an increase in the level of globulins in the blood serum and colostrum of cows [14], while Awadeh *et al.* [15] indicated an increase in the level of globulins in the colostrum of cows fed a diet rich in selenium during the late pregnancy period, while feeding pregnant ewes a diet lacking selenium led to a decrease in the percentage of milk fat, protein and total solids compared to the control group [16]. Turner and Finch [17] indicated the role of selenium and vitamin E in maintaining milk production and udder health in dairy cows.

This experiment aims to study the effect of weekly dosing with different levels of vitamin E and selenium on milk productivity and its components for local goats in Muthanna Governorate.

## **Materials and methods**

This experiment was conducted in one of the private fields of goat farmers in Muthanna Governorate, for the period from 13/12/2024 to 24/1/2025 for a period of 6 weeks, to determine the effect of weekly doses with different levels of vitamin E and selenium, on milk productivity and its components for local goats in Muthanna Governorate. As 12 goats (with newborns) were selected at the age of 4-5 years.

Animals were fed a concentrated feed for ruminants at a rate of 2.5% of body weight. Adjusted every two weeks when weighing animals, in addition to providing roughage at a rate of 500 gm /animal per day with the possibility of free grazing. Providing green fodder in pens equipped with mineral salt molds. The concentrated feed consisted of barley (37%), Wheat bran (45%), Yellow corn (10%), Vegetable protein (5%), Limestone (2%), salt (1%). The percentage of crude protein in the feed was 13.5%.

Animals were divided into four treatments (each treatment had 3 animals), as follows:

**T1:** Control treatment.

**T2:** Weekly dosage of vitamin E (1 mg) with selenium (30 µg).

**T3:** Weekly dosage of vitamin E (1.5 mg) with selenium (45 µg).

**T4:** Weekly dosage of vitamin E (2 mg) with selenium (60 µg).

Milk samples were collected weekly after milking by hand, and the amount of milk produced was recorded, with the addition of milk that was suckled by the kid (through the difference in weight before and after suckling). The proportions of milk components were measured by Ecomilk device, at the graduate laboratory of the Faculty of Agriculture.

## Results and Discussion

Table (1) shows the effect of weekly dosing with different levels of vitamin E and selenium on milk productivity of local goats in Muthanna Governorate, there were no significant differences between all treatments in the first and second weeks of the experiment. As for the third, fourth and fifth weeks of the experiment, there was a significant effect of vitamin E and selenium dosing on milk productivity compared to the control treatment, as treatment T2 led to a significant increase compared to the control treatment. There were no significant differences between treatments T1, T2 and T3 on the one hand, and treatments T2, T3 and T4 on the other hand. In the fifth week of the experiment, treatment T5 outperformed significantly compared to treatment T2, which outperformed significantly compared to the control treatment, there were no significant differences between treatments T2 and T3 on the one hand, and treatments T3 and T4 on the other hand. In total production throughout the experiment period, it is noted that treatment T4 increased significantly by 16.63 kg, compared to treatment T3 (15.58 kg), it was significantly superior compared to treatment T2 (14.79 kg), which was significantly superior compared to the control treatment, which amounted to 14.29 kg.

**Table (1) Effect of weekly dosages of different levels of vitamin E and selenium on milk productivity (kg) of local goats in Muthanna Governorate.**

Treatments	Periods (weeks)						Total
	1	2	3	4	5	6	
<b>T1</b>	2.14	2.35	2.22 b	2.41 b	2.55 b	2.62 c	14.29 d
<b>T2</b>	2.04	2.19	2.37 ab	2.59 ab	2.72 ab	2.88 b	14.79 c
<b>T3</b>	2.21	2.31	2.45 ab	2.63 ab	2.89 ab	3.09 ab	15.58 b
<b>T4</b>	2.11	2.43	2.67 a	2.94 a	3.14 a	3.34 a	16.63 a
<b>SE</b>	0.05	0.02	0.11	0.09	0.14	0.16	0.22
<b>Sig.</b>	N.S	N.S	*	*	*	*	*

The reason for the increase in milk production in the E+Se treatments and its superiority over the control group may be due to the effect of vitamin E and selenium [18], because vitamin E and selenium deficiency leads to a decrease in immunity and thus exposes ewes to mastitis and

stress, and as a result milk production decreases [19]. Or the reason for the superiority of the group in milk production may be due to the effect of selenium in enhancing the role of the enzyme glutathione peroxidase, which protects the body from the effects of oxidation [16, 20].

Table (2) shows the effect of weekly dosing with different levels of vitamin E and selenium on the percentage of fat (%) of local goat milk in Muthanna Governorate, there were no significant differences between all experimental treatments during the first, second and third weeks of the experiment. In the fourth and fifth weeks of the experiment, there was a significant effect of dosing both vitamin E and selenium on the percentage of fat of local goat milk, as a significant increase in the percentage of fat in T4 compared to the control treatment. There were no significant differences among treatments T1, T2 and T3 on the one hand, and treatments T2, T3 and T4 on the other hand. In the fifth week of the experiment, treatment T5 was significantly superior compared to treatment T2, which was significantly superior compared to the control treatment. There were no significant differences between treatments T2 and T3 on the one hand, and treatments T3 and T4 on the other hand. In the average fat percentage throughout the experiment, a significant increase was observed for treatment T4 by 3.22%, compared to treatment T2 (3.06%), which did not differ significantly with treatment T3 (3.13%), which was significantly superior compared to the control treatment, which gave the lowest fat percentage (2.94%).

**Table (2) Effect of weekly dosages of different levels of vitamin E and selenium on the percentage of fat (%) of local goat milk in Al-Muthanna Governorate.**

Treatments	Periods (weeks)						Total
	1	2	3	4	5	6	
<b>T1</b>	2.95	2.93	2.90	.296 b	.295 b	.297 c	2.94 c
<b>T2</b>	2.77	3.03	3.07	3.11 ab	3.17 ab	3.22 b	3.06 b
<b>T3</b>	2.85	3.06	3.12	3.21 ab	3.25 ab	.331 ab	3.13 ab
<b>T4</b>	3.01	3.11	3.14	3.29 a	.333 a	.342 a	3.22 a
<b>SE</b>	0.17	0.25	0.06	0.09	0.22	0.19	0.31
<b>Sig.</b>	N.S	N.S	N.S	*	*	*	*

Table (3) indicates the effect of weekly dosing with different levels of vitamin E and selenium on the percentage of total protein (%) of local goat milk in Muthanna Governorate. There were no significant differences between all experimental treatments during the first, second and third weeks of the experiment. In the fourth and fifth weeks of the experiment, a significant effect is observed for dosing both vitamin E and selenium on the percentage of total protein of local goat milk. A significant increase in the percentage of total protein in T4 compared to the control treatment. There were no significant differences between treatments T1, T2 and T3 on the one hand and treatments T2, T3 and T4 on the other hand. In the fifth week of the experiment, treatment T5 was significantly superior compared to treatment T2, which was significantly

superior compared to the control treatment. There were no significant differences between treatments T2 and T3 on the one hand and treatments T3 and T4 on the other hand. In the total protein ratio rate throughout the experiment, a significant increase was observed for treatment T4 by 3.40%, compared to treatment T2 (3.35), which did not differ significantly with treatment T3 (3.34), which was significantly superior compared to the control treatment, which gave the lowest total protein ratio (3.23%).

**Table (3) Effect of weekly doses of different levels of vitamin E and selenium on the total protein percentage (%) of local goat milk in Al-Muthanna Governorate.**

Treatments	Periods (weeks)						Total
	1	2	3	4	5	6	
<b>T1</b>	3.22	3.26	3.21	3.29 b	3.25 b	3.20 c	3.23 c
<b>T2</b>	3.24	.329	3.31	3.37 ab	3.39 ab	3.42 b	3.34 b
<b>T3</b>	3.21	.332	3.34	3.39 ab	3.40 ab	.346 ab	3.35 ab
<b>T4</b>	.326	.333	3.39	3.43 a	.346 a	.350 a	3.40 a
<b>SE</b>	0.24	0.19	0.15	0.11	0.08	0.16	0.22
<b>Sig.</b>	N.S	N.S	N.S	*	*	*	*

Table (4) shows the effect of weekly doses with different levels of vitamin E and selenium on the percentage of lactose (%) of local goat milk in Muthanna Governorate, as weekly doses with different levels of vitamin E and selenium did not significantly affect the percentage of lactose throughout the experiment. Treatment T4 gave the highest percentage of lactose at a rate of 4.27%, while the control treatment gave the lowest percentage, which amounted to 4.21%.

**Table (4) Effect of weekly doses of different levels of vitamin E and selenium on the lactose content (%) of local goat milk in Muthanna Governorate.**

Treatments	Periods (weeks)						Total
	1	2	3	4	5	6	
<b>T1</b>	4.20	4.22	4.21	4.22	4.20	4.20	4.21
<b>T2</b>	4.19	.424	4.25	4.26	4.25	4.26	4.24
<b>T3</b>	4.22	4.26	4.27	4.27	4.28	4.28	4.26
<b>T4</b>	4.21	4.27	4.28	4.28	4.30	4.30	4.27
<b>SE</b>	0.06	0.03	0.11	0.17	0.20	0.14	0.06
<b>Sig.</b>	N.S	N.S	N.S	N.S	N.S	N.S	N.S

Table (5) shows the effect of weekly dosing with different levels of vitamin E and selenium on the percentage of non-fat solids (%) of local goat milk in Muthanna Governorate. There were no significant differences between all experimental treatments during the first, second and third weeks of the experiment. In the fourth and fifth weeks of the experiment, it is noted that there

is a significant effect of dosing both vitamin E and selenium on the percentage of non-fat solids of local goat milk, aA significant increase in T4 compared to the control treatment. There are no significant differences between treatments T1, T2 and T3 on the one hand, and treatments T2, T3 and T4 on the other hand. At the sixth week of the experiment, the T4 treatment was significantly superior compared to the T2 treatment, which did not differ significantly compared to the T3 treatment, which was significantly superior compared to the control treatment, on the total rate of the percentage of non-fat solids throughout the experiment period. The T4 treatment was significantly superior by a rate of 9.66%, compared to the T2 treatment (9.59%) and the control treatment (9.50%), T4 was not significantly different from the T3 treatment (9.63%).

**Table (5) Effect of weekly dosages of different levels of vitamin E and selenium on the percentage of non-fat solids (%) of local goat milk in Al-Muthanna Governorate.**

Treatments	Periods (weeks)						Total
	1	2	3	4	5	6	
<b>T1</b>	9.52	9.47	9.51	.948 b	9.50 b	9.49 c	9.50 c
<b>T2</b>	9.49	9.52	9.55	9.62 ab	9.65 ab	9.69 b	9.59 bc
<b>T3</b>	9.55	9.55	9.57	9.67 ab	9.71 ab	9.75 ab	9.63 ab
<b>T4</b>	9.48	9.57	9.60	9.72 a	9.76 a	9.81 a	9.66 a
<b>SE</b>	0.11	0.07	0.12	0.25	0.31	0.29	0.36
<b>Sig.</b>	N.S	N.S	N.S	*	*	*	*

The increase in the percentage of fat in T4 treatment milk may be due to the role of vitamin E and selenium as antioxidants, as they protect fat molecules from being destroyed by oxidation, thus increasing the percentage of milk fat [8,21]. Swanson *et al.* [16] found that there is a relationship between selenium deficiency and low milk fat, while Yang *et al.* [6] found that vitamin E does not affect the percentage of milk fat.

The increase in the percentage of protein in T4 treatment milk may be due to the role of selenium in increasing protein production [9], as selenium leads to increased protein production in tissue culture and inside the body [22].

The increase in the percentage of non-fat solids in T4 treatment milk may be due to the increase in the level of selenium, which leads to an increase in the percentage of ash in Milk as well as increased milk protein content which may lead to increased non-fat solids content [23].

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