How to Cite:
Karkouch, M. H., & Adhab, A. A. (2022). Effect oral administration zinc oxide nanoparticles' or metal for Local Awassi Ewes in some productive trails. *International Journal of Health Sciences*, *6*(S3), 12062–12069.
https://doi.org/10.53730/ijhs.v6nS3.9065

Effect oral administration zinc oxide nanoparticles' or metal for Local Awassi Ewes in some productive trails

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***Abstract*---**This experiment was conducted in a field of a breeder (private sector) in Wasit Governorate / Kut district for the period from 1/7/2021 to 1/4/2022. 50 pregnant local Awassi sheep, aged 3-4 years, with average 62.00±0.5kg Body weight were used in this experiment to study the effect of dosing on Nano zinc oxide. Or mineral for local Awassi ewes in some productive traits. The ewes were divided into 5 groups, a control group and four treatments, each group comprising 10 ewes. The first group represented the control group without addition, the first treatment was 40 mg/animal/day Zno, the second treatment was 20 mg/animal/day nZno, and the third treatment was 60 mg/animal/day Zno and the fourth treatment 30 mg/animal/day nZno. Ewes were dosed with zinc capsules at the beginning of the fourth month of pregnancy on 1/10/2021 and until30/11/2021. The results of this study showed that there were no significant differences in the weight of ewes for the control group and the first, second, third and fourth treatment when mating , and at the fourth month of pregnancy and the fifth month and at birth and the subsequent months, the first, second and third after birth, the second and fourth treatment recorded the highest birth weight at birth for lambs and significantly (P≤0.05) outperformed the control group and the first and third treatment, highly significant (P≤0.01) for the second and fourth treatment over the control group and the first and third treatment in weight in the first month, and the second and fourth treatments recorded the highest weight at weaning and were highly significant (P≤0.01) over the control group and the third treatment, and there were no significant differences between the treatments The second, fourth and first treatments, The second and fourth treatments were significantly (P≤0.05) superior to the control group and the third treatment. In milk production at the second month, the second and

fourth treatments were significantly (P≤0.05) superior at the third month in milk production.

***Keywords*---**local Awassi sheep, Nano, zinc oxide, birth weight, milk.

Introduction

The trace elements are necessary to feed animals, and are required in quantities smaller or equal to 100 mg / kg in the dry food, and these elements include (iron, zinc, copper, manganese, selenium), and in the event of a deficiency of one or all of them in the components of natural feed will require the use of supplements To make the diet nutritionally complete (Miller *et al,* 1991), and micro minerals have a great importance and impact on animal physiology and reproduction, and most of the rough and commercial feeds have a deficiency in trace mineral elements, and the imbalance of these elements leads to many problems, including a decrease in The reproductive efficiency of the animal, which is therefore an economic loss (Kumar *et al*, 2011). One of the most important of these trace elements is zinc, which has a vital role in the animal and is an essential component in more than 200 mineral enzymes, and participates in protein synthesis, carbohydrate metabolism, and many reactions Other biochemical (Salim *et al*, 2008), and zinc is necessary and important for ruminants, where preliminary studies indicated that zinc helps in the digestion process and in the case of its deficiency causes problems in the digestive system. For animal growth and reproduction (Suttle, 2000). And zinc is fed in the form of inorganic salts, for example, zinc oxide (ZnO) and zinc sulfate (Znso4).

However, enhancing the availability of zinc biologically can help improve livestock performance (Abedini *et al.*, 2018). Nanoparticles of metallic elements have higher bioavailability, due to their novel properties such as larger surface area, higher surface activity, high catalytic efficiency, and stronger adsorption capacity (Manuja *et al.*, 2012). The metal is excreted and polluted the environment (Raje *et al*, 2018), also the positive effect of nanoparticles used as feed additives in most cases was reflected in an increase in body weight (Mohamed *et al.,* 2017) It is one of the important productive characteristics as the breeder seeks to obtain the best birth weight and thus increase the profit during a short period of time, which is the period before weaning (Abdel Nour, 2011), and (Adhab *et al,*2015) mentioned that the birth weights of Awassi sheep in the first, second, third and fourth month of a flock Grazing reached 22.61, 17.25, 11.11 and 27.55 kg, respectively, an increase in the average daily weight gain, and an improvement in the efficiency of feed conversion (Bakowaski *et al*, 2018). Thus, the main objective of the current study was to know the effect of different levels of dietary or mineral zinc oxide on some productive traits of local Awassi ewes, and the growth of their lambs.

Materials and Methods

Experimental site

The experiment was conducted in Wasit Governorate / Kut district in a field belonging to a sheep breeder (private sector) west of Kut city for the period from 1/7/2021 for 1/4/2022. To know the effect of Nano or metallic zinc on some productive traits and growth characteristics of local Awassi ewes and their lambs.

Experimental Animals

The experimental animals were monitored from the beginning of the fertilization until the weaning of the newborns (3 months). The mothers and their newborns were weighed at birth and then monthly until weaning. The ewes were spoiled, as the ewes were placed with the rams for the duration of the vaccination period from the beginning of the fertilization1/7/2021. Where a specific number was placed on the back of the ewe, indicating the date of insemination with spry dye, and the date of insemination of each ewe was recorded. The ewes were grazing in the morning from six in the morning until eleven in the morning and from three to seven in the evening in summer, while in winter they were grazing from seven in the morning to four in the afternoon with giving agricultural crop residues such as wheat straw, barley straw after cutting it and yellow corn and barley groats Barley groats with different types of grains with crushed hay and served to the animals in the evening after returning from the pasture, at the rate of 500 g per head in a feeder be displayed 50cm width 60 cm high and 10 m long. It provides clean drinking water for animals. In the barn there is an iron basin with an area of (2 m * 0.75) cm, in which drinking water is placed for the animals.

Experimental Design

The experimental animals consisted of 50 Awassi sheep, divided into 5 groups, 10 ewes per group. Each group was numbered sequentially from 1-10. Each group was given a color with spry dye. Its initial weight was recorded after mating on1/7/2021. The capsules were filled with zinc oxide. Nano or metallic ones and weighed with a sensitive scale in the laboratory of the Department of Animal Production / College of Agriculture Wasit University for each treatment as follows: (40 mg/animal/day Zno, 20 mg/animal/day nZno, 60 mg/animal/day Zno, 30 mg/ animal/day nZno).

Studied traits

- Ewe weights: Ewes were weighed with a scale of 150 kg with a sensitivity of 0.5 kg every month from the beginning of the experiment until weaning.
- Newborn weights: Newborns were weighed with an electronic scale of 500 kg with a sensitivity of 50 g at birth and every month until weaning.
- Milk production: By hands milking method was used to collect milk samples once a week after Isolation the lambs for 12 hours from the mothers and milking the next morning and multiplying the result by 2 according to the ICAR method (1992).

Statistical analysis

The data of the experiment were analyzed using the Complete Randomized Design (CRD) to determine the effect of the treatments on the studied traits and the significant differences between the means were compared with (Duncan,1955) polynomial test, and the ready-made statistical program (SAS) (2012) was used in the statistical analysis According to the following mathematical model:
Yij= the observed value j of the transaction i. μ= the overall mean
Ti= effect of treatment. Eij=the Experimental error.

Results and Discussions

Ewes Weight

From Table (1) there are no significant differences between the control group and the four treatments in the initial weight, the weight at the end of the fourth month of pregnancy, the end of the fifth month of pregnancy, at birth, and the first, second and third month after birth, as there were arithmetical differences but Did not reach the level of morale. Where the initial weight was 62.60, 62.20, 62.25, 62.20, 61.90 kg, respectively, for each of the control group and the first, second, third and fourth treatment, respectively This result agreed with(Mohamed *et al*,2017), where they noticed that there were no significant differences in the initial weight of ewes when using metallic and Nano zinc oxide in pregnant ewes, where the weight reached 39.20,39.08,39.83 kg for the treatment of Nano zinc oxide, metallic zinc oxide and the control group, respectively. It differed with the same researcher in the postpartum period, the lactation period, where there were significant differences between the treatment of Nano-zinc oxide and the control group, which amounted to 36.42, 39.08 kg, respectively, and at weaning, it reached 37.32, 42.00 kg, respectively, and this result agreed with(Abo-El-haded *et al* ,2021) where they noticed that there were no Significant differences between the treatments and the control group in , The initial weight, after birth, and at weaning in the weights of ewes at The use of three different sources of zinc, zinc sulfate, zinc methionine, And zinc oxide nanoparticles, as a control group.

Table1
Effect of Nano or metallic zinc Oxide dosing on Awassi Ewes' Weights (kg) (Mean ± standard error)

Treatment / Periods	Control	T1 40mg Zno	T2 20mg nZno	T3 60mg Zno	T4 30mg nZno	Sig Test
Initial body weight/kg	61.90a ±0.36	62.20a ±0.25	62.25a ±0.42	a 62.20 ±0.35	a62.60 ±0.28	N.S
4 Month of pregnant/kg	62.95a ±0.25	63.15a ±0.15	63.25a ±0.28	63.45a ±0.19	63.40a ±0.23	N.S
5 Month of Pregnant/kg	64.05a ±0.24	64.25a ±0.23	64.45a ±0.19	64.30a ±0.28	64.60a ±0.32	N.S
Birth weight/kg	57.00a ±0.46	56.19a ±0.65	56.33a ± 0.53	57.15a ± 0.46	57.40a ± 0.53	N.S
First/kg	55.77a	54.94a	55.83a	55.55a	55.40a	N.S

	±0.44	± 0.65	± 0.33	± 0.32	± 0.43	
Second/kg	55.55a ± 0.61	54.44a ± 0.47	55.05a ± 0.44	55.10a ± 0.39	54.60a ± 0.69	N.S
Third/kg	55.72a ± 0.40	54.56a ± 0.95	55.33a ± 0.42	55.50a ± 0.38	55.55a ± 0.59	N.S

N.S=Not significant

Lambs Weight

From Table (2) the weights of the newborns of the second and fourth treatment were significantly (P ≤ 0.05) superior to the weights of the control group, and the first and third treatments in birth weight, and there were no significant differences between the control group, and the first and third treatments in birth weight. The weight of the newborns at birth was 4.92,4.19,4.97,4.33,4.25 kg for each of the control and treatment groups (1,2,3,4), respectively, and the second and fourth treatment were significantly (P≤0.05) superior in weight at the first month On the control group and the first and third treatment, while there were no significant differences between the control group and the first and third treatment, and for the weight of newborns in the second month, there were no significant differences between the treatments and the control group, as there were arithmetic differences but did not reach the level of morale, and at the weight of Weaning of newborns, the second and fourth treatment (P≤0.01) were highly superior to the control group and the third treatment, and there were no significant differences between the first, second and fourth treatment.

This result differed with (Monem and El-Shahat,2011) found when zinc oxide was used in ewes, which is that there were no significant differences between treatments and the control group in the weights of newborns at birth. This result agreed with what (Mohamed *et al* ,2017) mentioned when using Nano-zinc oxide and zinc oxide as a control group, and the superiority of the Nano-zinc oxide treatment over the zinc oxide treatment and the control group in the weights of newborns at birth reached 3.90,3.34,3.18 kg, respectively and weaning weight. This result agreed with what was observed by (Abo-El-haded *et al,* 2021) in pregnant ewes when using Nano-zinc oxide, zinc methionine and zinc sulfate as a control group, and significantly (P≤0.05) the Nano-zinc oxide treatment over the zinc sulfate treatment and the control group. At birth and weaning weight.

Table 2
Effect of dosing Nano or metallic zinc oxide on birth weights (kg)

(Mean ± standard error)

Age	Control	T1 40mg Zno	T2 20mg nZno	T3 60mg Zno	T4 30mg nZno	Sig Test
Birth Weight	4.25b ± 0.24	4.33b ±0.25	4.97a 0.16±	4.19b ± 0.19	4.92a ± 0.23	*
First month	9.56b ± 0.60	9.71b ± 0.58	11.73a ±0.38	9.60b ±0.30	11.78a ± 0.49	**
Second Month	16.85a ± 0.98	17.49a ±0.99	18.81a ± 0.40	17.03a 0.56±	18.96a ± 0.60	N.S

Third month	23.73b ± 1.43	25.58ab ± 0.97	27.56a ± 0.50	24.11b ± 0.66	27.24a ±0.70	**

Means with different letters within the same row mean that there are significant differences at the level of probability (P≤0.05)
*significant, ** (P≤0.01) highly significant
N.S not significant.

Milk Production

Table (3) shows the monthly milk production for the treatments (1,2,3,4) and the control group during the lactation months, and it is noted that there are no significant differences between the treatments (1,2,3,4) and the control group at the first month of milk production, As there were arithmetic differences, but did not reach the level of significance, while treatment (2,4) was significantly (P≤0.05) superior to treatment (3) and the control group in the second month of lactation in milk production, and there were no significant differences between the treatments (2,4), and treatment (1), and at the third month of lactation, treatments (2,4) were significantly superior to treatment (3) and the control group (P≤0.05), and there were no significant differences between treatments (2,4) and treatment (1),This result agreed with (Mohamed *et al* ,2017) when using Nano-zinc oxide and zinc oxide in the control group and the superiority of the Nano-zinc treatment as it reached the peak of milk production in the fifth week of the second month compared to the zinc oxide treatment and the control group, this result also agreed. With what was indicated by (Abo-El-haded *et al*,2021) in pregnant ewes, the treatment of Nano-zinc was superior to that of zinc sulfate and the control group, and in the sixth week at the second month of lactation, and this result agreed with what (Mohamed *et al* ,2017) mentioned. The superiority of Nano- zinc treatment significantly, where the highest value of milk production was recorded in the tenth week, the third month of the lactation period, in comparison with the other groups. And the control group, and there were no significant differences between the zinc nanoparticle treatment and the zinc methionine treatment, where the highest value of milk production was recorded in the third month at the end of the lactation period. The reason for this may be due to the disease of a number of ewes in the treatments that produce less milk with inflammation in the udder, full or half of the udder cirrhosis, as for the better-productive treatments, the reason may be due to the improvement of the digestive treatments of the food in order to improve the digestive enzymes, and the secretion of the hormone prolactin, which works on Initiation and continuation of milk, as nano zinc has an important role in the synthesis of enzymes and hormones, As mentioned by (Zalewski *et al,*2005).

Table 3
Effect of Nano or metallic zinc oxide dosing on milk production for Awassi ewes
(Mean ± standard error)

Treatment / Periods	Control	T1 40mg Zno	T2 20mg nZno	T3 60mg Zno	T4 30mg nZno	Sig Test
First Month	9.01a ±1.04	9.28a ± 0.81	10.34a ± 0.48	9.14a ± 0.67	10.26a ± 0.48	N.S

Second Month	7.25b ± 0.68	8.03ab ± 0.74	9.01a ± 0.45	7.02b ± 0.52	8.98a ± 0.38	*
Third Month	6.26b ± 0.62	7.60ab ± 0.59	8.08a ± 0.33	6.22b ± 0.73	8.01a ± 0.29	*

Means with different letters within the same row mean that there are significant differences at the level of probability (P≤0.05)
*significant, ** (P≤0.01) highly significant
N.S not significant

Conclusions

There was no significant effect of Nano or metallic zinc oxide on the weight of ewes during pregnancy, postpartum period and until weaning of the newborns. Significantly (P≤0.05) the treatments of Nano-zinc, the second and fourth treatments, were superior to the other treatments in terms of birth weights at birth and highly significant (P≤0.01) at the first, third month after birth, in weight on the third treatment and control group, The second and fourth treatment were significantly (P≤0.05) superior to the control group and the third treatment in milk production, and there were no significant differences between the second and fourth treatment and the metallic zinc oxide treatment with a concentration of 40/mg at the second and third month.

Acknowledgments

We extend our thanks and appreciation to the laboratories of the College of Agriculture at the Universities of Diyala and Wasit for their assistance in carrying out this experiment.

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