

Effect of trace minerals from different sources on growth performance of Baluchi male lambs

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Abstract

To achieve a high level of performance in animal's farms, adding mineral supplementation such as Zn, Cu and Mn can seem necessary to provide the normal requirements of livestock. In the current study, the effectiveness of supplementation capsules of mineral mixture from different resources on growth in Baluchi lambs receiving mineral-supplements was investigated. Twenty-five Baluchi fattening lambs were randomly housed and assigned to four dietary treatments over the course of 60 day, as follows: T1: the control group (without received mineral-supplemented capsulate); T2: the treated group with receiving Zn-Cu-Mn-sulfate supplemented capsulate; T3: the treated group with receiving mixed 70%Zn-Cu-Mn-sulfate+30%Zn-Cu-Mn-hydroxychloride supplemented capsulate, T4: the treated group with receiving sulphate-organic 70%Zn-Cu-Mn-sulft+30% Zn-Cu-Mn-Meth supplemented capsulate. The results show that supplementation with a mixture of organic-sulfate minerals improved body weight gain (kg) and average daily gain (ADG) compared to lambs groups receiving just inorganic mineral supplementation during the 60 d of the trial. Feed conversion ratio was notably ($P<0.05$) lower in the organic group compared to sulfate and the control groups. The findings of this research indicated that providing one third livestock's mineral requirements from organic mineral source improves performance in the fattening lambs.

Keywords: trace mineral, growth performance, lambs

Introduction

To gain a high level of performance in animal's farms, adding mineral supplementation can seem necessary to provide the normal requirements of animals. Zinc (Zn), manganese (Mn) and copper (Cu) are vital trace elements for function in farm livestock (Spears, 1996). Trace mineral elements (TM) play important roles in the function of various cellular systems and structural development and the mineral status of dairy calves depend on many factors. It is therefore, vitally important that sufficient TM status is set up at birth and be sustain to ensure that adequate stores are present for better animal performance, especially if they are challenged by stressors or disease agents. Many animal physiological processes, such as the immune system, can be highly affected by the availability of essential minerals elements and their nutrition are vital for various biochemical processes, including cell replication, immune response and skeletal growth, especially for the new-born calves (Carroll & Forsberg, 2007).

Materials and methods

Twenty-five three month old male Baluchi lambs with an initial body weight (BW) of 40.2 ± 1.6 kg were used in the research. To keep away from infection, all the lambs were housed in single iron fences and beds of clean straw. A starter concentrate was formulated according to NRC (2001), recommendations to be adequate in protein, energy, vitamins and minerals which was fed to each lamb over the course of 60 days of trial. One third lamb's mineral requirements provided from organic and hydroxychloride mineral source instead of sulfate source. The body weight of individual Baluchi lambs was documented at the beginning of the trial (1 day), middle of trial (30 day) and at end of trail in the begging of morning, before watering and feeding, to evaluated the changes average daily gain (ADG) and body weight gain (BWG).

Statistical analysis

Elevated of the BW data was carried out according to the Durbin-Watson test and illustrated that the randomization was effective. The effect of mineral source on the growth performance, mineral intake and antioxidant concentration was evaluated by subjecting the data to one-way ANOVA in the mixed procedure of SAS 9.4 (SAS Institute Inc., Cary, NC).

Result

The dry matter intake, average daily gain, feed efficiency are indicated in Table 2. No significant differences ($P > 0.05$) were observed in the average of DMI and final weight of the lambs in different experimental groups. It is noticeable that supplementation of different forms of minerals in all but one of three forms improved the average daily gain and feed efficiency in comparison with the control treatment (Table 2). According to plenty of studies, trace elements are vital factors for multiple functions, such immune responses, antioxidant activity, skeletal development, and growth performance in livestock (Underwood EJ, Suttle, 1999). Providing one third lamb's mineral requirements from organic mineral source (mixed organic and inorganic sulphate) improved body weight gain (kg) compare to the treated group just received sulfate form, while no significant differences found in DMI, in agreement with the previous research that supplementation of diets with Zn methionine had no significant effect on DMI in growing lambs (Droke et al 1998, Fadayifar et al 2012), goats (Salama et al 2003), and beef steers (Mandal et al 2007).

Table 2. Body weight change, average weight gain, DMI of Baluchi lambs fed with capsulated supplementary minerals

Performance	Control	Experimental treatments			SEM	P.value
		100%Zn-Cu-Mn-sulft	70%Zn-Cu-Mn-sulft+30%Zn-Cu-Mn-oxide	70%Zn-Cu-Mn-sulft+30%Zn-Cu-Mn-Met		
Basal diet intake(g/day)	1715.42	1691.05	1705.23	1701.74	118.35	0.6768
Initial BW(kg)	32.8	31.8	33.2	33	2.44	0.99
Final BW(kg)	50.80	47.2	52.60	53.80	3.28	0.30
Average daily gain(g/day)	0.30	0.26	0.32	0.35	0.08	0.99
Feed efficiency (%)	5.72	6.50	5.33	4.86	0.027	0.02

Means in the same row with different superscripts are significantly different ($P \leq 0.05$).

¹Cu-Met = copper methionine group, ²Zn-Met = zinc methionine group; ³Mn-Met = Manganese methionine group.

Conclusion

The dietary supplementation with mixed both sulfate and organic minerals improved the feed efficiency and body weight gain of lambs over the course of 60 days. Therefore, the use of Zn, Cu and Mn in organic forms in part of



supplementation can be a new strategy to improve the body weight gain and immune responses of lambs in long-term practical feeding.

References

- Spears, J.W., 1996. Organic trace minerals in ruminant nutrition. *Anim. Feed Sci. Technol.* 58, 151–163.
- Carroll, J.A., Forsberg, N.E. 2007. Influence of stress and nutrition on cattle immunity. *Vet. Clin. North Am. Food Anim. Pract.* , **23**, 105–149.
- Underwood, E.J., 1981. *The Mineral Nutrition of Livestock*, 2nd ed. Commonwealth Agricultural Bureaux, London, UK.
- Salama AAK, Caja G, Albanell E, Such X, Caslas R, Plaixats. Effects of dietary supplements of zinc-methionine on milk production, udder health and zinc metabolism in dairy goats. *J Dairy Res* 2003; 70: 9–17.