EFFECT OF MINERAL BLOCKS ADDITION ON FATTENING RABBIT PERFORMANCE

Zerrouki N.[1]*, Lebas F.[2], Davoust C.[3], Corrent E.[3]

[1]Université Mouloud Mameri, Laboratoire de Biochimie Analytique et Biotechnologies BP 17 RP, 15000 Tizi-Ouzou, Algeria
[2]Cuniculture, 87A Chemin de Lassère, 31450 Corronsac, France
[3]INZO, BP 19, Chierry, 02402 Château-Thierry, France
*Corresponding author: nacera_zerrouki@yahoo.fr

ABSTRACT

One hundred twenty rabbits of the Algerian locally called «white population» were distributed at weaning (35 d) between two equivalent groups according to weaning weight (590 g on average) and litter origin. Rabbits were placed in collective cages of six. The control group received *ad libitum* during the 5 weeks of the study a commercial pelleted diet (36% alfalfa, 25% barley, 26% hard wheat bran, 12% soybean meal, 1% of minerals and vitamins), and fresh water through automatic nipple drinkers. The experimental group was caged and fed in the same conditions, but in addition a commercial mineral block (Blocs Harmony, Inzo, France) was fixed along a wall in each cage. New blocks were placed every week even if blocks were "consumed" within a shorter time. Mineral blocks (225 g, 47% total ash) contained mainly calcium (12%), trace elements (Cu, Mn, Zn and Se) and few total phosphorus (1.5%) and sodium (2%). An average mortality of 17.5% was observed during the experiment (the first 3 weeks) but without difference between treatments. In presence of mineral blocks, average pelleted feed intake was increased by 16% (68.3 vs. 59.0 g/d.; P=0.008) as was the growth rate (33.6 vs. 28.3 g/d; P=0.001). Feed conversion ratio was not significantly modified (2.84 with blocks and 2.92 for the control; P>0.05). At 10 weeks of age, the final live weight of rabbits with mineral block was 188 g higher than that of the control rabbits (1767 vs. 1579 g; P=0.02). Despite the high inclusion level of alfalfa in the commercial diet, its analytical calcium content was lower (0.6%) than recommended for fattening rabbits. The positive effect of the mineral blocks addition was most probably a consequence of the calcium deficiency alleviation: consumption of blocks trebles the average calcium intake of rabbits. New experiments are necessary to test the effects of mineral blocks utilisation in addition to pelleted feeds correctly balanced for the calcium content. This experiment also demonstrate that for rabbit feeding mineral supply can be separate from the main feed providing fibre, proteins and energy.

Keys words: Rabbit, Supplementation, Mineral blocks, Fattening, Calcium, Separate feeding.

INTRODUCTION

The importance of mineral requirements for fattening rabbits was the subject of few recent works. Effectively the majority of works are mainly related with the contribution of fibres, energy or proteins and their effects on growth as it was underlined a long time ago (Lebas, 1980).

In Algeria, the recent published works concerned mainly the protein and fibre contribution in fattening rabbit feeding (Berchiche *et al.*, 2000). In the Algerian conditions, the rabbit commercial feeds are generally composed of raw materials plus a mineral and vitamins premix incorporated at 1% during feeds manufacturing. Growth performance recorded for the local population showed a slow growth rate from 4 to 8 weeks (28 g/day) and the target slaughter weight of 2.3 kg was not obtained before 15 weeks (Lakabi *et al.*, 2004). The analysis of the feeds composition may reveal an imbalance in the mineral contribution compared to the needs for the animals in growth or reproduction (Lebas, 2004).

The present study purpose was to analyse the effects of an additional mineral distribution on the fattening performances of rabbits.

MATERIALS AND METHODS

The experience was carried out in a commercial rabbitry near Djebla from February to March 2007. This unit was located 18 km north from Tizi-Ouzou (Algeria) at an altitude of 135 m. The climate is of Mediterranean type, heat in summer, cold and wet in winter. In the building, the wire mesh cages were placed in "flat deck" disposition. Ventilation was natural and the temperature was not controlled.

Animals and experimental design

A total of 120 rabbits of the locally called «white population» (Zerrouki *et al.*, 2007) were distributed at weaning (35 d) between 2 equivalent groups according to weaning weight and litter origin. According to the number of contemporaneous rabbits weaned at the same time in the rabbitry, young of 2 consecutive weekly weanings were used (2 series at 1 week of interval, 84 and 36 rabbits). Rabbits were placed in collective cages six by six (cage dimension: 60x38x40 cm high). The control group received *ad libitum* during the 5 weeks of the study, a commercial pelleted diet (Ceregran, Bouzaréah, Algeria) and fresh water through automatic nipple drinkers. The block group was caged and fed in the same conditions, but in addition a commercial mineral block ("Bloc Harmony", Inzo, Chateau Thierry, France) was fixed along a wall in each cage by means of a hook, near the feeder (Figure 1). New blocks were placed every week even if blocks were "consumed" within a shorter time.

Figure 1: Mineral block placed in a cage

Diets

The commercial pelleted feed was composed of alfalfa hay (36%), barley (25%), hard wheat bran (26%), soybean meal (12%), minerals and vitamins premix (1%). The analytical composition was dry matter 88.7%, proteins 16.0%, crude fibre 10.4%, total minerals 6.1% with 0.60% of calcium and 0.62% of total phosphorus. Starch content was 22.7% (enzymatic method of analysis).

The commercial mineral blocks aromatized with thyme were designed for all rabbits to avoid stress, control the dental growth, and supply additional minerals and trace elements. According to the producer declaration, blocks were composed of calcium sulphate, acid whey, wheat, calcium carbonate, dicalcium phosphate, flavour, sodium chloride, yeasts and complex of trace elements. The chemical composition of the mineral blocks is presented in Table 1. The weight of a block was 225 g.

Table1: Chemical composition of mineral blocks

Macro-minerals (% of the block)		Trace elements (mg/kg)	
Total minerals (ash)	47.0	Zinc	80
Calcium	12.0	Manganese	80
Phosphorus	1.5	Copper	20
Sodium	2.0	Selenium	0.25

Controls and Statistical Analysis

Animals and feeds were weighed by cage at the beginning (5 weeks of age: initial weight), and then every week until the 10th week of age (final weight). Daily weight gain, daily feed intake, and feed conversion ratio were determined after correction for the number of rabbits effectively alive in each cage at the end of each experimental week. Records were analysed using a model of variance analysis with fixed effects and interaction (GLM procedure according to SAS, 1988). The 2 effects considered in this model were the experimental group (2 levels: experimental and control) and the series of setting up (2 levels).

RESULTS AND DISCUSSION

Effect of setting up series and interaction with experimental treatments were not significant and then were not presented below. During the first 3 weeks of the experimental period, 21 rabbits died (17.5% mortality) without significant difference between the 2 treatments: 10 in the control and 11 dead rabbits in the block group. No mortality was observed during the 2 last weeks. The initial weight of rabbits was identical for both groups (Table 2).

Table 2: Growth performance of experimental rabbits (means and residual coefficient of variation, rCV)

	Treatments		rCV (%)	Probability
	Block	Control		
Number of cages/treatment	10	10	-	-
Initial weight (g)	590	590	14.81	0.939
Final weight (g)	1767	1579	9.6	0.020
Daily weight gain (g/day)	33.60	28.27	10.8	0.008
Daily feed intake (g/day)	95.61	82.56	9.4	0.001
Feed conversion ratio	2.84	2.92	6.7	0.451

The presence of mineral blocks, induced to a significant increase of pelleted feed intake (+16%) resulting in a proportional increase of growth rate without significant effect on feed conversion ratio. This effect was observed throughout the experiment as it can be observed in the live weight evolution (Figure 2).

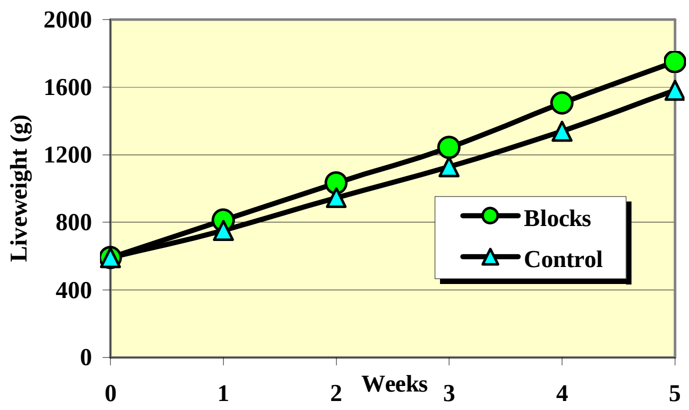

Figure 2: Evolution of rabbits live weight during the experiment

Live weight difference between the 2 groups was significant ($P<0.05$) since the end of the first experimental week. According to this growth rate increase, at the end of the experiment, the live weight of rabbits of the experimental treatment was 188 g higher than that of the control rabbits (+12%; $P=0.02$).

In all works on the fattening performance of rabbit's in Algeria, with this «white population» or with the classical local population (Berchiche *et al*., 2000; Kadi *et al*., 2004; Lakabi *et al*., 2004), the average daily growth rates were similar to that observed for the control group of the present experiment. Chemical composition of the commercial pelleted feed used in this study shows a low calcium content which may be responsible for these weak performances. Effectively, the calcium content of the pelleted feed was 0.6% which is lower than the 0.7-0.8% recommended by Lebas (2004). The average daily amount of calcium provided by pelleted feed was 0.36 g per rabbit, and on a week average basis, the daily amount of calcium provided by the mineral blocks was 0.64 g (blocks of 225 g with 12% Ca consumed by the 6 rabbits during a week). It means that the blocks provided a quantity of calcium representing about twofold that obtained from pellets. Nevertheless the effect of ingredients other than calcium included in the mineral blocks cannot be excluded.

The very low calcium level of the commercial diet was surprising since the alfalfa content was high (36%), but it was confirmed by the analysis of different batches of the commercial diet. For example Cheeke (1987) consider that diets with such level of alfalfa (40% or more) there is no risk of calcium deficiency. Effectively, calculation of the calcium brought by the diet alfalfa according to recent European tables of feeds composition (Sauvant *et al*., 2002) results in a contribution of 0.7% of calcium from alfalfa in the final diet (1.8 to 2.0% of Ca in alfalfa). It could be the occasion to underline that tables established in a region of the world may not be necessarily pertinent for raw material used on other regions.

One side observation may also be mentioned: in most cages, the mineral block was completely eaten within a maximum of 2 or 3 days. Because new blocks were placed in cages only at the beginning of the following week, the mineral complementation was discontinuous, but remained clearly efficient. This observation implies two hypotheses: or mineral supplementation (mainly calcium) may be completely discontinuous, or the supplementation positive effect may be greater if blocks were permanently available or consumed more slowly. We have not detected in the literature experiments of discontinuous mineral supplementation in the rabbit. Thus, the choice between the 2 hypotheses cannot be done at the moment but a future experimental demonstration would be easy to manage. This experiment demonstrate also that for rabbit feeding, mineral supply can be separate from the main feed providing fibre, proteins and energy.

CONCLUSIONS

The exact origin of the improvement with mineral blocks has not been precisely established but may be probably in relation with the low calcium content of the main rabbit pelleted food available in the country. Further experiments are necessary to determine if the supplementation with mineral blocks has also a positive effect when the pelleted diet is well balanced in calcium.

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