

PRODUCTION INDICATORS AND CARCASS CHARACTERISTICS ON MEAT RABBITS SUPPLEMENTED WITH PHOSPHORUS AND CIANOCOBALAMIN

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ABSTRACT

The objective of the present work was evaluate the production indicators in New Zealand White rabbits supplemented with Catosal to different doses. The experiment was carried out with 100 rabbits New Zealand White whose age were between 24 to 29 days old, them were weighed and sexed, they're wormed with Fenbendazole (35 mg/kg⁻¹) and they were supplied with sodium sulfamonomethoxine (50mg/kg⁻¹). The treatments were: T1: 3 ml of physiologic saline (control group); T2: 2 ml of Catosal; T3: 3 ml of Catosal and T4: 4 ml of Catosal. Were administered 6 doses to each treatment every 7 days. Five rabbits housed in a European type cage constituted an experimental unit, thereafter, were taken 20 experimental units with average weighs between 3635 a 4185g.

The rabbits were fed *ad libitum* with commercial feed; every 7 days were weighed being determined so, weekly and daily gain, consumption and food rejection, feed conversion and slaughter weight. Were improved the weight gains ($P>F=0.0094$) and was decrease the residual food ($P>F=<0.0001$).

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Introduction

Catosal (Bayer Animal Health, Leverkusen, Alemania) provides 17.3 mg of phosphorus by every ml^{-1} , is a commercial combination available of cyanocobalamin ($0.05\text{mg}/\text{ml}^{-1}$) and a phosphorus compound (100mg of butaphosphan/ ml^{-1}) that improve the energetic metabolism and at present is commercialized in more of 70 countries (Fürll *et al.*, 2006; Fürll *et al.*, 2010).

The B₁₂ vitamin is an essential compound of many enzymes related with the synthesis *de novo* or transfer of a unit of carbon, such as the methyl. Wich is closely related with other molecules such as choline, methionine and folic acid (ROCHE, 1989). Also, it is an essential cofactor in both reactions transmethylation, one of which is intertwined with the folic acid in the synthesis of DNA and hematopoiesis. However, the conversion of homocysteine to methionine requires an enzyme dependent on vitamin B₁₂ as well as a methyl group donor for the 5-methyltetrahydrofolic (5-methylTHF) (Fishman *et al.*, 2000).

Moreover, the butaphosphan is an amino acid derived of the phosphoric acid (EMEA, 1999) wich is used as an organic source of phosphorus in the animal supplementation (Grunberg *et al.*, 2009; Schmidt *et al.*, 2010; Rollin, 2010).

Also, has been demonstrated that improve the status health, the food consumption (Fürll *et al.*, 2006), the immune system (Simon, 1990; Larscheid, 1994; Hasi *et al.*, 2005c), the digestive function (Hellmann *et al.*, 2006; Lohr *et al.*, 2006), the hepatic operation (Fürll *et al.*, 2006; Cuteri *et al.*, 2008; Deniz *et al.*, 2010), the muscular operation (Hasi *et al.*, 2005a, b; Fürll *et al.*, 2006), the hemostasis (El-Sherif *et al.*, 1987; Coppo y Gapel, 2000; Delport *et al.*, 2006) and stress decreases (De Groot *et al.*, 2003; Van Der Staay *et al.*, 2006; Van Der Staay *et al.*, 2007).

Even though has been studied the effects of application of Catosal in dairy cattle (Cuteri *et al.*, 2010; Ortiz *et al.*, 2010; Pereira *et al.*, 2013a), beef cattle (Tang, 2004), pigs (Bautista *et al.*, 2010; Dantas *et al.*, 2010; Schmidt *et al.*, 2010), horses (Coppo y Gapel, 2000; Cazales *et al.*, 2012), ewes (Tang y Barron, 2006; Lopes *et al.*, 2010; Pereira *et al.*, 2013b), Nile Tilapia (Alkobaky, 2008), dogs (Deniz *et al.*, 2009) and mice (Hasi *et al.*, 2005a, b, c), don't have been studies the effects of application on rabbits; however, the objective of this work is evaluate the

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production indicators of New Zealand White rabbits supplemented with Catosal to different doses.

Material

Location

The experiment was carried out in Rabbits Scientific Research Center of State of Mexico A. C (COCICEMAC), located in San Miguel Coatlinchan, Texcoco, State of Mexico at latitude of 19° 17' N y 98° 53' O, a 2240 meters above sea level. The average temperature is 15 °C and the average annual rainfall is 645 mm (García, 1981).

Animals

Were used 100 rabbit New Zealand White whose age were between 24 to 29 days old, them were weighed, sexed and labeled with permanent ink of down in the right ear with consecutive numbers from 1. The treatments were: T1: 3 ml of physiologic saline (control group); T2: 2 ml of Catosal; T3: 3 ml of Catosal and T4: 4 ml of Catosal. Were administered 6 doses to each treatment every 7 days. Five rabbits housed in a European type cage constituted an experimental unit, thereafter, were taken 20 experimental units with average weighs between 3635 a 4185g. Rabbits from each experimental unit were weighted every week with a digital scale TOR-REY^{MR} MFQ-40, after administration of the dose corresponding Catosal and emphasize it's identification number on the right ear.

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Food handling

The commercial pelleted food offered to the experimental units containing: protein 15.5 %, fat 2 %, fiber 15 %, ashes 9 %, moisture 12 %, nitrogen free extract 46.5 %, calcium 1 % y phosphorus 0.55 %. Offered *ad libitum* in Englis hopper type feeder from weaning until slaughter; was recorded weekly consumption and food residue.

Sanitary handling

After being randomly assigned to the experimental units rabbits were subjected to a prophylactic deworming management, for which Fenbendazole (35mg/kg⁻¹) was used for two days. Furthermore, to prevent the occurrence of problems of diarrheal type or respiratory, sulfamonomethoxine sodium (50mg/kg⁻¹) was used for three days, both treatments through



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drinking water in universal drinkers, after this operation were provided with water *ad libitum* by automatic nipple drinkers type.

Method

Food consumption, waste food, weight gain and feed conversion were analyzed using a completely randomized design. Comparison of means was done using Tukey's test with the SAS statistical analysis program 2002.

Results and Discussion

The highest daily average gain was found in T3 (11.77g) and that T2 was 10.72g ($P>F=0.0094$); while the largest single-day gain was for T3 (2.355g) ($P>F=0.0094$), as in T2 were obtained 2.144g. Furthermore, the total weight gain was greater for T3 (412.2g), which for T2 (375.2g) ($P>F=0.0094$). However, the weight for week 2 of the experiment T4 (1049G) obtained the highest value ($P>F=0.0298$). In addition, the weight difference for week 3 in T3 (550.3g) was found higher than T4 (425g) ($P>F=0.0067$); Likewise, the greater weight at week 4 was obtained in T3 (419.5g) ($P>F=0.0298$). However, greater weight to week 5 was obtained in T3 (552.8g), followed by T4 (506.8g) and T2 (494.8g) ($P>F=0.0002$); but a higher final weight of T3 (552.8g) was also found that with T4 (506.8g) or T2 (494.8g) ($P>F=0.0002$).

This is because Catosal (trade combination Butafosfan 100mg/ml^{-1} and cyanocobalamin 0.05mg/ml^{-1}) increases the processes of hematopoiesis, improving liver function, digestion, tissue regeneration, absorption and assimilation of nutrients (Flasshoff 1974). Similar findings found El-Sherif *et al.* (1987) in a group of animals in which growth was administered Catosal and a vitamin-mineral compound, they gained 38% more weight per day than a group that received no additives. However, Bautista *et al.* (2010) showed that in a group of piglets treated with Catosal ($n=108$) obtained 58g more of daily gain than pigs untreated group ($n=11$), this is, had a higher average weight of 8.5 kg. This effect is attributed to the stimulation of the metabolic processes and increased muscle activity (Cuteri *et al.*, 2008; Deniz *et al.*, 2008.). On the other hand, the average residual food T3 was 370g, whereas T1 was 272g during week 2 of the experiment; however, that the lowest value (209g) was to T2 ($P>F= <0.0001$); also the residual food of the week was 3 for 200g T3, T2 239g and 188g for T4 compared to T1 (227g)

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($P > F = 0.0006$). Furthermore, the difference in residual food during week 4 to T1 was higher (307.25g) than T3 (249g) ($P > F = 0.0023$). Although the residual feed at week 5 of the experiment to T4 (273g) was greater than for T3 (252.25g) ($P > F = < 0.0001$).

However, the individual feed consumption T2 (0.48kg) was lower than T3 (0.62kg) ($P > F = 0.0038$). This is because the Butafosfan helps to reduce the metabolic reactions of stress by lowering cortisol levels and increase insulin levels, a hormone that improves the entry of glucose into the cells, which helps in performance (Deniz *et al.*, 2008). Furthermore, the Butafosfan is also responsible for storing the energy in glycogen, triglycerides and protein formation. Since this facilitates the entry of glucose into the intracellular environment, which results in a better use of energy in the diet, generally optimized metabolism, and thus an effect in improving the production and reproduction (Cuteri *et al.*, 2008). Moreover, Tang (2004) showed a positive effect on the increase in feed intake in cattle with acute respiratory clinical picture, after applying a single dose of a business combination Butafosfan vitamin B₉ and B₁₂.

In an experiment Dantas *et al.* (2010) observed with lactating sows increased feed intake at weeks 1, 2 and 4 after applying 20 ml of Catosal; on the other hand, total feed intake was also higher, postpartum weight losses were lower ($p < 0.05$). In the same experiment a group that was applied to 15 ml of Catosal had less weight loss than the control group; however, to the percentage of weight loss, the group receiving 20 ml of Catosal had a lower weight loss ($p < 0.05$) than the control groups which received 10 ml of Catosal. Furthermore, Deniz *et al.* (2010) observed a significant increase ($p < 0.001$) in feed intake in a group of cows treated with Catosal on days 3-5 and 12-17 postpartum; however, there was no significant difference between the groups from 30 to 35; but milk production was higher in the same group ($26.79 \pm 3,378$ kg) than in the control group (23.78 ± 1.583 kg) at 7 days postpartum ($p < 0.01$).

Conclusions

You can improve the productive indicators in New Zealand White rabbits. To get the best daily average weight gain per cage and individual, as well as the maximum total weight gain is better

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to use 3 ml of Catosal. However, during the 4 or 5 weeks duration of the period of fattening on rabbits can employ a dose of 3 ml for maximum weight gain values. However, if one wants to obtain the lowest reject food is necessary to apply 2 to 3 ml of Catosal during the growth of the rabbits. On the other hand, applying 2 ml of Catosal feed intake due to increased concentrations of insulin decreases, which helps the liver-cell performance and digestive metabolism. Although the results obtained in this work, is necessary to further research related to the mechanism of action of Butafosfan since the hormonal and-molecular point of view, since the rabbit in Mexico is a national priority.

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