

Intake and Digestibility with Nutritional blocks for brocked deers (*Mazama americana* and *Mazama temama*)

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ABSTRACT

Three experiments were conducted to evaluate the use of blocks and their effect on nutrient digestibility in brocked deer (*Mazama americana* and *M. temama*). In the first experiment, a reversible design was used with two periods of 10 days with two groups with seven and nine brown brocket deer (*Mazama americana*) receiving a multi-nutritional block (molasses, urea, cement, lime, minerals and alfalfa hay). In the last two experiments, a control period without

block was followed by a supplementing period receiving the block (each period of 10 days). In the second experiment, seven red brocket deer (*Mazama temama*) were used and a commercial mineral block was evaluated and in the third experiment, four red brocket deer (*Mazama temama*) were used which received a commercial protein block. The digestibility of dry matter was increased ($P < 0.05$) with the mineral block in experiment 2 (74.4 vs. 71.2%), whereas in experiments 1 (50.8 vs. 62.4%) and 3 (68.39 vs. 73.1%), no differences were detected ($P > 0.05$). The average intake was: 59 g/d for the

multi-nutritional block, 6.74 g/d for mineral and 60.23 g/d for the protein block. Nutritional supplementation with for brocket deer allows increased dry matter digestibility.

INTRODUCTION

Multi-nutrient or mineral blocks have been used for domestic ruminants to supply nutrients, mainly in extensive systems or as supplements for low quality diets.^{19,22,26} Intake of blocks is variable and depends on block characteristics, environment, diet quality, species and management.¹²

The benefits of using supplements in whitetail deer were shown, where calf mortality was reduced, and deer weight and antler size improved.¹⁴ Positive responses have been observed in domestic ruminants to blocks associated with increases in nutrient digestibility.^{9,21}

In hunting ranches, the use of supplementary feeding in various forms including blocks is common.¹⁵ There have been over 140 studies of supplementation in wildlife species since the seventies;⁵ however, there has been no scientific evaluation of nutritional or mineral blocks in cervids. The benefits of other supplements have been demonstrated in white tailed deer, where mortality was reduced, and weight and antler size improved in deer.¹⁴ Since there is great variation in the consumption of blocks in domestic ruminants,⁴ it is necessary to know the wildlife consumption in order to design strategic supplements, as the design should be a specific block model considering the physiology and nutritional aspects of the species.¹² Considering the above, the objective of this study was to evaluate the intake of blocks (multi-nutrient and mineral) and their effect on digestibility in brocket deer (*Mazama americana* and *M. temama*).

MATERIAL AND METHODS

Three experiments were conducted where nutritional blocks were offered as supplements, all with a control group without supplement. The first experiment was conducted at the Chapultepec Zoo "Alfonso L. Herrera" in Mexico City. In this experiment,

a reversible design was used,¹¹ with two periods of 10 days and two groups with 7 and 9 brown brocket deer (*Mazama americana*), by group receiving a multi-nutritional block prepared in the laboratory (molasses 40%, urea 10%, lime 10, minerals 5%, sulphur 1% and corn stover 34%). The mineral used was Rumisal Plus (Loefflervet, Mexico) (grams: Ca 130, P 50, Na 109, Cl 200, Fe 4.3 and Mg 3.33; mg: Mn 200, Cu 80, Co 66.6, I 4, Zn 80 and Se 70 mg).

The ration (dry matter basis) consisted of fresh alfalfa (31.48%), domestic cattle concentrate (30.17%), carrots (27.55%) and apple (10.80%).

The two other experiments were conducted at the Nido Park in Ixtapaluca, México. In the second experiment, seven red brocket deer (*Mazama temama*) were used and a commercial mineral block was evaluated. The mineral used was Min Plex Ve-12 (MNA of México) (grams Ca 100, P 120, Mg 32; mg: Mn 4000, Cu 800, Co 10, I 100, Zn 3000, Se 15 and Fe 200). There was a control period without a block, followed by a treatment period receiving the block; each period lasted for 10 days. The ration (dry matter basis) that the brocket deer received consisted of fresh alfalfa (65%) and oat straw (35%). There was a control period without block, followed by a treatment period receiving the block; each period lasting for 10 days.¹¹

In the third experiment, 4 red brocket deer (*Mazama temama*) were used, supplemented with a commercial protein block (Pro Plex 32) (MNA of Mexico) (crude protein 320 g, Ca 25 g, P 13 g, NaCl 69 g and K 8 g). There was a control period without a block followed by a treatment period receiving the block (each period of 10 days). The ration (dry matter basis) that the brocket deer received consisted of fresh alfalfa (3%), domestic horse concentrate (48%; Galope, México) and wheat bran (49%).

To estimate the apparent digestibility, feed and faeces samples were collected daily for five days within each period to determine the concentration of acid insoluble ash as an

Table 1. Effects of block supplementation on intake and digestibility in cervids.

	Experiment		
	1	2	3
Block type	Multi-nutritional	Mineral	Proteinic
Specie	<i>M. americana</i>	<i>M. temama</i>	<i>M. temama</i>
Block intake g/d			
Control	0	0	0
Block	59.00	6.74	60.23
Total intake g/d			
Control	565	516	600
Block	623	618	666
DM digestibility %			
Control	50.83	71.28 ^a	68.88
Block	62.46	74.44 ^b	73.15
NDF digestibility %			
Control	24.24	68.66	67.12
Block	37.10	72.13	74.29

^{ab} Means with different superscript differ ($p < 0.10$)

internal marker.²³ Dry matter was analysed by procedures of AOAC2 and NDF, as described by Van Soest et al.²⁴

RESULTS

Results of the three experiments are presented in Table 1. Higher digestibility of dry matter was observed in experiment 2 ($P < 0.10$) and numerical differences were seen in all of the experiments, as well as in NDF digestion. Intake of mineral block was numerically lower compared to multi-nutritional or protein block.

DISCUSSION

Multi-nutritional consumption and protein blocks was highly variable and several factors have been reported to modify block consumption, such as hardness,⁴ the level urea block,⁸ forage availability and time of year.^{1,7,16,17} In an evaluation of three commercial blocks on farms, sheep consumed an average of 270 g/d, but there was a large variation as 5 to 27% of animals consumed the block.⁶

Supplementing urea molasses with

mineral block in wheat straw-based diets in cattle, organic matter digestibility increased by 5 to 9 units; 21 other groups did not find any effect on digestibility, but observed a greater intake.^{5,25} In sheep fed forages of higher quality, mineral block supplementation with urea increased DM digestibility by 13%, which can be explained by a higher rate of ruminal degradation.²⁶ The increase in digestibility can be attributed to the increased activity of microorganisms in the gastrointestinal tract. There has been an increase in vitro dry matter digestibility from 2 or 3% when zinc and copper were added in goat rations.²⁷ It has been reported in goats that Cu supplementation may increase the in vivo digestibility with 6% dry matter and NDF digestibility by 11%.⁹ Using rations supplemented with ZnSO₄ or Zn-methionate, reported increases in ADF (10%) and cellulose (15%) digestion,³ but no change in DM or other nutrients. In cattle, smaller doses of Zn increased DM digestibility by 1%, but higher doses reduced DM digestibility to 88%.¹⁸ In a study²⁰ that included three levels

(100, 110 and 120%) of the NRC¹³ requirements of Ca, P, S, Zn and Mn for lambs and DM digestibility increased by 17 and 10%, whereas protein increased by 7%. Supplementing diets based on straw calves with 58% CP blocks based on urea and minerals and found increases in DM digestibility (4.8%) and MO (4.9%),¹⁰ which is attributed to the greater ruminal bacteria activity when receiving blocks.²⁰ Observed increments in the total digestibility of nutrients with urea mineral blocks in cattle by 9.2%.²¹ There are reports an increase of 12.4% in corn stover digestibility in calves receiving urea mineral block.²² In lambs fed rice straw-based diets, digestibility of dry matter and organic matter increased by 13.1% and 12.7%, respectively, when the diets were supplemented with urea mineral blocks.²⁶

CONCLUSION

Supplementation with block (mineral or multinutritional) for brocket deer allows increased dry matter digestibility.

DISCLOSURE OF STATEMENT

Authors do not have any conflicts of interest.

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