

NOTA BREVE

## A STUDY OF MINERAL STATUS IN THE CARCASS OF BOER GOAT BUCKS: INFLUENCE OF SUPPLEMENTATION

MINERALES DE LA CANAL DE CABRITOS BOER:  
INFLUENCIA DE LA SUPLEMENTACIÓN

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### ADDITIONAL KEYWORDS

Live weight. Minerals in tissues.

### PALABRAS CLAVE ADICIONALES

Peso vivo. Minerales en tejidos.

### SUMMARY

Minerals of the carcass were evaluated in Boer goat bucks under two feeding regimens: winter grass veld hay with or without supplementation. Non-supplemented animals had a significant decrease in live weight and lower whole quantities for each mineral analysed (phosphorus, potassium, iron, zinc, magnesium and calcium). Concentrations of Ca, Mg, Fe and P were higher for non-supplemented animals as these minerals are mainly associated with the skeleton. Quantifications and concentrations for each carcass mineral for young Boer goat bucks are provided.

### RESUMEN

Los minerales de la canal fueron evaluados en cabritos Boer bajo dos sistemas de alimentación: heno de *veld* de invierno con o sin suplementación. Los animales no-suplementados tuvieron un descenso en el peso vivo y menores cantidades totales de los minerales analizados:

fósforo, magnesio, calcio, zinc, hierro y potasio). Las concentraciones de Ca, Mg, Fe e P fueron mayores en animales no-suplementados pues su presencia está asociada al esqueleto. Se especifica las cuantificaciones y concentraciones para cada mineral de la canal en cabritos jóvenes de raza Boer.

### INTRODUCTION

South Africa's livestock industry produces most of its products from natural pastures, known as the veld. *Themeda trianda* (red grass) is the common dominant grass in most areas. The veld experiences seasonal changes and production in the winter months tend to decrease dramatically.

Mineral status has been studied in several animal species (Littledike *et al.*, 1995; Schwartz *et al.*, 1995) in function of ingestion levels. However,

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no information seems to be available regarding specific (sub)tropical seasonal undernutrition conditions and breeds used under such conditions.

In this paper, we aim to establish the mineral (phosphorus, potassium, iron, zinc, magnesium and calcium) status (both concentrations and total quantifications) in the carcass of young Boer goat bucks under two feeding regimens: winter veld hay with or without supplementation.

#### MATERIAL AND METHODS

Animal housing and feeding was described earlier (Almeida *et al.*, 2003; Almeida *et al.*, 2004). Briefly, 15 intact Boer Goat bucks (6-8 months; 28.0 kg), were divided in two groups. WH (n=8) was fed 500 g winter veld hay (CP - crude protein of 38.4 g/kg and ME - metabolic energy of 7.0 MJ/kg). WH+S (n=7) was fed 600 g winter veld hay plus supplement: 170 g of maize meal (91 g/kg CP; 8.8 MJ/kg ME) 44 g of molasses meal (49 g/kg CP; 12.5 MJ/kg ME) and 15 g of urea (2857 g/kg CP). At the end of the experimental period (29 days) animals were slaughtered and carcass weight determined. Half carcass was cut into 4 cm slices and cutting residues collected for mineral concentration determination. Residues were dried to constant weight hence determining total dry matter. 500 mg of dry sample were incinerated at 500°C for 4h. After adding 5ml HCl 3M, mixture was finally filtered. Standard mineral quantification methodologies were used for as summarized in **table I**.

Total mineral quantities were

**Table I.** Methodologies for mineral concentration determination. (Metodologías para determinar concentraciones de minerales).

P	Spectrophotometry (Unicam 420mm)
K	Flame fotometry (FLM3 with lithium pattern)
Fe	Spectrophotometry
Zn	of
Mg	atomic absorption
Ca	(UNICAM; PU9100)

determined by the multiplication of concentration per total dry matter and per carcass fresh weight.

Results of both groups were compared by ANOVA Single factor.

#### RESULTS AND DISCUSSION

Results regarding mineral concentrations and total mineral quantities are presented in **table II**. Animals of the WH group had a 20 percent decrease in live weight while WH+S had an increase in 10 percent of increase in live weight.

Calcium concentrations were higher in the carcass of non-supplemented animals, while total quantities were similar for the two groups. Such result is due to the localization of this mineral in the carcass. In fact, Calcium is located essentially at the level of the skeleton. As WH animals are lighter than WH+S animals as fat and muscle are depleted, an increase in concentration is hence expected. Similar results were found for other minerals such as phosphorus and Magnesium that can basically be found in the skeleton. Similarly to Mg and P, Zinc is also essentially found in the skeleton.

## SUPPLEMENTATION AND MINERAL STATUS IN THE CARCASS OF BOER GOAT BUCKS

**Table II.** Carcass minerals. (Minerales de la canal).

	Mineral concentration		Mineral total quantities		
	WH+S	WH	WH+S	WH	
Zn (mg/100g)	14.91 (1.2)	15.72 (1.2)	Zn* (mg)	499 (62)	363 (19)
Mg* (mg/100g)	175.81 (38)	225.73 (15)	Mg (mg)	5845 (1183)	5253 (1463)
IFe* (mg/100g)	12.09 (3.4)	15.96 (4.0)	Fe (mg)	398 (62.5)	369 (109)
Ca* (mg/100g)	573 (43)	787 (44)	Ca (mg)	19075 (2956)	18298 (2504)
K (mg/100g)	676.2 (71)	647.6 (61)	K* (mg)	22624 (3115)	14996 (3195)
P* (mg/100g)	3345.5 (486)	4227.4 (621)	P (mg)	111551 (16496)	97713 (25411)

\*indicate statistical significance ( $p < 0.05$ ); WH: animals fed winter veld hay; WH+S: animals fed winter veld hay + supplement. Variances are shown between parenthesis.

However, in our assay, no difference was found between the two groups regarding Zinc concentration. Such fact is probably related to the fact that this mineral is found in relatively minimal quantities.

Potassium is mainly found in the intracellular fluid of skeletal muscle. Such fact explains the lack of significant differences for the concentration of this mineral and the higher absolute quantities in the carcass of animals of the WH+S group that experienced an increase in body weight.

Iron is equally found at the level of muscle proteins. Such fact, together with mechanisms that prevent nitrogen depletion in underfed animals probably explain the inexistence of significant differences regarding total iron quantities as weight-losing animals

tend to preserve the protein fraction (Kabbali *et al.*, 1992) and hence the results obtained for the concentration of this mineral.

In conclusion, lack of supplementation affects significantly the mineral quantities and concentrations in the carcass of boer goat bucks. It seems therefore necessary to conduct supplementation practises for the winter dry season in tropica and subtropical latitudes.

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