MILK AND BLOOD SERUM RUBIDIUM AND STRONTIUM CONCENTRATIONS IN LACTATING DONKEYS

Fantuz F.[1], Ferraro S.[1], Todini L.[1], Mariani P.[1], Piloni R.[1], Zurlo N.[2], Salimei E.[2]

[1]Dip. Scienze Ambientali, Università di Camerino, Camerino, Italy; [2]Dip. S.T.A.A.M., Università del Molise, Campobasso, Italy

INTRODUCTION

- Studies on donkey milk gross composition showed similarities with human milk but information on trace elements concentration are scarce.
- Although Rubidium (Rb) and Strontium (Sr) are potential essential elements in mammals nutrition only few data are available on Rb and Sr concentratons in milk from other species.

OBJECTIVE

- to determine the concentrations of Rb and Sr in milk and serum of lactating donkeys.

milk from other species (µg/L) (Literature data)

	Rb	Sr	reference
Human	570-840	60-88	Anderson (1992); Krachler et al. (1999); Yamawaky et al. (1999)
Mare	--	442	Anderson (1992)
Cow	2300-5000	310-330	Krachler et al. (1998)
Goat	--	560-1100	Coni et al. (1996); Guler (2000)

MATERIALS AND METHODS

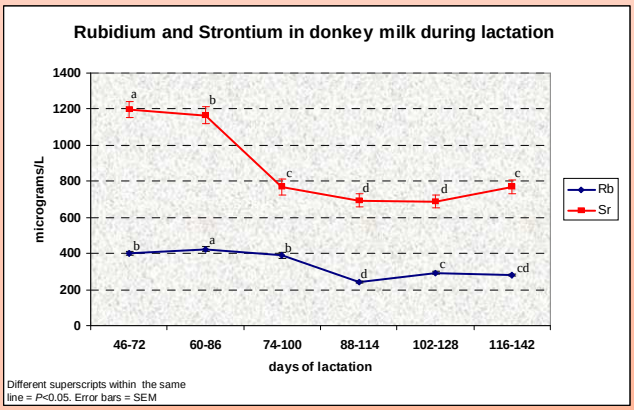
Animals, diet and sampling -- 16 lactating donkeys (32-58 days from foaling; 205.4 kg body weight) were used to provide samples and were fed coarse hay ad libitum and 2.5 kg of mixed feed daily. As a part of a larger study on trace elements in donkey milk experimental animals were divided into 2 groups and 8 donkeys received a mixed feed supplemented with Fe, Cu, Zn, Mn, I, Co, Se. Based on Rb and Sr in feeds and assuming daily hay intake at 5 kg, estimated daily dietary intake of Rb and Sr were respectively 70 mg and 350 mg for both groups. The study lasted 3 months and individual milk samples were collected at 2 weeks interval by machine milking at 11:00 am. Blood samples were collected right after the milking.

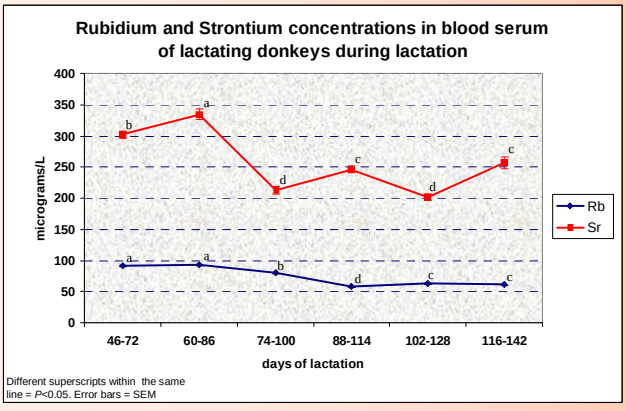
Analyses and statistics -- Rubidium (Rb) and Strontium (Sr) concentrations in feeds, milk and blood serum were measured by inductively coupled plasma-mass spectrometry. Data were elaborated by ANCOVA for repeated measures.

Descriptive statistics for Rb and Sr concentrations (µg/L) in donkey milk and blood serum (n=96)

	Milk		Serum	
	Rb	Sr	Rb	Sr
Mean	338.9	880.3	74.1	254.8
Median	318.9	819.6	74.9	247.5
SD	81.8	269.34	15.2	56.0
Min	156.1	307.7	48.1	160.2
Max	502.1	1728.7	67.2	416.7
1st quartile	267.9	679.4	60.3	206.9
3rd quartile	409.2	1084.2	88.1	294.1

Dietary treatment did not affect the concentrations of Rb and Sr. The concentrations of Rb and Sr changed significantly during the trial





Rb and Sr correlations

milk Rb vs serum Rb	r = 0.85*
milk Sr vs serum Sr	r = 0.75*
milk Rb vs milk Sr	r = 0.66*
serum Rb vs serum Sr	r = 0.51*

*P<0.001

CONCLUSIONS

- Rb and Sr in donkey milk are respectively the 3rd and 2nd represented trace element after Zn.
- Opposite to cow and human milk Sr was higher than Rb in donkey milk.
- The concentrations of Rb and Sr in donkey milk were respectively 4.6 and 3.5 times higher than those in blood serum suggesting that the mammary gland plays an active role in transferring Rb and Sr from blood to milk.
- Milk and blood Rb and Sr correlations also indicated that systemic regulation of blood minerals play a role in determining Rb and Sr concentrations in milk

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