NATIONAL UNIVERSITY OF IRELAND

University College Dublin
Faculty of Agriculture

MOLASSED BLOCK AS A SOURCE OF MINERALS FOR LACTATIONG MARES AT PASTURE: EFFECTS ON THE COMPSITION OF MARES MILK AND FOAL MINERAL LEVELS

A Thesis in fulfilment of the M.Sc(Agri.) Degree

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CHAPTER TWO : MATERIALS AND METHODS.

The aim of this experiment was to determine the mineral block intake of horses at pasture and its subsequent effect on mare milk mineral composition, foal weight gain, foal hoof horn mineral content, hardness plus foal hair mineral composition. The trial commenced in February 1996 and concluded in November 1996.

Farm background.

The trial took place on a 100 acre stud farm in county Meath. The land is predominantly sandy loam, with a wide variety of grass species, and has been used for horse breeding for over thirty years. During peak season there can be up to 200 horses on the farm. There were no other grazing livestock.

Two paddocks were used for the purpose of the trial. The horses were divided between the two with an even split of Thoroughbreds and Halfbreds in each.

Paddock analysis.

The two paddocks grazed in the trial had similar stocking rates of approximately 2 horses per acre. The paddocks used are called the Barn field (supplemented) and Lab field (unsuplemented).

A soil and herbage mineral analysis was carried out over the whole farm to establish their macro and micro mineral status pre trial and post trial. The analytical methods used were as described by *A.D. Hughes (1979).*

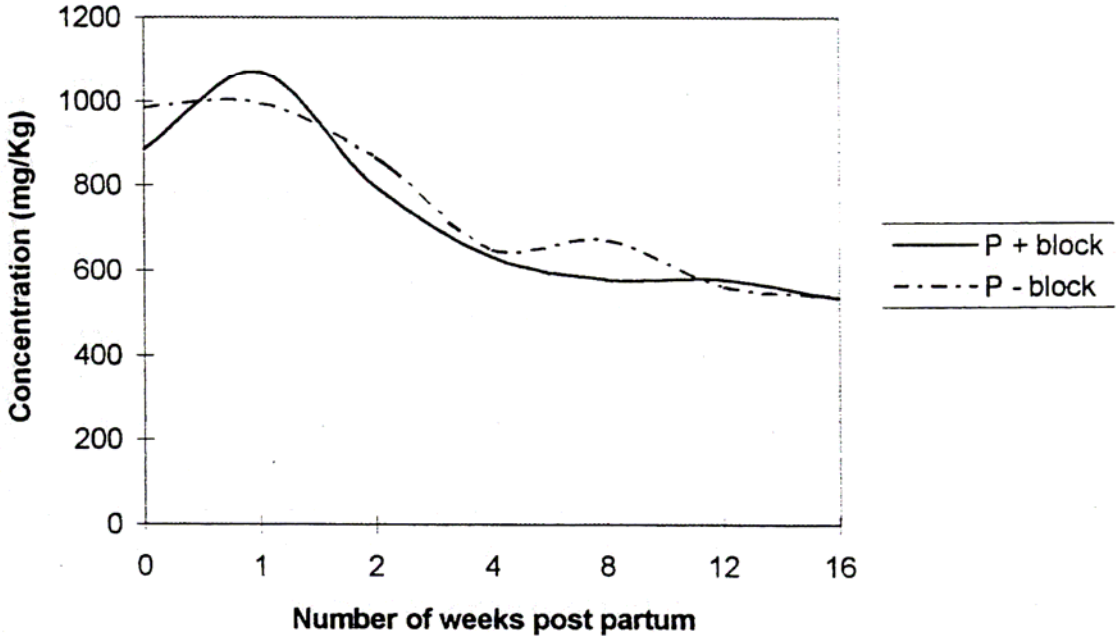
Phosphorous.

Table 3.6

Weeks pp	colostrum	1	2	4	8	12	16
+ Conc. (mg/Kg)	884	1070	799	632	578	579	534
Conc. (mg/Kg)	983	994	870	648	670	561	535

+ Mares on block.

Figure 3.4



The phosphorous levels in milk from treated and untreated mares during the first 16 weeks of lactation are shown in Table 3.6 and Figure 3.4.

Mineral block supplement had no significant effect on the phosphorous concentration of mare milk. A slight increase was observed in the first week of lactation. The concentration then fell by approximately 41% in treated mares at 4 weeks post partum, remaining relatively constant thereafter. The concentration of phosphorous in untreated mares fell by 35% in the first 4 weeks of lactation.

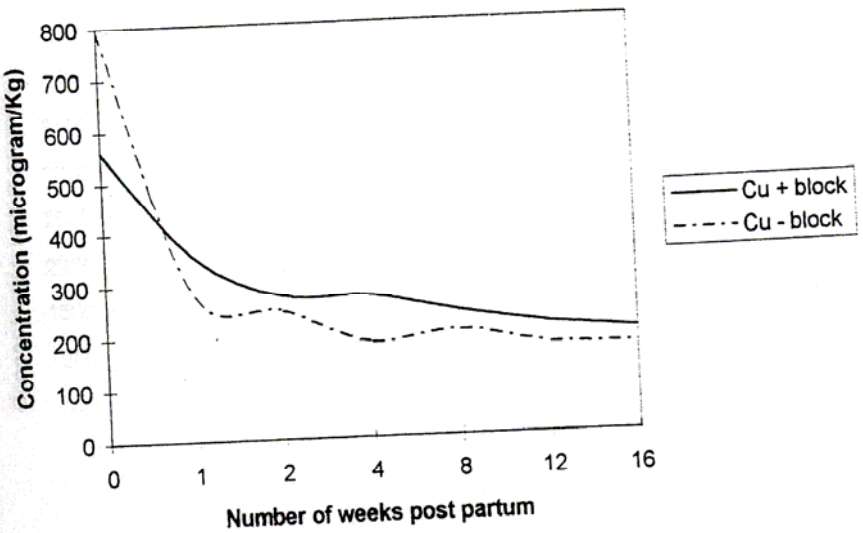
Copper.

Table 3.11

Weeks pp	colostrum	1	2	4	8	12	16
+Conc. (µg/Kg)	559	355	275	272	237	210	195
Conc. (µg/Kg)	765	278	247	181	200	171	166

+ Mares on block.

Figure 3.9



The copper levels in milk from treated and untreated mares during the first 16 weeks of lactation are shown in Table 3.11 and Figure 3.9.

The milk concentration of copper in supplemented mares was consistantly higher than in the unsupplemented mares. Although this difference was not significant over the 16 week period, the higher levels in the treated mares from weeks 1 to 8 were approaching significance (p=0.1). The copper concentration in the milk fell much more rapidly in the unsupplemented mares as opposed to the supplemented mares (64% v 36%).

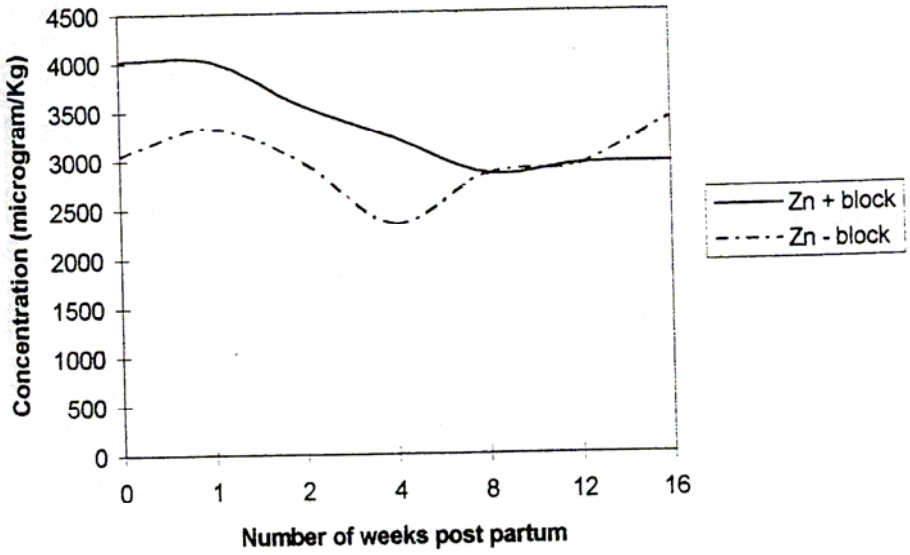
Zinc.

Table 3.12

Weeks pp	colostrum	1	2	4	8	12	16
+Conc. (µg/Kg)	4023	4013	3556	3219	2851	2939	2948
Conc. (µg/Kg)	3049	3319	2971	2328	2827	2927	3401

+ Mares on block

Figure 3.10



The zinc levels in milk from treated and untreated mares during the first 16 weeks of lactation are shown in Table 3.12 and Figure 3.10.

Mineral block supplement had no significant effect on the zinc concentration of mare milk over the 16 weeks of lactation. The concentration of zinc in supplemented mares was significantly higher from 1 week to 4 weeks of lactation ($p<0.05$).

Milk zinc concentration remained relatively constant throughout lactation dropping by approximately 27% in supplemented mares. The level in unsupplemented mares however drops by 22% in a two week period between weeks 2 and 4 of lactation and then increases by a similar amount upto week 8.

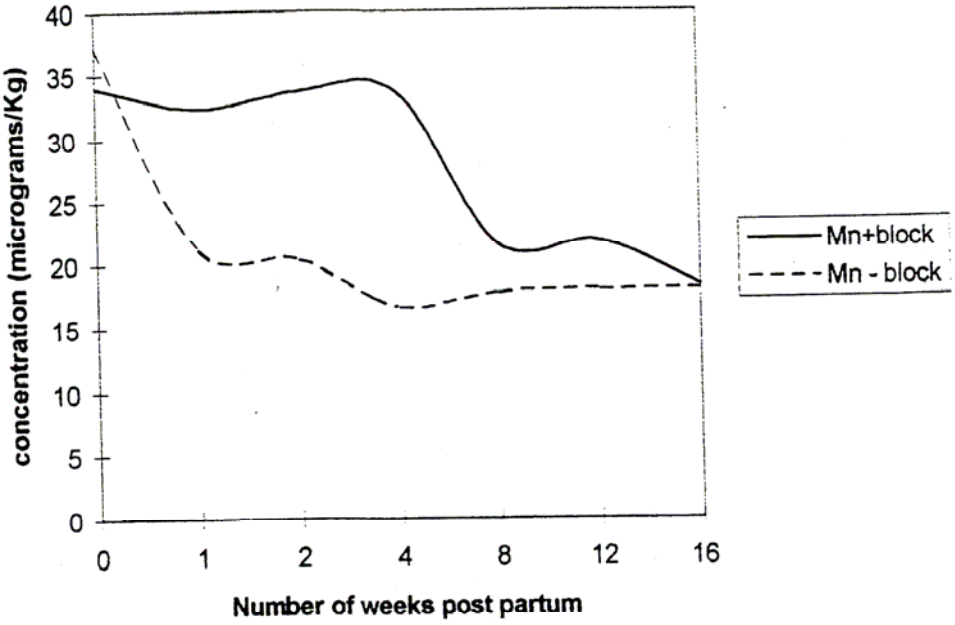
Manganese.

Table 3.13

Weeks pp	colostrum	1	2	4	8	12	16
+Conc. (µg/Kg)	33.9	32.3	33.9	33.6	21.5	21.8	18.2
Conc. (µg/Kg)	37.1	21.5	20.3	16.5	17.6	17.9	17.9

+ Mares on block

Figure 3.11



The manganese levels in milk from treated and untreated mares during the first 16 weeks of lactation are shown in Table 3.13 and Figure 3.11.

Mineral block supplement had no significant effect on the concentration of manganese over the entire trial period. However Figure 3.11 illustrates that the concentration of manganese was consistently greater in treated mares than untreated mares. Mare milk manganese was significantly higher ($p<0.01$) in supplemented mares from week 1 to week 8. Supplemented milk manganese concentration remained relatively constant for up to 8 weeks of lactation after which the concentration dropped by approximately 36%. In

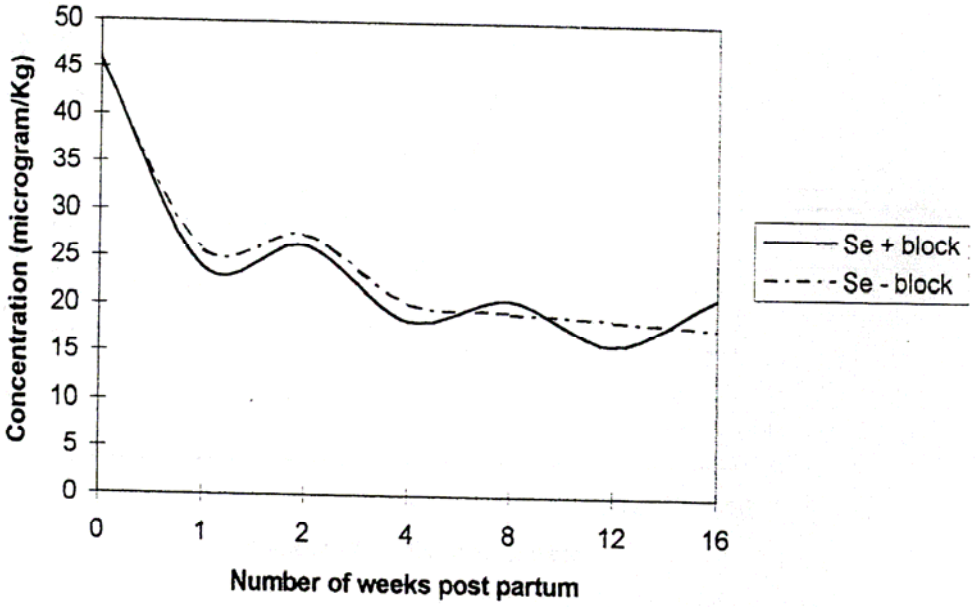
Selenium.

Table 3.16

Weeks pp	colostrum	1	2	4	8	12	16
+Conc. (µg/Kg)	45.8	23.9	26.3	18.4	20.7	16.1	21.1
Conc. (µg/Kg)	45.2	25.7	27.3	20.3	19.4	18.7	17.8

+ Mares on block.

Figure 3.14



The selenium levels in milk from treated and untreated mares during the first 16 weeks of lactation are shown in Table 3.16 and Figure 3.14.

Mineral block supplement has no significant effect on the concentration of selenium in mare milk. Colostrum contained the highest levels of selenium. The concentration fell by approximately 48% within a week of lactation after which it remained relatively constant for both groups.

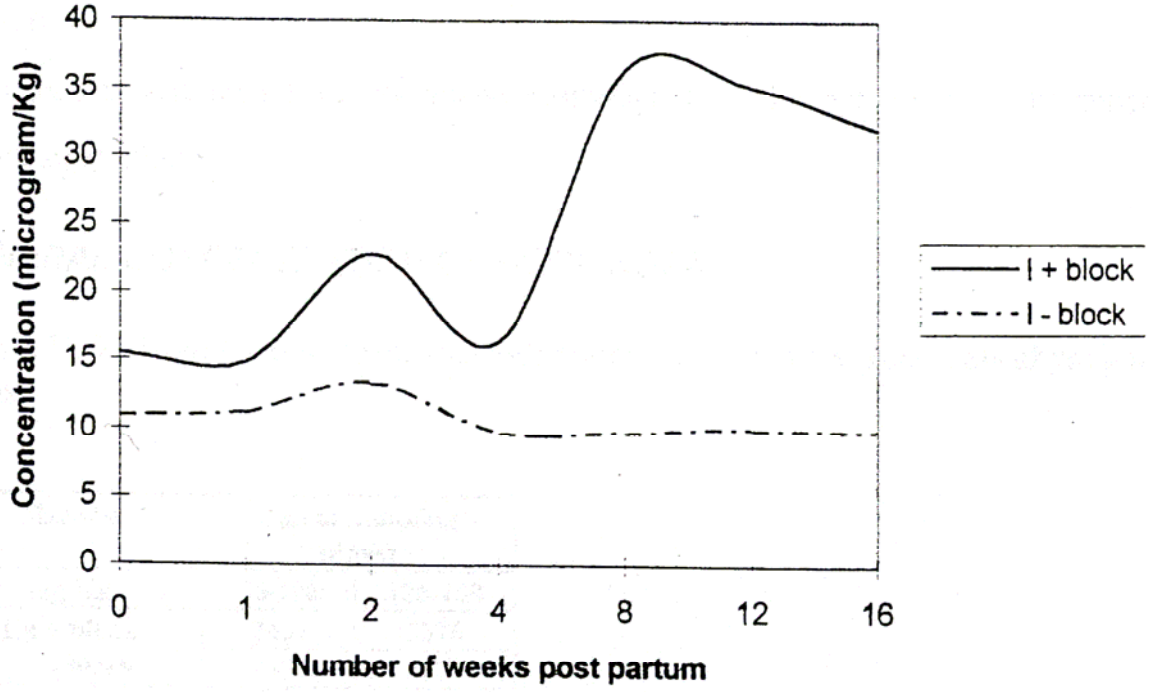
Iodine.

Table 3.17

Weeks pp	colostrum	1	2	4	8	12	16
+Conc. (µg/Kg)	15.5	14.8	22.8	16.4	36.5	35.2	32.0
Conc. (µg/Kg)	10.9	11.1	13.3	9.7	9.7	10.0	9.8

+ Mares on block.

Figure 3.15



The iodine levels in milk from treated and untreated mares during the first 16 weeks of lactation are shown in Table 3.17 and Figure 3.15.

The iodine concentration in milk is significantly increased by mineral block supplementation ($p<0.05$). Figure 3.15 illustrates a steady increase in the level of iodine from its concentration in colostrum until 12 weeks of lactation in treated mares. The levels of iodine in the milk of untreated mares remained fairly constant throughout the trial period.

MINERAL CONCENTRATIONS OF FOAL HAIR.

Table 3.18: Analysis carried out on mane hair from 100 day old foals on the trial.

	Mean mineral concentration (mg/Kg)									
Treatment	Ca	P	Mg	Cu	Zn	Mn	Mo	Se	I	Fe
+ supplement	5866	1161	684.1	66.2	285.7	36.2	0.58	3.2	4.9	41.9
- supplement	5272	1137	722.3	25.0	264.3	28.6	0.86	2.3	3.4	32.0

In general the mean concentration of minerals were higher in the hair from foals of mares recieving mineral block. These were not significant except in the case of copper ($p<0.05$).

Mo and Fe, were included in the analysis although they were not present in the mineral block supplement.

MINERAL CONCENTRATION OF HOOF HORN.

Table 3.19 : Hoof horn mineral concentrations and hardness from foals of varying ages.

Mineral	**Age at sampling (days)**	
mg/Kg	**76-100**	**126-150**
Ca + block	2463	3376
- block	2466	3174
P + block	336	460
- block	448	424
Mg + block	296	383
- block	343	345
Na + block	450	549
- block	407	537
Cu + block	5.65	5.54
- block	6.28	5.03
Zn + block	129	114
- block	132	119
Mn + block	35.9	47.7
- block	72.5 i	53.2
Co + block	0.25	0.33
- block	0.47 ii	0.37
I + block	0.67	0.66
- block	0.73	0.93
Hardness +	311.1	434
Hardness -	258.4	389

MINERAL BLOCK INTAKE.

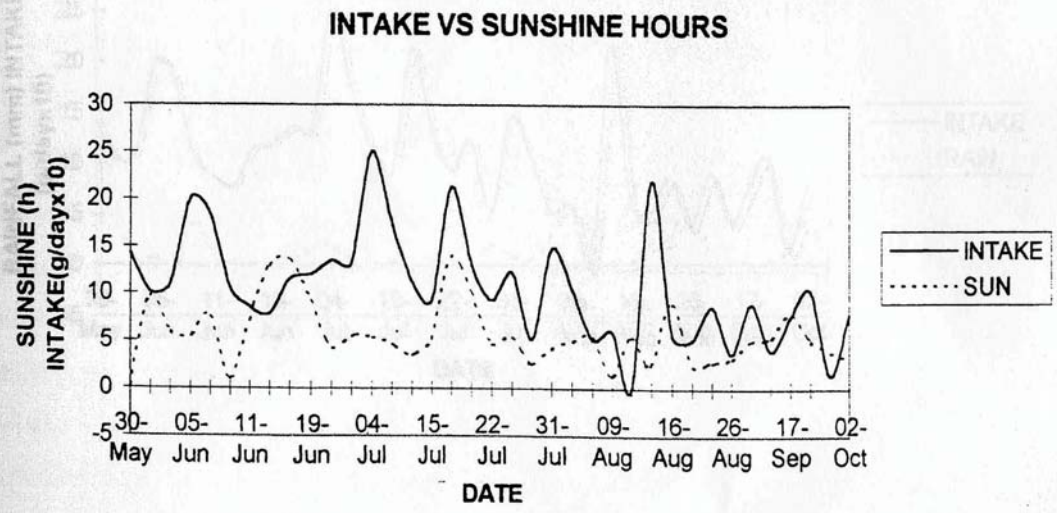
The intake of the mineral block by mares over the trial period was varied. The mean block intake over the 4 month trial period was 106g per day. The maximum block intake was 250g per day and the minimum was 0g per day.

Table 3.22 : Weekly mean mineral block intake of lactating mares at pasture (Commencing 2nd May).

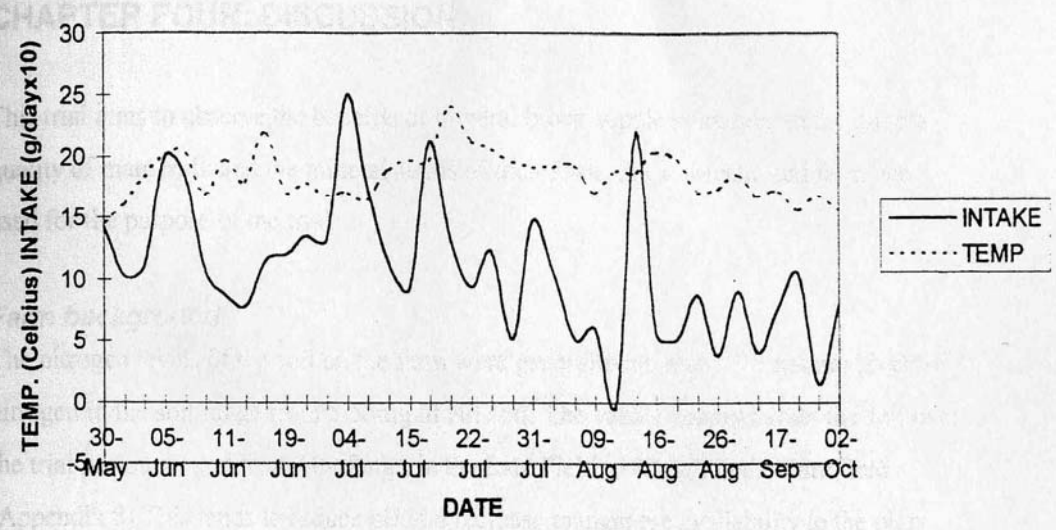
Week no.	1	2	3	4	5	6	7	8
Intake g/day	147.4	90	117	135	186	103	172.5	88.7

Week no.	9	10	11	12	13	14	15	16
Intake g/day	126	55.5	92	58.3	40	90.4	14	78

Figure 3.16 : Mineral block intakes of mares shown in relation to daily sunshine hours, temperature, and rainfall over the trial period.



INTAKE VS TEMPERATURE



INTAKE VS RAINFALL