NORMAL MANGANESE, ZINC, COPPER, IRON, IODINE, MOLYBDENUM, NICKEL, ARSENIC, LITHIUM AND CADMIUM SUPPLY DEPENDENT ON THE GEOLOGICAL ORIGIN OF THE SITE AND ITS EFFECTS ON THE STATUS OF THESE ELEMENTS IN WILD AND DOMESTIC RUMINANTS

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INTRODUCTION

The influence of the geological origin of the site of the flora on its trace element content was systematically investigated in Central Europe (GDR, Hungary, Czechoslovakia) by means of indicator plants. Lucerne and acre red clover in buds, meadow red clover and rye in blossom and wheat in stalk shooting were used for that purpose. The time of collecting the samples was fixed on the basis of phenological data so that the stage of development was the same in all countries. 7185 plant samples were at our disposal. Depending on their biotope, the trace element status of the ruminant species cattle, sheep, goats, roe deer, fallow deer, red deer and moufflons was investigated in 5570 samples of liver, cerebrum, kidneys, ribs, blood serum and hair.

Results of plant analysis

The geological origin of the material for soil formation varies the trace element content of the indicator plants of all tested trace elements significantly (table 1). For clarity's sake, the trace element content was relativized and the mean richest origin was equated with 100.

The Cu, Ni and Fe content of the flora on the weathering soils of the lower strata of new red sandstone (table 1) is significantly higher than that of the moor and peat areas. Boulder clay and diluvial sands have a similar Cu- and Ni-poor vegetation. Compared to the lower strata of new red sandstone, the sediments of the triassic produce Ni-poorer feedstuffs.

On the other hand, the flora of alluvial riverside soils proved to be particularly J-rich and that of triassic and, particularly, of muschelkalk very J-poor. Concentrated J deficiency in ruminants occurs on this soil.

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The Mo-richest feedstuff were found on the weathering soils of gneiss and granite, whereas those of the trias formations were particularly Mo-poor. Thus Mo-deficiency usually occurred in cauliflower and leguminous plants on muschelkalk and keuper weathering soils.

Table 1. The influence of the geological origin of the site on the copper, nickel, iron, iodine and molybdenum content of indicator plants in Central Europe

origin	Cu	Ni	Fe	Mn	Zn	Cd	As	Li	I	Mo
gneiss	93	70	79	52	75	78	100	98	80	100
granite	82	69	81	74	85	100	58	79	54	100
syenite	86	89	84	100	100	100	58	72	87	63
phyllite	93	83	81	73	92	81	38	69	92	73
slate	94	84	72	80	82	80	44	100	73	88
lower strata of new red sandstone	100	100	100	62	84	89	87	83	71	96
new red sandstone	80	62	69	69	61	74	49	89	71	67
muschelkalk	93	65	73	44	59	68	50	89	65	54
keuper	85	61	72	52	52	66	46	100	61	51
boulder clay	70	67	68	69	61	85	56	58	95	61
diluvial sand	70	67	90	98	79	69	59	77	95	62
loess	86	63	82	58	62	60	66	76	83	67
moor, peat	52	56	79	69	82	51	-	60	-	69
alluvium	74	68	83	69	70	70	70	54	100	79

The Mn-, Zn- and Cd-richest vegetation was found on the acid syenite sites of Central Europe, whereas muschelkalk or keuper weathering soils as well as loess produced the Mn-poorest feedstuffs. Therefore, Mn deficiency symptoms regularly occurred in cattle on these soils. The Cd intake of ruminants is lowest on moor and peat sites.

Apart from the geological origin of the site, emissions, plant species, part and age of plants influence the trace element content of the flora significantly.

The trace element status of ruminants

The relations between the site-specific offer, the influence of antagonists and the species-specificity of the trace element status are demonstrated by the example of Cu. Cu deficiency is most reliably reflected by the Cu content of cerebrum and liver. The Cu offer to cattle is worst on moor, diluvial sand and boulder clay. Primary Cu deficiency regularly occurs on these soils. Their Cu status and that of cows exposed to S, Cd and Mo is represented in table 2.

Table 2. The copper status of dairy cows with primary and secondary copper deficiency (mg/kg dry matter)

part of the body	normal (n 177)	Cu-deficiency primary (50)	S (115)	secondary Cd (130)	Mo (15)	Fp
cerebrum	11	6.0	5.2	8.4	6.4	< 0.001
liver	137	14	15	64	7.1	< 0.001

The trace element status of the organs is species-specific. The "normal Cu" content of the cerebrum of roe deer differs significantly from that of sheep. In sheep, this Cu concentration would indicate a considerable Cu deficiency.

LITERATURE

Anke,M., Szentmihályi,S., Groppel,B., Regius,A., Lokay,D. (1986) Mengen- u.Spurenelemente 6:108-120