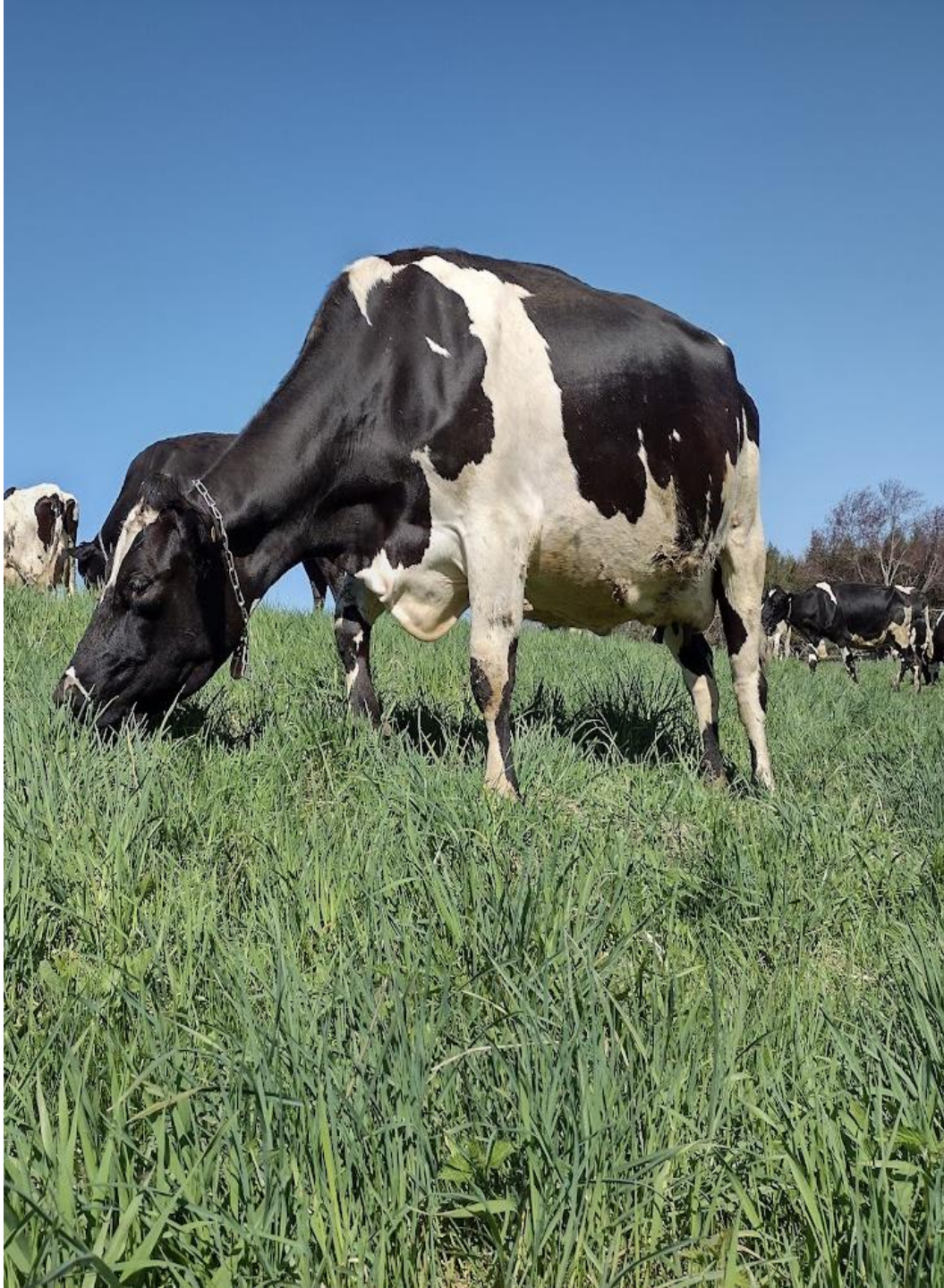
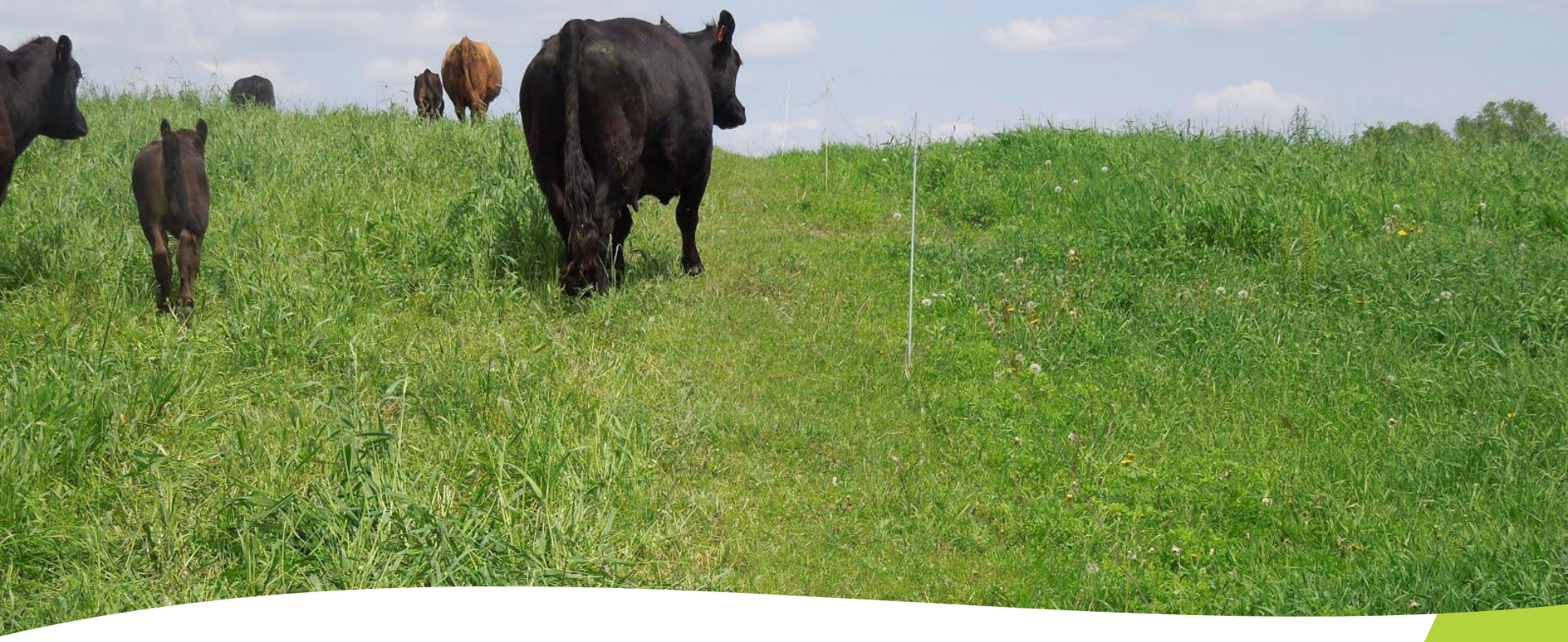
Pasture Nutrient Management

Dr. Heather Darby



The University of Vermont



Grazing Management

- Cattle deposit 80 to 90% of nutrients consumed back on the land in manure.
- 10 to 20% incorporated into meat/milk

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Nutrients from Manure of Grazing Livestock

Table 1.—Total production and nutrient content of manure from various farm animals

Animal	Animal size (lb)	Total manure production			% water	Nutrient content		
		lb/day	cu ft/day	gal/day		N lb/day	P lb/day	K lb/day
Dairy	150	13	0.19	1.5	88	0.06	0.011	0.04
	250	22	0.32	2.4	88	0.11	0.023	0.07
	500	43	0.66	5.0	88	0.22	0.047	0.15
	1000	89	1.32	9.9	88	0.45	0.094	0.29
	1400	120	1.85	13.9	88	0.59	0.131	0.41
Beef								
Cattle	500	30	0.50	3.8	91	0.17	0.051	0.12
	750	45	0.75	5.6	91	0.26	0.079	0.19
	1000	60	1.0	7.5	91	0.34	0.109	0.24
	1250	65	1.2	9.4	91	0.43	0.12	0.31
Cow		63	1.05	7.9	91	0.36	0.11	0.26
Swine								
Nursery pig	35	2.9	0.038	0.27	89	0.018	0.0052	0.01
Growing pig	65	5.3	0.070	0.48	89	0.034	0.0099	0.02
Finishing pig	150	12.4	0.16	1.13	89	0.078	0.023	0.045
	200	16.6	0.22	1.5	89	0.104	0.036	0.059
Gestate sow	275	11.3	0.15	1.1	89	0.069	0.023	0.04
Sow and litter	375	15	0.21	1.4	89	0.1	0.031	0.054
Boar	350	14	0.19	1.4	89	0.081	0.023	0.051
Sheep	100	4	0.062	0.46	87	0.045	0.0066	0.032
Poultry								
Layers	4	0.26	0.0035	0.027	84	0.0034	0.0012	0.0012
Broilers	2	0.17	0.0024	0.018	78	0.0024	0.0006	0.0008
Horse	1000	51	0.75	5.6	85	0.31	0.072	0.25

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Moore and Gamroth, 1993

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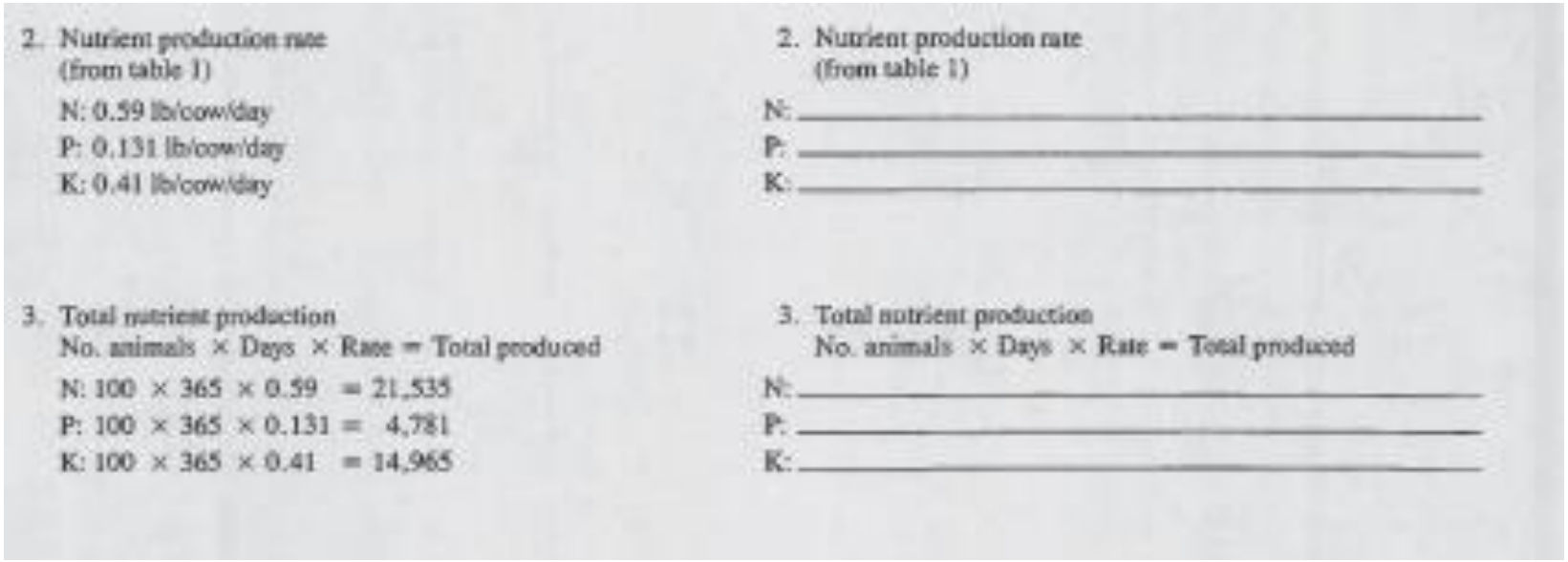


2. Nutrient production rate
(from table 1)

N: 0.59 lb/cow/day
P: 0.131 lb/cow/day
K: 0.41 lb/cow/day

3. Total nutrient production
No. animals × Days × Rate = Total produced

N: 100 × 365 × 0.59 = 21,535
P: 100 × 365 × 0.131 = 4,781
K: 100 × 365 × 0.41 = 14,965

2. Nutrient production rate
(from table 1)

N: _____
P: _____
K: _____

3. Total nutrient production
No. animals × Days × Rate = Total produced

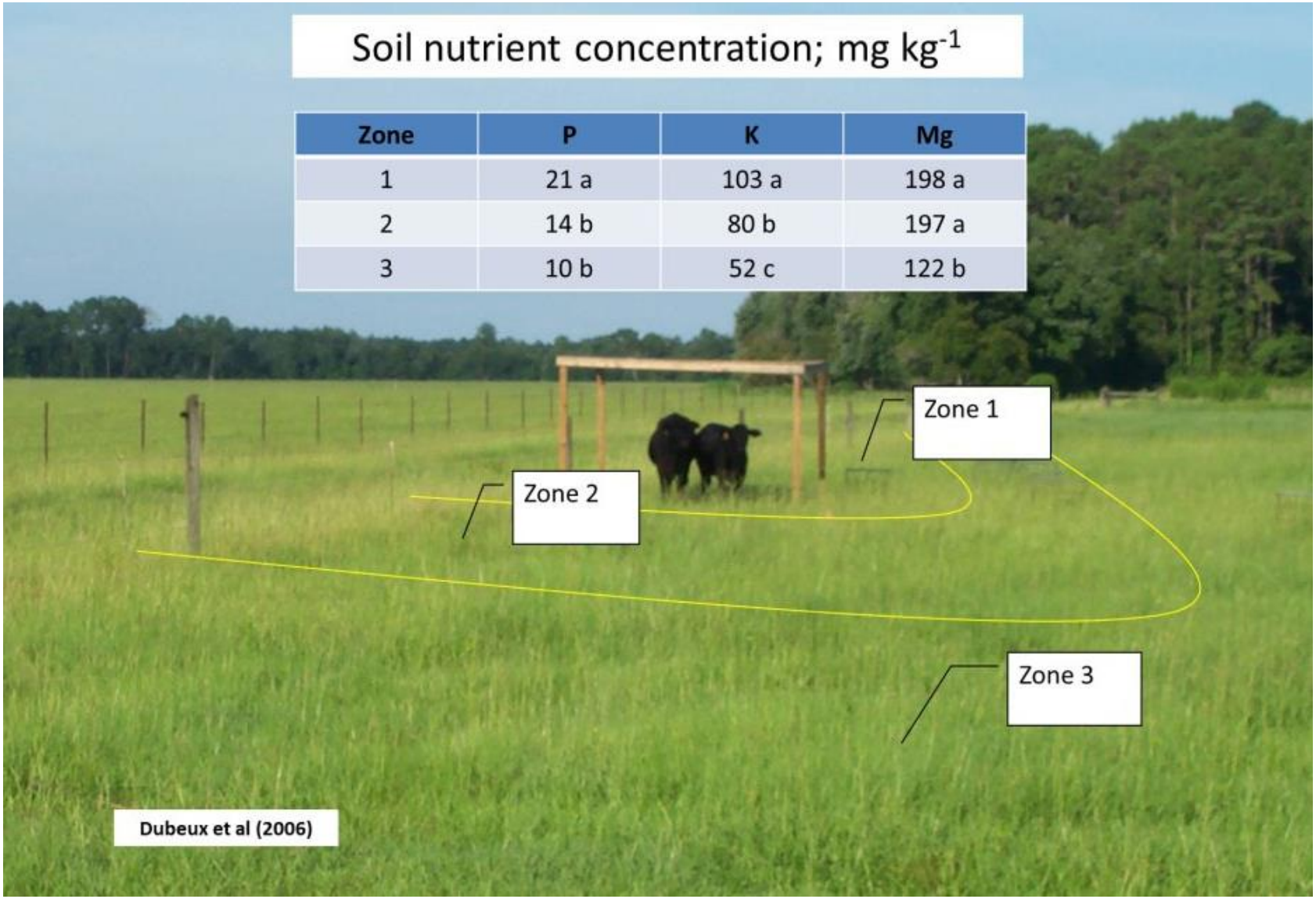
N: _____
P: _____
K: _____

Simple Manure Calculation - Pasture

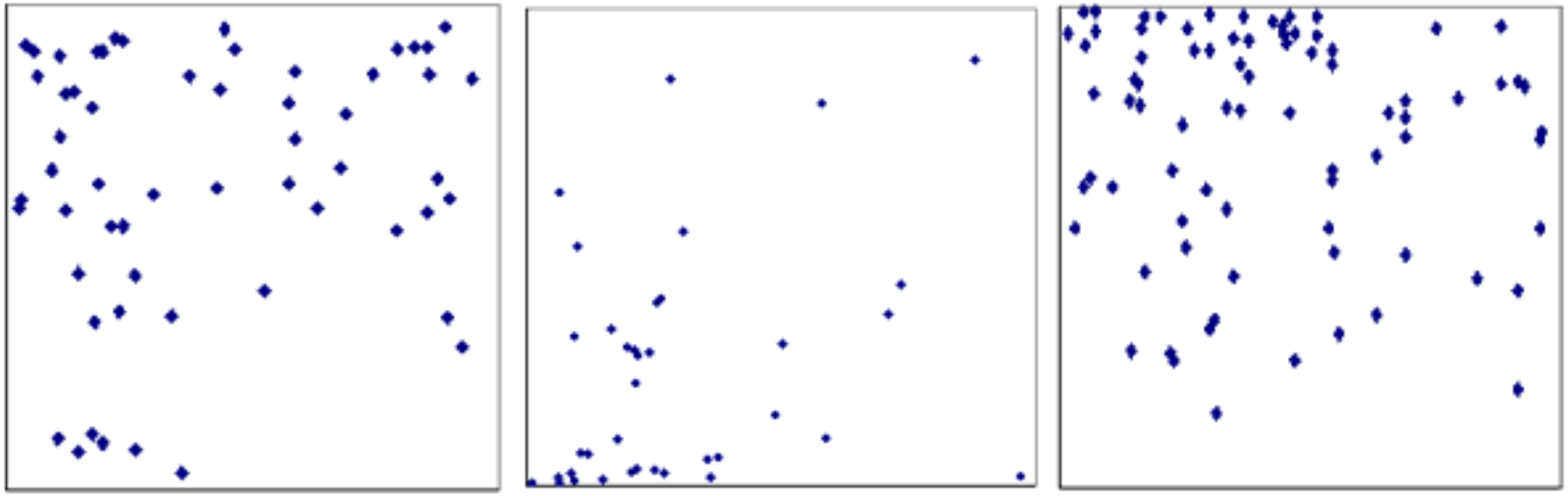
- N: 100 x 2 days * 0.59 = 118 lbs
- P: 100 x 2 days *0.131 = 26.2 lbs
- K: 100 x 2 days * 0.41 = 82 lbs

Soil nutrient concentration; mg kg^{-1}

Zone	P	K	Mg
1	21 a	103 a	198 a
2	14 b	80 b	197 a
3	10 b	52 c	122 b



Continuous vs. Rotational Stocking



Rot. 1-d Cont. Rot. 7-d

Adjust Rates Based on What is Being Grown!

- Mostly grass – plan on 30 lbs/N per ton of dry matter removed.
- If there is a good mixture of legumes - 60 lbs/N total for the season

Try adding more legumes first

- Legumes can provide substantial portion of N need to forage crop
- >30% of composition
- They don't stick around forever, you must manage
- Make sure you've set yourself up for success
  - be ready when conditions are right
  - correct underlying pH/fertility issues

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Diversity of stand: Grass/Legume Mixtures

Nitrogen treatment	DM yield tons ac^{-1}
Urea	1.25
Grass-legume mix	1.28
Grass alone	0.607

Can legumes replace N fertilizer?

Treatment	Crude protein	30-hr Digestible NDF lbs ac^{-1}	Milk yield
Clover	**388**	**993**	**5925**
None	181	491	2834

Time N applications When Needed

- Most of the growth in the spring and early summer.
- Similar to hay fields can apply N before first graze.
- Some people have too much growth in the spring so need to manage.
- Limited landbase should consider early N applications.

Check Phosphorus and Potassium

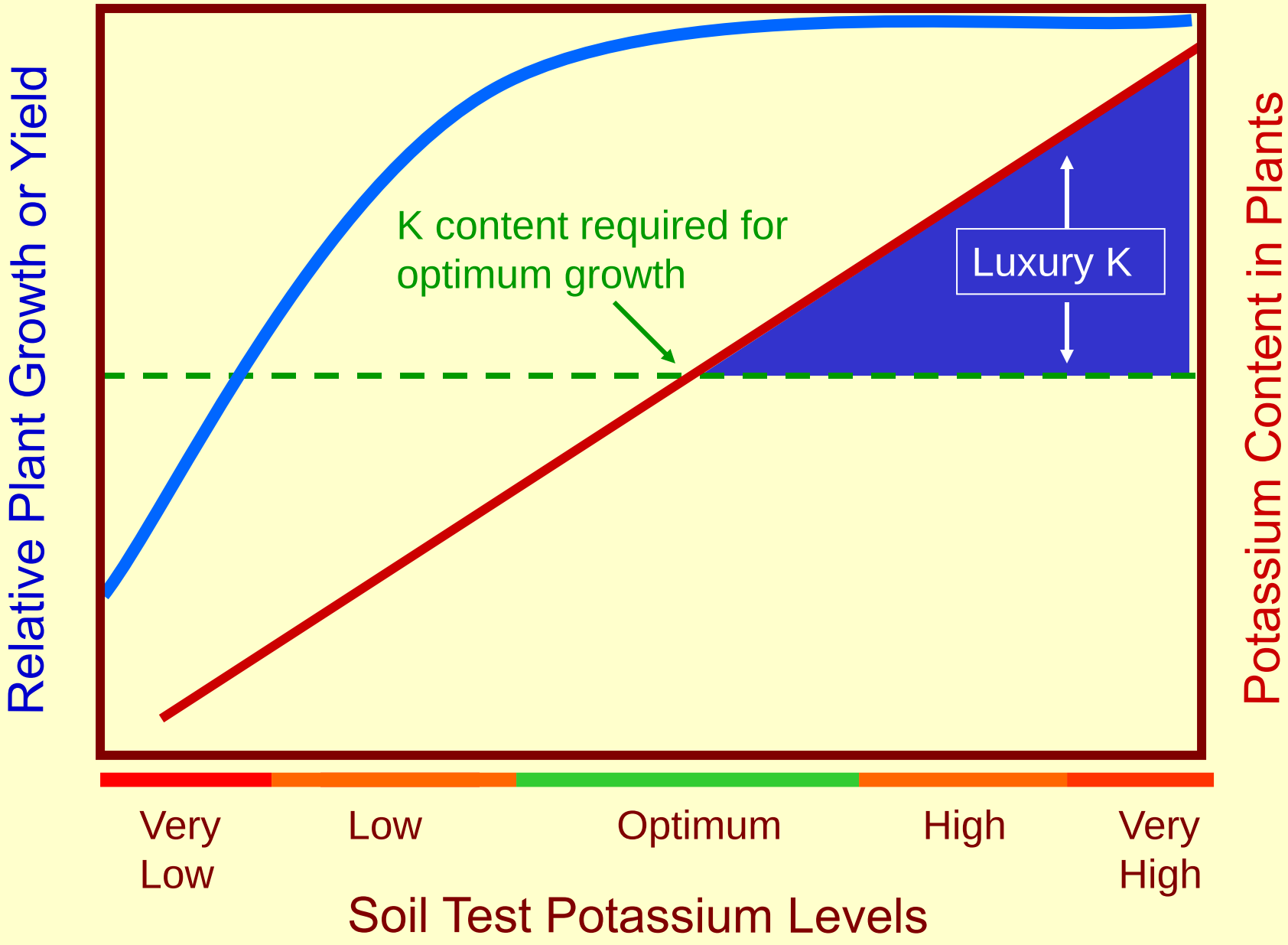
- Starts with soil test
- Phosphorus should be easily managed with manure
- Manage to minimize environmental losses.
- Manage ph to make sure P available.

Potassium and Grass Management

Grasses are capable of removing a lot of potassium but are also very competitive for K when soil test is low.

K management is very critical when managing mixtures if legumes are to be maintained.

Luxury Consumption of Potassium



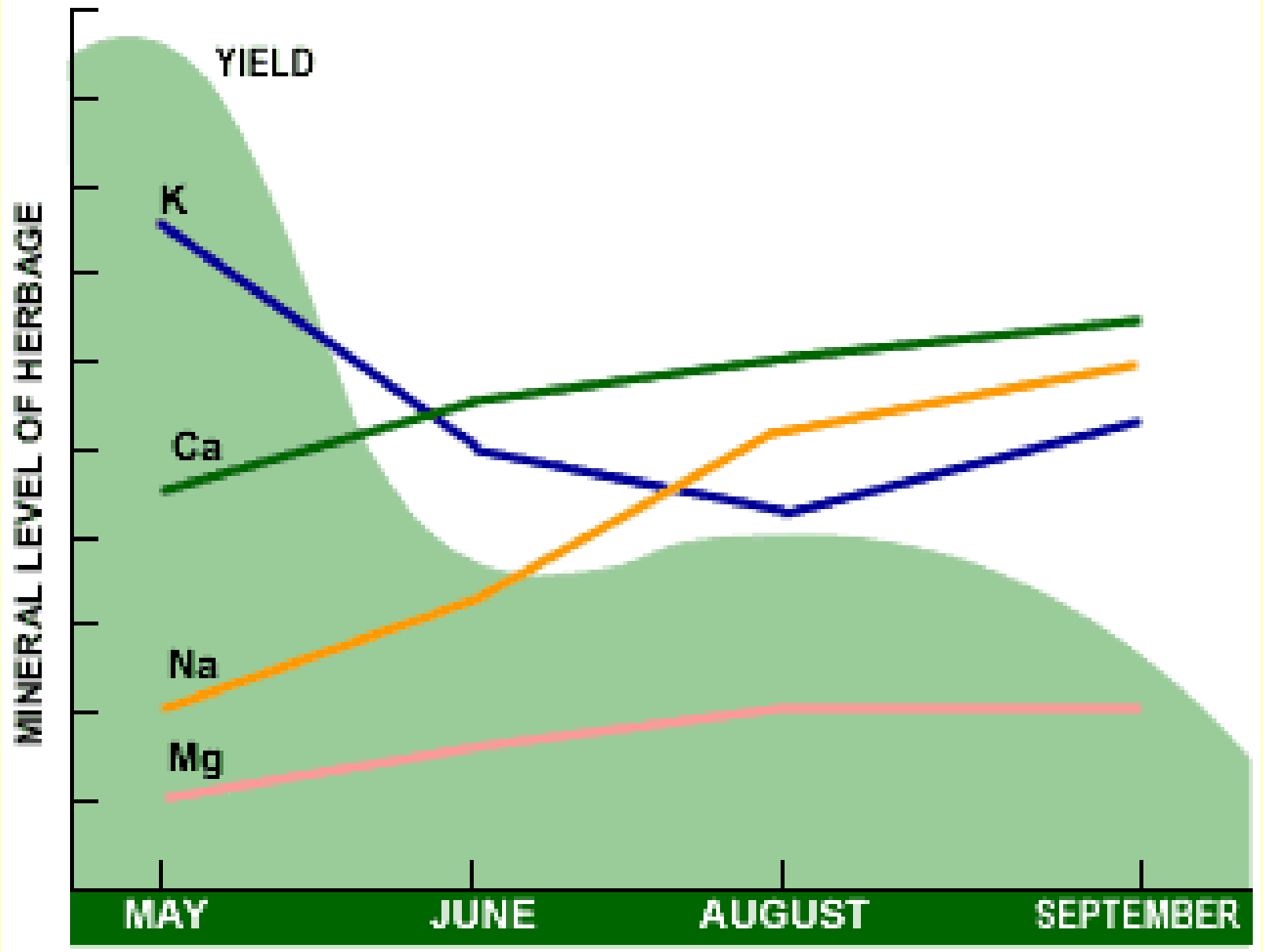
Split Applications of Potassium?

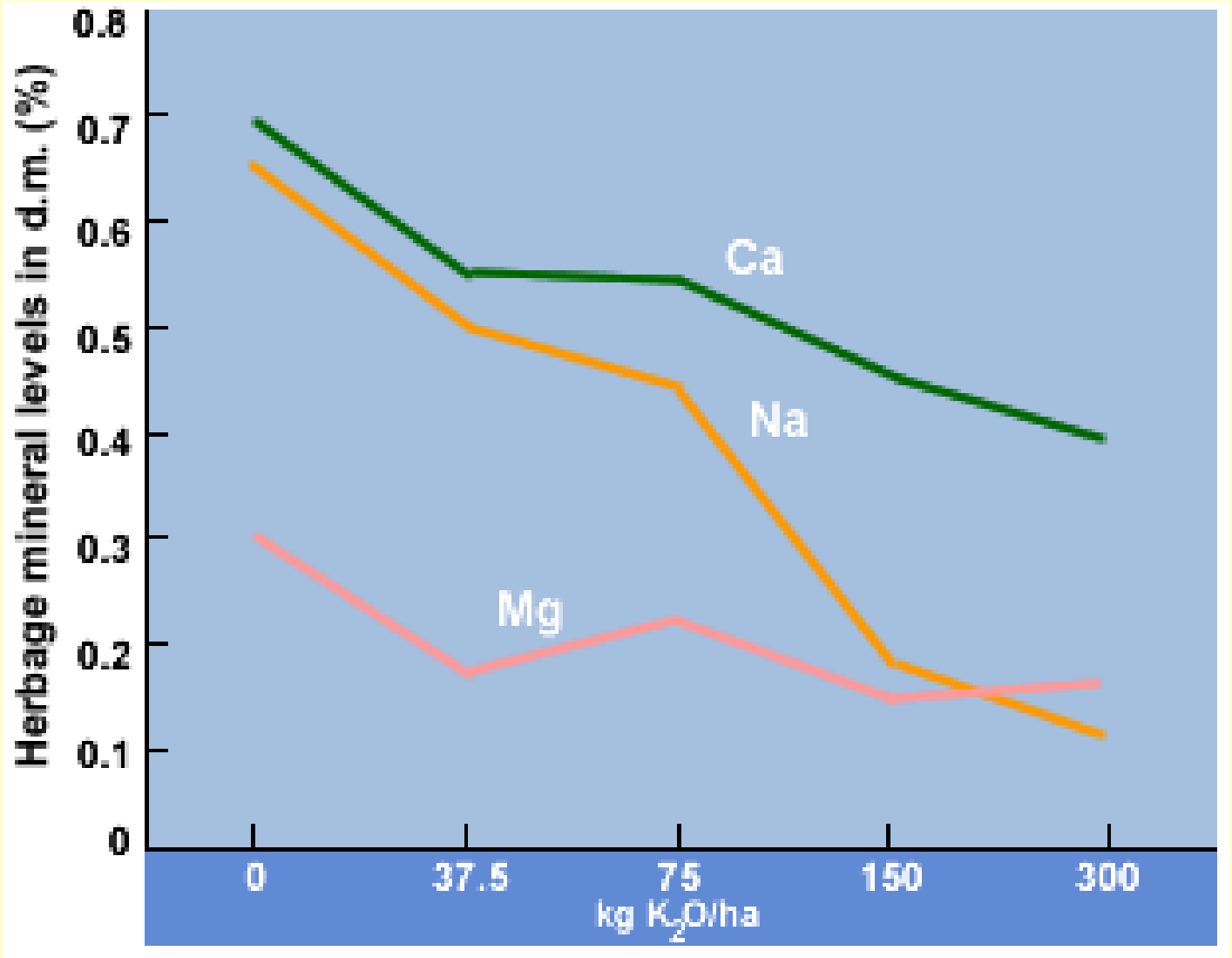
- Split applications helps to reduce luxury consumption.
- Split applications helps to reduce leaching losses in sandy soils
- After first and after late summer harvest

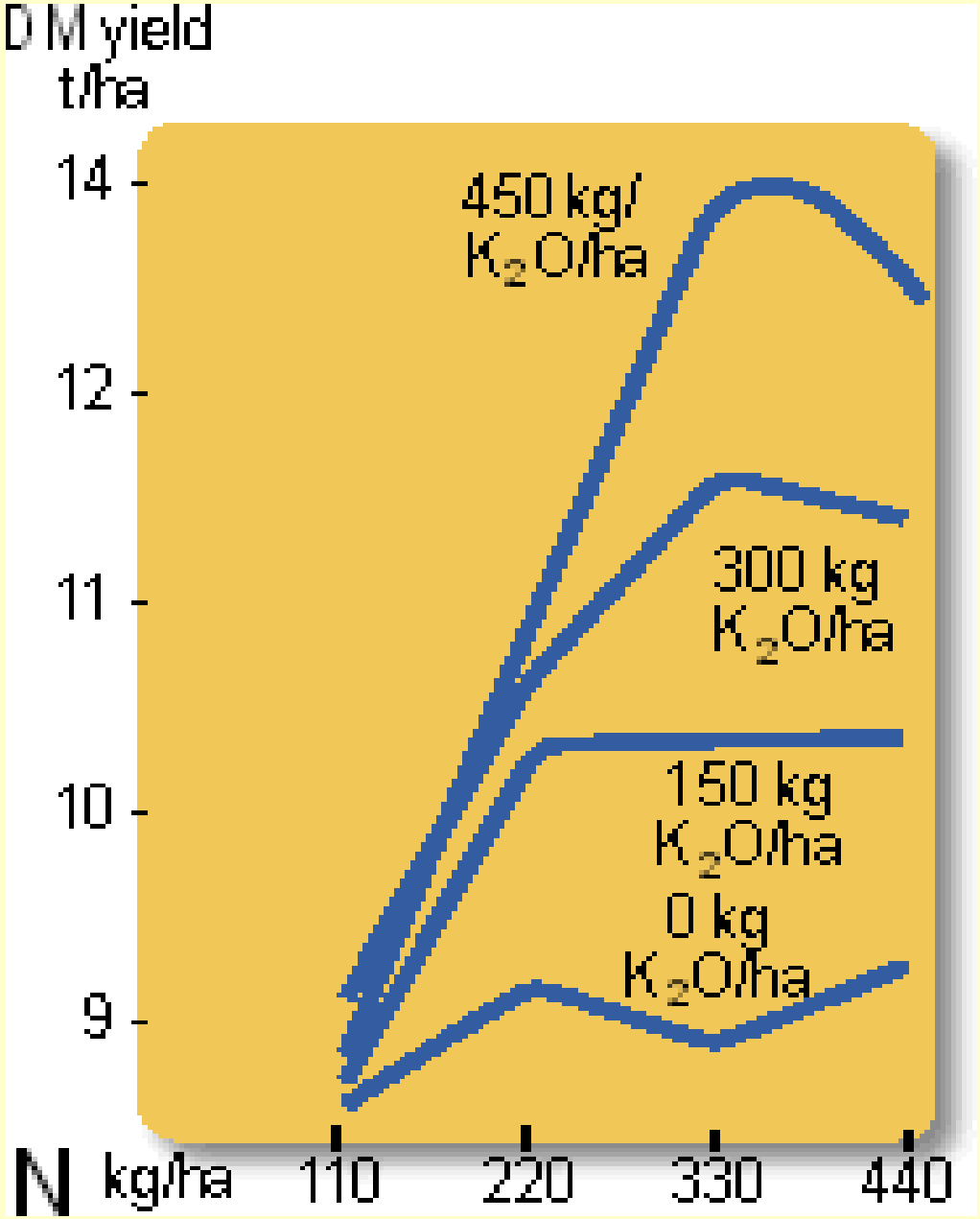
Effects of Liming on K

- Liming increases exchange sites on organic matter; therefore, increasing the potential of exchangeable potassium.

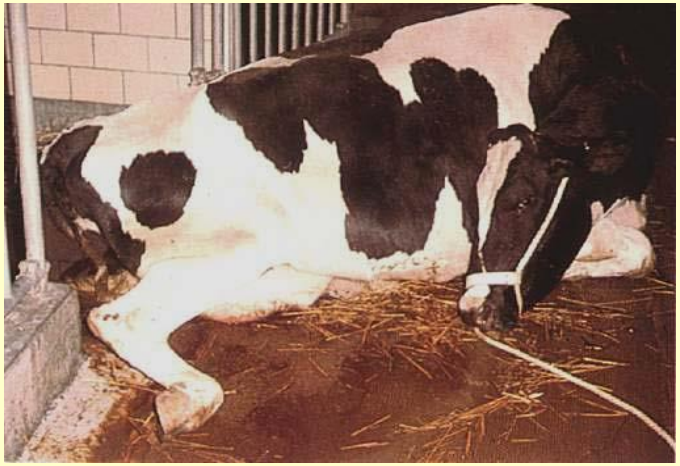
- Liming reduces potassium leaching


YIELD
K
Ca
Na
Mg
MINERAL LEVEL OF HERBAGE
MAY
JUNE
AUGUST
SEPTEMBER


Herbage mineral levels in d.m. (%)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Ca
Na
Mg
0
37.5
75
150
300
kg K2O/ha


D M yield
t/ha
14
12
11
10
9
450 kg/
K2O/ha
300 kg
K2O/ha
150 kg
K2O/ha
0 kg
K2O/ha
N kg/ha
110
220
330
440

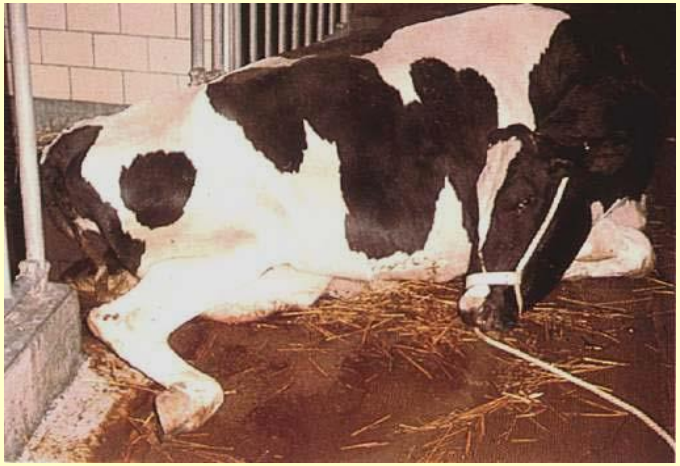
Animal Metabolic Disorders Involving Potassium



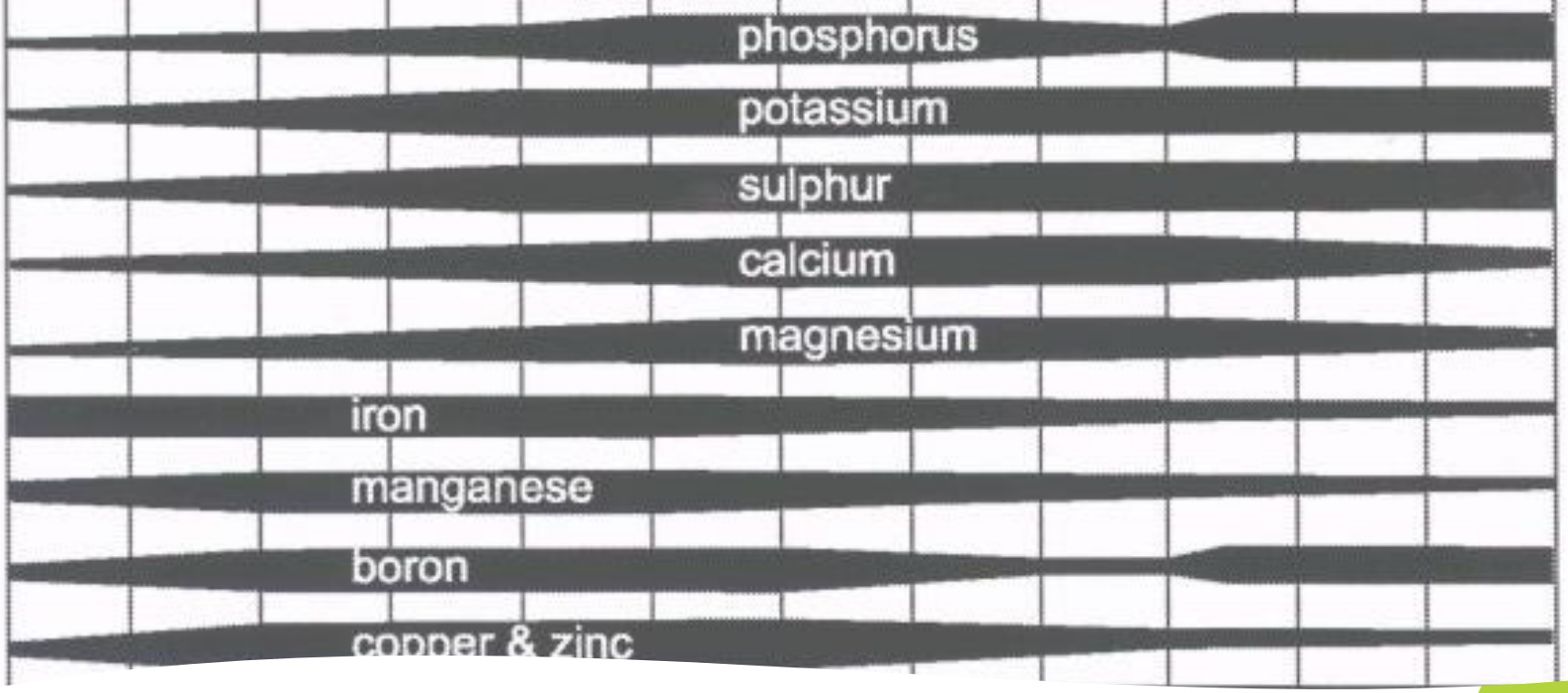
Hypocalcaemia

Hypomagnesaemia

Animal Metabolic Disorders Involving Potassium



Hypocalcaemia
Or
“Milk Fever”



Apply Lime if Needed

- Pay attention to soil pH.
- Impacts availability of other nutrients, microbes, nutrient cycling, etc.
- Lime before pH gets too low.
- Surface application of lime takes a longer period of time to react with soil and neutralize acidity.