

Nitrogen (pg 85-87, 267-275)

- .....
- soil N status is generally related to ....., both are extremely difficult to measure and quantify
- soil N forms include ..... and numerous ..... which vary in plant N availability
- $\text{NO}_3^-$  &  $\text{NH}_4^+$  are ..... and don't stay in the soil long.
- Forage production is more closely related to ..... than the ..... (in contrast to S, K and P) (analogy to a bank account balance)

**N-balance**

For any site soil N status =

the N-inputs (..... + ..... + .....  
+ .....)  
- the N-losses (..... + ..... +  
.....)

**N<sub>2</sub> Fixation (pg 85)**

.....

species specificity

white clover and alfalfa can fix up to ....., typically .....

crop rotations

**Legumes**

Two key attributes

- 1) ..... to grassland and subsequent crops
- 2) high ....., hence high .....

Disadvantages

- 1) .....
- 2) potential ..... problems

Species

- 1) white clover (*Trifolium repens*) 32 M ac in Australasia, 12 M ac in USA, about 7-9 M ac sown annually world-wide, double for 'indigenous' white clover
- 2) alfalfa (*Medicago sativa*) 65 M ac in the world, 15-20 M ac sown annually
- 3) red clover (*Trifolium pratense*), annual sowing about 3.2 M ac with about 9-11 M ac grown in USA
- 4) subterranean clover (*Trifolium subterraneum*), mainly in Australia 32 M ac. also in USA and Mediterranean
- 5) birdsfoot trefoil (*Lotus corniculatus*), About 1.5 M ha is grown in USA, and annual sowing in southern

**Fertilizer nitrogen (pg 273)**

Anhydrous (crops only)	82-0-0-0
Urea	46-0-0-0
NH <sub>4</sub> NO <sub>3</sub>	34-0-0-0
(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	21-0-0-0
manure	0.5% N for cattle, 1% N for poultry

fertilizer N suppresses N fixation

rule of thumb –..... will prevent .....
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split dressings (.....)

strategic applications (new pasture or in fall for winter stockpile)

20 kgDM/kg N

**Atmospheric deposition**

= pollution

..... in North America

.....in Europe

### **Volatilization**

Release of ..... – results in ..... of fertilizer application

Unless nitrogenous fertilizers are ..... soon after application they can “.....” as  $\text{NH}_3$  and reduce the fertilizer response

### **Nitrification & Denitrification**

An environmental issue. In extreme cases can account for up to ..... from soil

Nitrification = .....

Denitrification = .....  
(released to the atmosphere), high in wet soils

### **Leaching**

Not usually significant for most soils (being N deficient)

Can be extremely high if ..... (fixation and fertilizer) exceed .....

Is usually high in areas with .....

### **Removal in hay/silage or animal products**

Often underestimated – but is usually the greatest loss of N from the soil

Hay typically 25% protein (protein is 16% N = hay is 4%N)

Typical alfalfa harvest 4 crops each of 1.5 ton/acre (12,000 lb/acre, 13.4 T/ha)  
= 480 lbN/ha (540 kgN/ha)

Cow-calf operation

Grazing 1 cow per acre, producing a 600 lb (275 kg) stocker calf per acre  
60% protein (16%N)  
= 58 lbN/acre