The Potash Development Association

POTASH News

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OPTIMISING POTASH USE ON CUT GRASSLAND

Grass cut regularly, as silage, haylage or hay, removes very large amounts of potassium (K). Unless this is replaced, soil K concentrations will fall. In recent years there is evidence of an overall increase in the number of grassland soils below target index (2-), as well as a decline in the use of potash fertiliser. This situation is not sustainable and grass yields will fall unless corrected.

When conserved grass is fed to our animals, nearly all the potassium returns in the dirty water, slurry or FYM. So, if these manures could be spread on the same fields from which the forage originated, satisfactory soil K levels would be more easily maintained. This article shows how careful nutrient planning of potash can move us towards this objective.

Table 1: Estimate the potash offtake from your grass fields

Management	Dry Matter	**Offtake kg K_2O /t**	Good Yield tonnes/ha	**Typical offtake kg K_2O/ha**
Silage	25%	6.0	1 cut 23 t/ha	140
"	"	"	2 cuts 38 t/ha	230
"	"	"	3 cuts 47 t/ha	280
Silage	30%	7.2	20 – 40 t/ha	as above
Silage with clover	25%	6.8	15 – 40 t/ha	as above
Haylage	55%	13.0	1 cut 10 t/ha	130
Hay	85%	18.0	5 t/ha	90

Table 2: Adjust potash requirement according to soil analysis.

Soil index	K_2O adjustment in kg/ha
0	add 60 per year, each year
1	add 30-40 per year, each year
2-	no adjustment
2+	deduct 30 per year (or 25 per cut)
3	deduct 70-140 per year

Table 3: What is the potash content of manures applied on the farm?

Manure	Dry Matter	"Available" kg K_2O/ t	"Total" kg K_2O/ t
Dirty water	0.5%	1.0	1.0
Cattle slurry	2%	2.2	2.4
"	6%	2.9	3.2
Pig slurry	2%	2.2	2.4
"	4%	2.5	2.8
Cattle FYM	25%	7.2	8.0
GreenWasteCompost	60%	4.5	5.5

Slurries are so variable that it is wise and cost-effective to analyse a representative sample for N P & K content.
In your nutrient plan use the "total" K_2O value in the manure, unless the soil index is 0 or 1, in which case use the lower "available" value.

Potash planning on cut grass fields

Silage cutting regimes vary enormously from farm to farm. A series of common examples are given below. The potash requirements are from RB209.

Example 1: Three cut silage, total yield 47 t/ha. Soil K index 2- (at target)
Cattle slurry 2% DM with 2.4 kg K_2O / m^3 (table 3)**.** *40 m^3/ha applies 40 x 2.4 = 95 kg/ha K_2O*

Timing	Feb/Mar	after 1st cut	after 2nd cut	after 3rd cut	Total
K requirement	80	90	80	30	**280**
Slurry plan	40 m^3/ha	40 m^3/ha	40 m^3/ha		
K it will supply	95	95	95		**285**
Fertiliser K	nil	nil	nil	nil	**0**
				Balance	+ 5

In this system the potash in the slurry is used optimally, and the soil index should be maintained satisfactorily without the need for potash fertiliser. The slurry will also enable big savings on N fertiliser.

However, three slurry applications are often not practical, typically because of wet ground conditions in early spring. See example 2.

Example 2: Three cut silage without an early slurry application

Timing	Feb/Mar	after 1st cut	after 2nd cut	after 3rd cut	Total
K requirement	80	90	80	30	**280**
Slurry plan		40 m^3/ha	40 m^3/ha		
K it will supply		95	95		**190**
Fertiliser K	90	nil	nil	nil	**90**
				Balance	+ 0

Potash fertiliser application is essential in early spring to maximise the growth of first cut.

A common scenario is where slurry is not used *after* the first cut. See example 3.

Example 3: Two cut silage (36 t/ha) then graze K index 2-

Timing	Feb/Mar	after 1st cut	after 2nd cut	Total
K requirement	80	90	60	**230**
Slurry plan	40 m^3/ha		40 m^3/ha	
K it will supply	95		95	**190**
Fertiliser K	nil	40	nil	**40**
			Balance	+ 0

Because the second cut will suffer if given no fresh K, potash fertiliser is applied immediately after first cut, at a rate that eliminates the annual deficit.

Some fields may receive too much slurry, especially where it is applied according to convenience, rather than need. Example 4 is a field near a dairy unit.

Example 4: one cut silage (23 t/ha) then 4 months grazing K index 3 (270 mg/l)

Total offtake (table 1) = 23t x 6kg = 140 kg/ha. Run-down (table 2) = 70 kg/ha
Requirement = 140 -70 = 70 kg/ha.

Timing	Feb/Mar	after cut	grazing	Total
K requirement	30	40	0	**70**
Slurry plan	40 m^3/ha	40 m^3/ha		
K it will supply	95	95		**190**
Fertiliser K	nil	nil	nil	**0**
			Balance	+ 120

Here, the slurry is supplying more potash than the silage removes and it is wastefully going onto a soil already high in K, and where there is negligible potash offtake during grazing. A better approach is to cut out the later slurry application and spread it on fields producing multi-cut silage, maize or arable crops, reducing their dependence on potash fertiliser.

Cutting scenarios may not fit standard recommendation tables, such as for a beef enterprise where hay and silage are required. See example 5.

Example 5: Moderate silage cut (20 t/ha) followed by moderate hay cut (4 t/ha)
Light dressing of FYM in spring (10 t/ha). Soil K index 2+
In cases like this, the first stage is to estimate the *total* annual potash requirement:-
Total offtake (table 1) = 20t x 6kg + 4t x 18kg = 190 kg/ha. Run-down (table 2) = 2 cuts x 25. Requirement = 190 - 50 = 140 kg/ha K_2O.

Timing	Feb/March	after 1st cut	after hay cut	Total
K requirement	60 *	65 *	15 **	**140**
FYM plan	10 t/ha			
K it will supply	80			**80**
Fertiliser K	nil	60	nil	**60**
			Balance	0

** these rates are from RB209 for silage and hay at index 2+. ** an extra 15 kg/ha is needed at some stage to match the annual requirement of 140 kg/ha.*
Note: the 60 kg/ha potash, as fertiliser, should be applied immediately after the silage cut.

Some general guidelines
There is no need to match the exact K requirements of each cut, but it is important to predict the likely *total yield of cut grass* over the year and hence the annual potash offtake, and any adjustment for high/low soil index. Should this prove impossible, you can correct the imbalance in next season's plan.

1. Do not apply more than 90-100 kg/ha potash as fertiliser at a time, and apply *none* if significant amounts of slurry or FYM are used at the same stage. Otherwise there is risk of excessive K uptake and unnecessary depletion of soil K.
2. If index is 3 or less, *some* K (as fertiliser or slurry) must be applied immediately after cutting, otherwise regrowth may be slowed due to temporary K shortage. This happens because the “readily available” K in the soil is temporarily depleted following the silage cut and requires some time to be replenished from the less available reserves in the soil.
3. At index 2+ or less, it is important to apply *some* K as fertiliser or slurry in spring to ensure a full yield of the first cut.
4. Slurry must be spread evenly, preferably by fixed width applicators with a controlled application rate. Ensure that planned FYM applications do cover the *whole* field.

Many different grades of fertilisers are available. We suggest a full nutrient plan is done, before ordering fertiliser, so that N P K and S requirements are optimally matched.