



The Potash
Development Association

POTASH

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Cereal straw –nutrient contents.

Straw has always been an important by-product of cereal production, with its main use historically being as feed and bedding for livestock. This remains the primary use, but other markets have developed over recent years, particularly as a result of the low profitability of arable farming and the need to maximise returns through the sale of the straw.

Attention is focussed on cereal and other straws at the moment due to the rise in the value of the fertiliser nutrients which straw contains, principally potash but also some phosphate, and to calculations of whether the removal and sale of straw is in the best interests of soil structure and fertility.

Some pros and cons can be considered when deciding whether or not to sell straw.

INCORPORATING STRAW

Some benefits	Some disadvantages
Adds organic matter to the soil, and can help to improve soil structure.	Extra diesel used by the combine when chopping straw.
Returns the nutrients in the straw to the soil.	Potential for increased slug problems.
No soil structural damage from baling and carting in wet conditions.	Competition with crop for available soil nitrogen in the autumn.
Potential reduction in loss of N from the soil in the autumn.	May be difficulties with incorporation.
No delay caused by baling and carting.	No additional direct income.
Lower labour requirement, unless by contractor.	

REMOVAL AND SALE OF STRAW

Some benefits	Some disadvantages
Income from the sale of the straw.	Costs of baling and carting, unless by contractor.
Potentially easier establishment of the following crop.	Significant extra removal of fertiliser nutrients from the field.
Possibly reduced slug problems.	Possible delay in baling and carting, leading to delayed establishment of following crop.
	Possible soil structural damage if soils are wet during baling and carting.
	Income from the sale of straw may not be spent on replacing the nutrients removed!

None of these issues is new, although changed circumstances lead to different priorities. The recent rise in the price of fertiliser nutrients has led to a detailed consideration of these pros and cons of chopping or selling straw, but other factors such as the price of diesel will also have a significant impact on the decision.

In order to factor the changed price of fertiliser nutrients into the decision, an estimate of the nutrient content of straw must be available. This can usefully be calculated on a per hectare basis, but when straw is sold and bought it is also important to know the probable quantity of fertiliser nutrients in each tonne of straw. Analysis shows that the nutrient content of spring cereal straw is higher than of winter straw, and that the potash content of straw is much higher than the phosphate content.

NUTRIENT CONTENT OF WHEAT AND BARLEY STRAW PER HECTARE

On average the amount of straw produced per hectare is in proportion to the grain yield, so the nutrient content per hectare of straw can be estimated by multiplying the grain yield by standard factors for phosphate (P_2O_5), for potash (K_2O) and for magnesium (MgO) which take into account the ratio of straw to grain yield.

Nutrients in straw	Winter cereal straw	Spring cereal straw
Phosphate: kg P_2O_5 /ha	grain yield (t/ha) x 0.6	grain yield (t/ha) x 0.8
Potash: kg K_2O /ha	grain yield (t/ha) x 4.8	grain yield (t/ha) x 6.3
Magnesium: kg MgO /ha	grain yield (t/ha) x 0.6	grain yield (t/ha) x 0.8

Example calculation:

A hectare of winter cereal straw from an 8 t/ha wheat crop is estimated to contain:

$$8 \text{ (t/ha)} \times 0.6 = 4.8 \text{ kg } P_2O_5/\text{ha}$$

$$8 \text{ (t/ha)} \times 4.8 = 38.4 \text{ kg } K_2O/\text{ha}$$

$$8 \text{ (t/ha)} \times 0.6 = 4.8 \text{ kg } MgO/\text{ha}$$

NUTRIENTS IN STRAW – KG PER TONNE OF STRAW

The table below gives the best estimates of the phosphate and potash contents of a number of straws as harvested, but the values for those marked with an asterisk are from relatively few samples. These figures provide a useful guide, but the actual values for specific crops may vary. For example the potash (but not the phosphate) contained in the straw may be reduced if there is appreciably more rain than average between the onset of senescence and baling.

Straw type	Guide kg nutrient / tonne of fresh straw		
	Phosphate - P_2O_5	Potash - K_2O	Magnesium - MgO
Winter wheat/barley straw	1.2	9.5	1.3*
Spring wheat/barley straw	1.5	12.5	1.2*
Oat straw	1.6	16.7	2.2*
Oilseed rape straw	2.2	13.0	n.d.
Rye straw	2.1*	10.0*	1.0*
Pea straw/haulm	3.9*	20.0*	1.7*
Bean straw/haulm	2.5*	16.0*	1.8*
Linseed straw	1.6*	9.2*	n.d.

* best estimates from few samples. n.d. = no data.

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