The Effect of Mechanical Separation on the Plant Nutrient Content of Animal Slurry

Slurry contains useful quantities of the major plant nutrients :
Nitrogen (N), Phosphate (P_2O_5), and Potash (K_2O)

a) Nutrient Content of Raw Slurry

The proportion of nutrients immediately available to a crop from undiluted slurry (excreta and urine) are shown in Table 1. However, smaller amounts of nutrients become available to later crops.

TABLE 1

Mean Values for Available Nutrient Contents of Excreta (Undiluted Slurry) (Kg/m³*)

	N	P_2O_5	K_2O
Cattle (11% DM)	2.3	0.8	4.3
Pigs – Meal Fed (10% DM)	3.5	2.0	2.4
Poultry (23%)	8.7	5.5	6.2

* Kg/m³ is approximately the equivalent to 1 bs/100 gals

The addition of water, waste feed and bedding affect the volume and dry matter of slurries found on farms. A range of these values for cattle and pig slurries are shown in Table 2.

TABLE 2

Range of Values of the Composition of Cattle and Pig Slurry

	Dry Matter %	N Kg/m³*	P_2O_5 Kg/m³*	K_2O Kg/m³*
Cattle	4 - 23	2.4 – 6.5	0.4 – 1.8	2.0 – 5.8
Pig	5 – 25	1.6 – 6.8	0.6 – 2.1	1.7 – 3.6

* Kg/m³ is approximately the equivalent to 1 bs/100 gals
The variation in the composition of the slurry is primarily the result of variation in dry matter content.

b) Nutrient Content of Separated Slurry

Separation results in an easily handled solid (18-25% dm) and a readily pumped liquid (2-7% dm). The output of liquid and fibre, together with the dry matter content of both fractions, depends upon the dry matter content of the raw slurry delivered to the Separator. However, trials carried out at the N.I.A.E have shown that separation produces about 30% solids and 70% liquid from cattle slurry and about 20% solids and 80% liquids from pig slurry.
The liquid and fibre each contain similar quantities of plant nutrients (N, P2 O5, K2 O) on a per unit weight basis as the un-separated slurry, but since separation yields 2-3 times as much liquid as fibre, most of the available plant nutrients are in the separated liquid. Tables 3 & 4 show average values of the plant nutrient content of raw cattle and pig slurries and the effect of separation on the nutrients based on the N.I.A.E figures of solids and liquid separation.

TABLE 3

Effect of Separation on the Available Nutrient Content of Separated Fraction of Cow Slurry

	N Kg/m³*	P_2O_5 Kg/m³*	K_2O Kg/m³*
Raw Slurry ≠	3.90	0.63	4.20
Separated Liquid	2.66	0.44	2.94
Separated Fibre	1.14	0.19	1.26

* Kg/m³ is approximately the equivalent to 1 bs/100 gals
≠ Mean figures for slurries with an average dry matter content of 7.9% (range 8-14.3%) from 33 farm sites

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TABLE 4

Effect of Separation on the Available Nutrient Content of Separated Fractions of Pig Slurry

	N Kg/m³*	P_2O_5 Kg/m³*	K_2O Kg/m³*
Raw Slurry ≠	3.00	0.88	1.50
Separated Liquid	2.40	0.70	1.20
Separated Fibre	0.60	0.18	0.30

* Kg/m³ is approximately the equivalent to 1 bs/100 gals

≠ Mean figures for slurries with an average dry matter content of 4.3% (range 5-12.7%) from 25 farm sites

APPENDIX – A

The Effect of Slurry Separation on Plant Nutrients

TABLE 1

Average Values for the Available Plant Nutrients in Undiluted Slurries

Nutrients – units/1000 gallons

	Dry Matter %	N	P_2O_5	K_2O
Cattle	11	26	9	48
Pigs (Meal Fed)	10	39	22	27
Poultry	23	97	62	69

TABLE 2

Fate of Plant Nutrients After Separation of 1000 Gallons of Cow Slurry (Units)

	N	P_2O_5	K_2O
Raw Slurry *	42	7	47
Separated Liquid	30	5	33
Separated Fibre	12	2	14

- Average values for slurries with an average dry matter content of 7.9% (range 8-14.3%) from 33 farm sites.

TABLE 3

Fate of Plant Nutrients After Separation of 1000 Gallons of Pig Slurry (units)

	N	P_2O_5	K_2O
Raw Slurry *	34	10	17
Separated Liquid	27	8	14
Separated Fibre	7	2	3

* Average values for slurries with an average dry matter content of 4.3% (range 5-12.7%) from 25 farm sites.

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