Summary of solid manure data

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```
names(dat)
                             "abs.emis.info"
## [1] "source"
                                                  "incorp.info"
##
  [4] "timing.info"
                             "location"
                                                  "manure.source"
  [7] "man.type"
                             "manure.source.det" "meas.meth"
## [10] "meas.meth.det"
                             "meas.scale"
                                                  "duration"
## [13] "house.inf"
                             "stor.meth"
                                                  "stor.cov"
## [16] "stor.cov.type"
                             "stor.length"
                                                  "man.treat"
                                                  "TAN"
## [19] "DM"
                             "Hq"
                             "X23"
## [22] "totN"
                                                  "app.meth"
## [25] "incorp"
                             "incorp.set"
                                                  "incorp.meth"
## [28] "incorp.depth"
                             "incorp.time"
                                                  "amount"
## [31] "season"
                             "temp.app"
                                                  "temp.avg"
## [34] "pres"
                             "soil.type"
                                                  "soil.clay"
## [37] "crop"
                             "soil.dens"
                                                  "soil.water"
## [40] "emis.perc.TAN"
                             "emis.perc.N"
                                                  "emis.source"
## [43] "emis.ID"
                             "notes"
                                                  "row.in.file"
## [46] "fTAN"
                                                  "incorp.depth.nm"
                             "manure.source.nm"
## [49] "meas.meth.nm"
                             "season.nm"
                                                  "source.key"
```

Counts

First plot counts:

kable(table(dat\$meas.meth, exclude = NULL))

Var1	Freq
dynamic chamber	141
micromet	53
NA	1

kable(table(dat\$manure.source, exclude = NULL))

Var1	Freq
cattle	47
pig	66
poultry	81
NA	1

kable(table(dat[, c('man.type', 'manure.source')], exclude = NULL))

	cattle	pig	poultry	NA
broiler litter	0	0	5	0
deep litter	12	2	0	0
farmyard manure	26	58	0	0
fiber	3	4	0	0
fresh solid manure	1	0	0	0
litter	0	0	43	0
manure	0	0	1	0
solid	2	2	4	0
NA	3	0	28	1

kable(table(dat[, c('meas.meth', 'manure.source')], exclude = NULL))

	cattle	pig	poultry	NA
dynamic chamber	30	62	49	0
micromet	17	4	32	0
NA	0	0	0	1

Then studies:

dat.study <- dat[!duplicated(dat[, c('source', 'meas.meth', 'manure.source')]),]
kable(table(dat.study\$meas.meth, exclude = NULL))</pre>

Var1	Freq
dynamic chamber	18
micromet	15
NA	1

kable(table(dat.study\$manure.source, exclude = NULL))

Var1	Freq
cattle	12
pig	9
poultry	12
NA	1

kable(table(dat.study[, c('man.type', 'manure.source')], exclude = NULL))

	cattle	pig	poultry	NA
broiler litter	0	0	1	0
deep litter	3	1	0	0
farmyard manure	4	5	0	0
fiber	2	2	0	0
litter	0	0	6	0

	cattle	pig	poultry	NA
solid	2	1	1	0
NA	1	0	4	1

```
kable(table(dat.study[, c('meas.meth', 'manure.source')], exclude = NULL))
```

	cattle	pig	poultry	NA
dynamic chamber	5	7	6	0
micromet	7	2	6	0
NA	0	0	0	1

Easier combined?

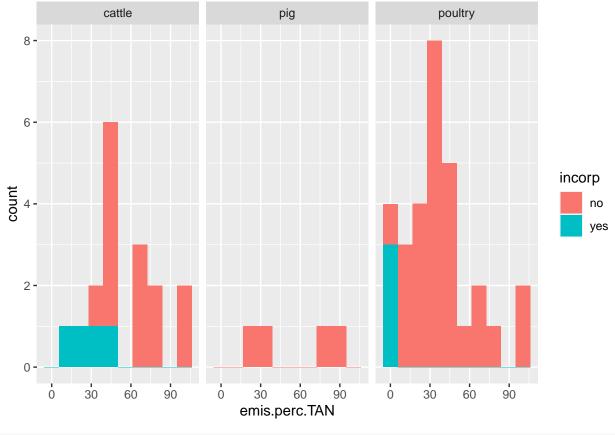
meas.meth	manure.source	source.n.plots	source.n.studies
dynamic chamber	cattle	30	5
micromet	cattle	17	7
dynamic chamber	$_{ m pig}$	62	7
micromet	pig	4	2
dynamic chamber	poultry	49	6
micromet	poultry	32	6

Emission factors and other variables for micromet observations only

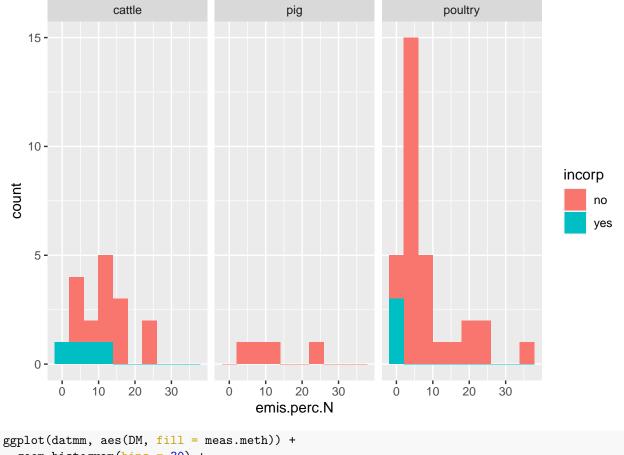
```
datmm <- subset(dat, meas.meth == 'micromet')

ggplot(datmm, aes(emis.perc.TAN, fill = incorp)) +
   geom_histogram(bins = 10) +
   facet_wrap(~ manure.source, scales = 'fixed')</pre>
```

Warning: Removed 2 rows containing non-finite values (stat_bin).

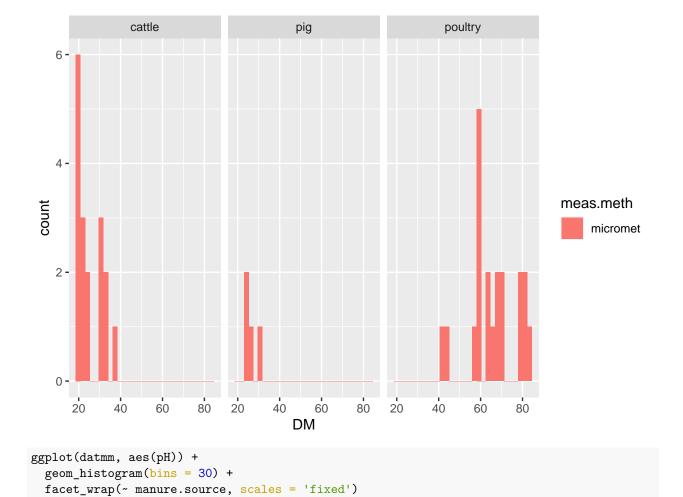


```
ggplot(datmm, aes(emis.perc.N, fill = incorp)) +
geom_histogram(bins = 10) +
facet_wrap(~ manure.source, scales = 'fixed')
```

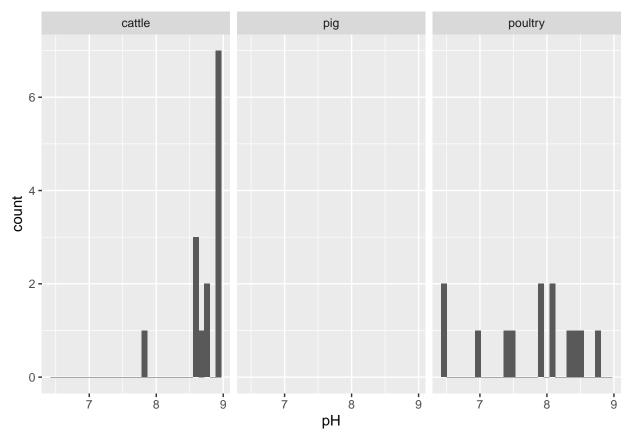


```
ggplot(datmm, aes(DM, fill = meas.meth)) +
geom_histogram(bins = 30) +
facet_wrap(~ manure.source, scales = 'fixed')
```

Warning: Removed 12 rows containing non-finite values (stat_bin).

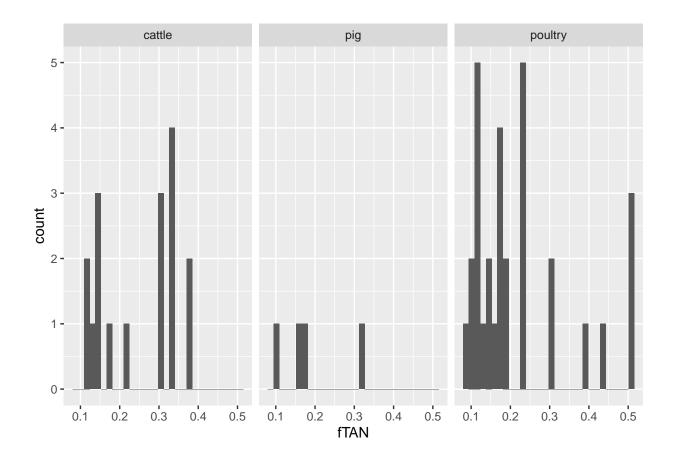


```
## Warning: Removed 26 rows containing non-finite values (stat_bin).
```



```
ggplot(datmm, aes(fTAN)) +
  geom_histogram(bins = 30) +
  facet_wrap(~ manure.source, scales = 'fixed')
```

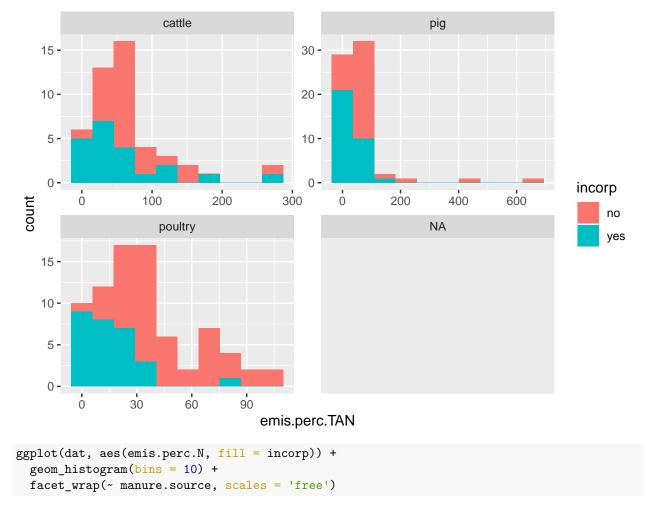
Warning: Removed 2 rows containing non-finite values (stat_bin).



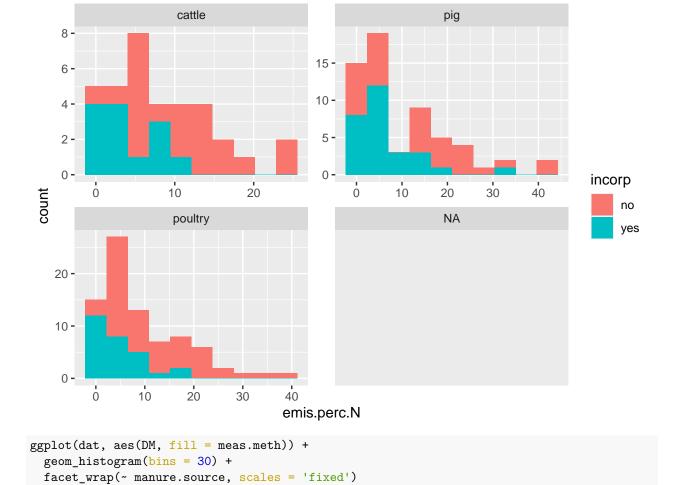
Emission factors and other variables for all observations

```
ggplot(dat, aes(emis.perc.TAN, fill = incorp)) +
  geom_histogram(bins = 10) +
  facet_wrap(~ manure.source, scales = 'free')
```

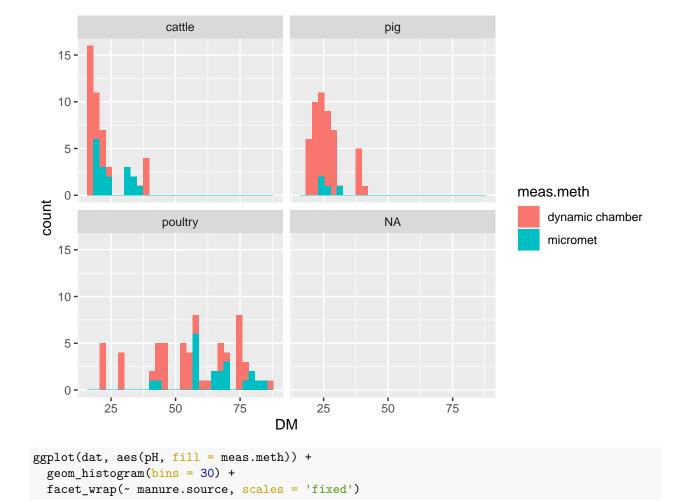
Warning: Removed 3 rows containing non-finite values (stat_bin).



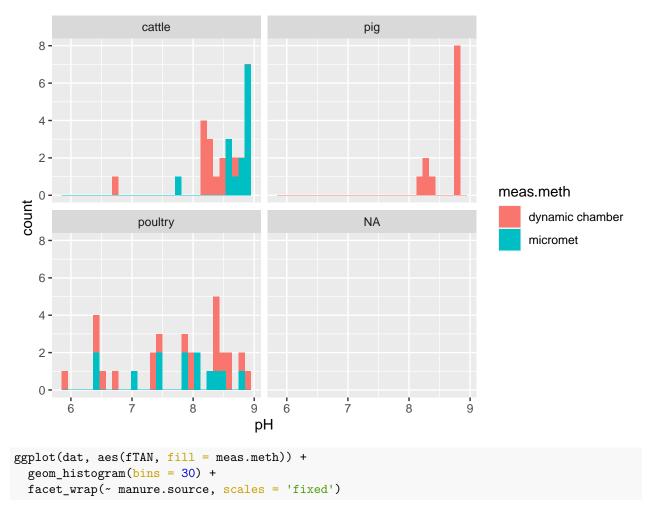
Warning: Removed 19 rows containing non-finite values (stat_bin).



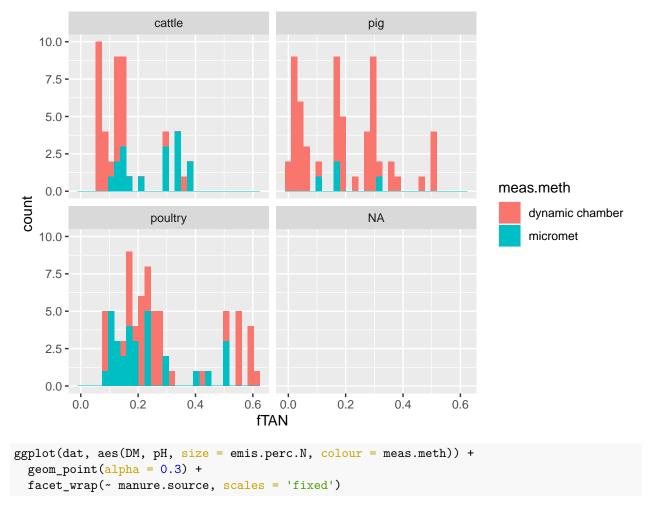
Warning: Removed 31 rows containing non-finite values (stat_bin).



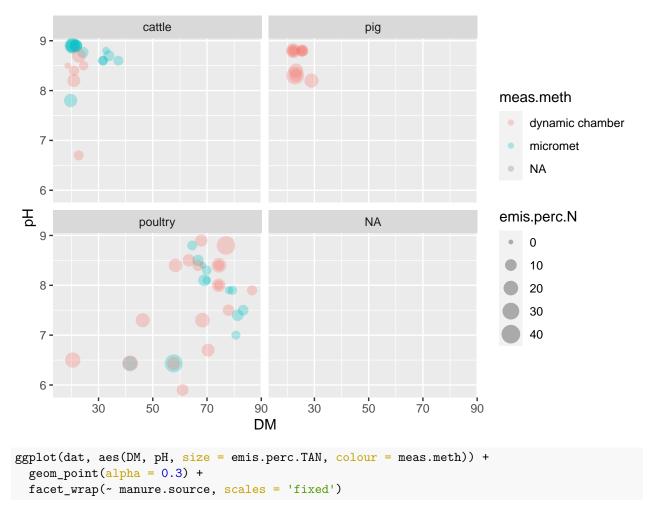
Warning: Removed 124 rows containing non-finite values (stat_bin).



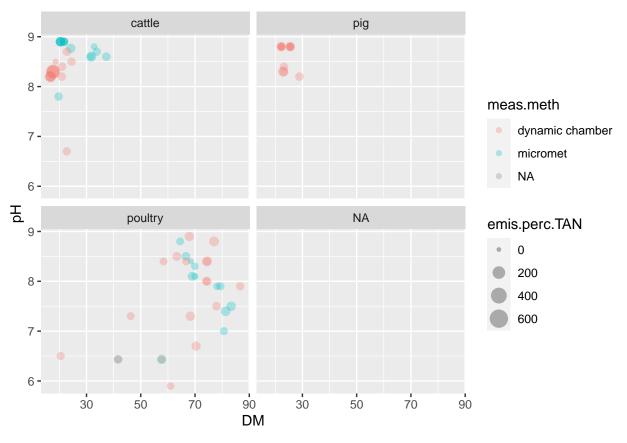
Warning: Removed 14 rows containing non-finite values (stat_bin).



Warning: Removed 132 rows containing missing values (geom_point).

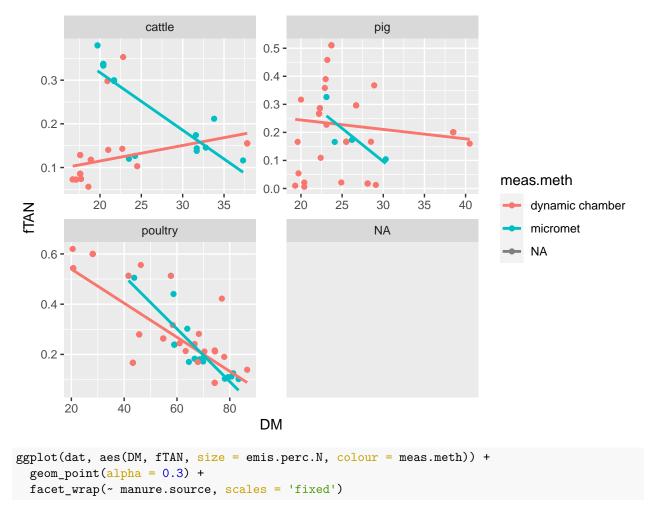


Warning: Removed 126 rows containing missing values (geom_point).

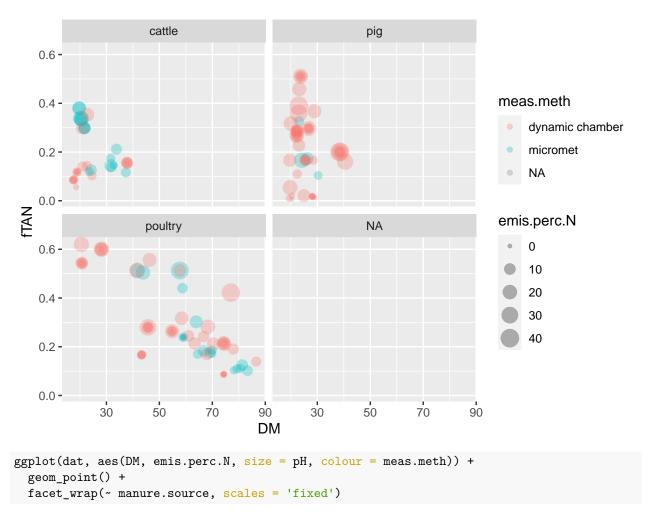


```
ggplot(dat, aes(DM, fTAN, colour = meas.meth)) +
  geom_point() +
  geom_smooth(method = lm, se = FALSE) +
  facet_wrap(~ manure.source, scales = 'free')
```

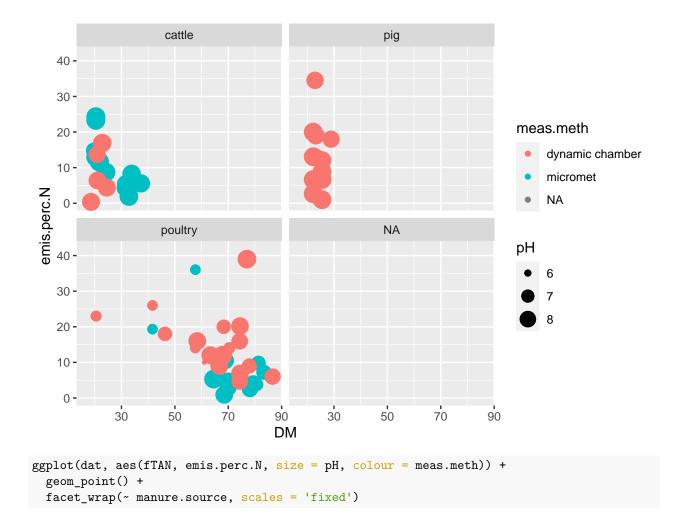
- ## `geom_smooth()` using formula 'y ~ x'
- ## Warning: Removed 36 rows containing non-finite values (stat_smooth).
- ## Warning: Removed 36 rows containing missing values (geom_point).



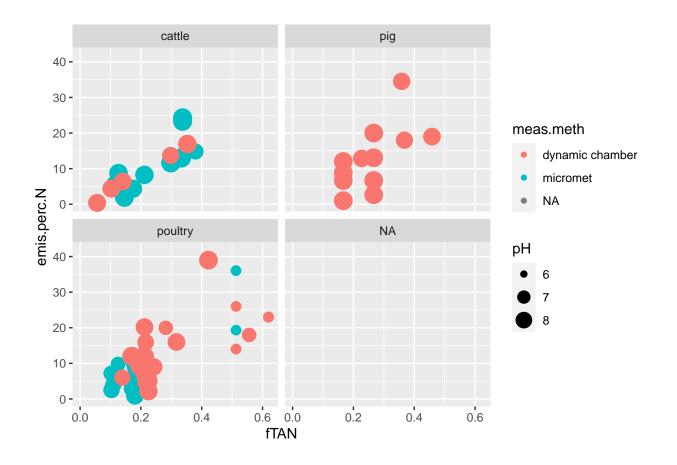
Warning: Removed 48 rows containing missing values (geom_point).



Warning: Removed 132 rows containing missing values (geom_point).



Warning: Removed 130 rows containing missing values (geom_point).



Variable summary

dfsumm(as.data.frame(dat))

```
##
    195 rows and 51 columns
##
    195 unique rows
##
##
                                        source abs.emis.info incorp.info timing.info
## Class
                                     character
                                                     numeric
                                                                  numeric
                                                                               numeric
## Minimum
                       Balsari et al. (2008a)
## Maximum
                       Williams et al. (2003)
                                                            1
                                                                         1
                                                                                     1
## Mean
                                                        0.242
                                                                    0.598
                                                                                 0.469
                                          <NA>
## Unique (excld. NA)
                                            25
                                                            2
                                                                                     2
                                                                         2
## Missing values
                                             1
                                                            1
                                                                                     1
## Sorted
                                         FALSE
                                                        FALSE
                                                                    FALSE
                                                                                 FALSE
##
##
                                        location manure.source
                                                                      man.type
## Class
                                       character
                                                      character
                                                                     character
## Minimum
                       Canada, British Colombia
                                                         cattle broiler litter
## Maximum
                                              UK
                                                        poultry
                                                                          solid
## Mean
                                            <NA>
                                                           <NA>
                                                                           <NA>
## Unique (excld. NA)
                                              11
                                                              3
                                                                              8
## Missing values
                                                              1
                                                                             32
## Sorted
                                           FALSE
                                                          FALSE
                                                                         FALSE
##
```

##			manure.s	nurca dat	_	mass mati	h maas mat	h dat	meas.scale	
##	Class			character		characte			character	
	Minimum		•			ic chamber			field plot	
	Maximum			turkey	•	microme			laboratory	
	Mean			<na></na>		NA>		<na></na>	<na></na>	
	Unique (excld.	MA)		\NA>			2	4	2	
	Missing values	IVA)		126			1	37	1	
	Sorted			FALSE		FALSI	_	FALSE	FALSE	
##	Sol red			LALDI		PALSI	<u>.</u>	LALDE	LALDE	
##			duration	n house.i	nf		a t	or.met	h stor.cov	
	Class		characte						er character	
	Minimum		120			t.in				
			90	_		containe	r, 5C, lab		=	
	Maximum Mean		<na:< th=""><th></th><th>IA></th><th></th><th>S</th><th>cockpil NA></th><th>•</th><th></th></na:<>		IA>		S	cockpil NA>	•	
		NT A \		=				\IV F	8 2	
	Unique (excld.	NA)	19		1			10	_	
	Missing values		33		.93			12		
	Sorted		FALS	L IF	RUE			FALS	SE FALSE	•
##			atom		ator	a langth r	man +maa+	г	M ~U	
	Class			cov.type		c.length r			OM pH c numeric	
					CI	o laracter	wetted	16.		
	Minimum Maximum		plastic	_						
			plastic :		several		wetted			
	Mean	BT A \		<na></na>		<na></na>	<na></na>	37.		
	Unique (excld.	NA)		1		7	1		30 22	
	Missing values			182		145	193	-	31 124	
	Sorted			TRUE		FALSE	TRUE	FALS	SE FALSE	
##			TLANT	+ - + N	VO2					
##	C1		TAN	totN	X23	app.metl		_	rp.set	
	Class						r characte		numeric	
	Minimum		0.0389	2.1		broadcast		10	1	
	Maximum		18.9	59.3 14.2	4.68	broadcast	3		12	
##						✓ NT A ヽ			4 00	
44.44	Mean	MT A \	3.15			<na:< th=""><th></th><th>/></th><th>4.29</th><th></th></na:<>		/>	4.29	
	Unique (excld.	NA)	96	103	13	:	1	2	12	
##	Unique (excld. Missing values	NA)	96 14	103 12	13 180	23	1 3	2 1	12 80	
## ##	Unique (excld.	NA)	96	103	13	:	1	2	12	
## ## ##	Unique (excld. Missing values	NA)	96 14	103 12	13 180	23	1 3 E FALS	2 1 SE	12 80 FALSE	
## ## ## ##	Unique (excld. Missing values Sorted	NA)	96 14	103 12	13 180	23	1 3 E FALS incorp.me	2 1 SE eth inc	12 80 FALSE	
## ## ## ##	Unique (excld. Missing values Sorted	NA)	96 14	103 12	13 180	23	1 3 E FALS incorp.me charact	2 1 SE eth inc	12 80 FALSE corp.depth character	
## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum	NA)	96 14 FALSE	103 12 FALSE	13 180 FALSE	2S TRUI	1 3 E FALS incorp.me charact	2 1 SE eth inc ter	12 80 FALSE corp.depth character deep	
## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum	NA)	96 14 FALSE	103 12 FALSE	13 180 FALSE	2S TRUI	1 3 E FALS incorp.me charact di cultivato	2 1 SE eth inc cer isc or)	12 80 FALSE corp.depth character deep shallow	
## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum Mean		96 14 FALSE	103 12 FALSE	13 180 FALSE	2S TRUI	1 3 E FALS incorp.me charact di cultivato	2 1 SE eth inc cer isc or)	12 80 FALSE corp.depth character deep shallow <na></na>	
## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld.		96 14 FALSE	103 12 FALSE	13 180 FALSE	2S TRUI	I FALS incorp.me charact d: cultivate	2 1 SE eth inc cer isc or) JA> 13	12 80 FALSE corp.depth character deep shallow <na> 3</na>	
## ## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld. Missing values		96 14 FALSE	103 12 FALSE	13 180 FALSE	2S TRUI	incorp.me charact di cultivate	2 1 SE eth inc cer isc or) JA> 13	12 80 FALSE corp.depth character deep shallow <na> 3 87</na>	
## ## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld.		96 14 FALSE	103 12 FALSE	13 180 FALSE	2S TRUI	incorp.me charact di cultivate	2 1 SE eth inc cer isc or) JA> 13	12 80 FALSE corp.depth character deep shallow <na> 3</na>	
## ## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld. Missing values		96 14 FALSE	103 12 FALSE	13 180 FALSE	23 TRUI	incorp.me charact di cultivate	2 1 SE eth inc ser isc or) NA> 13 114 SE	12 80 FALSE corp.depth character deep shallow <na> 3 87 FALSE</na>	
## ## ## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld. Missing values Sorted		96 14 FALSE vaste-tai	103 12 FALSE ndcultiva	13 180 FALSE	23 TRUI ixed tine	incorp.me charact di cultivate FAI	2 1 SE eth inconstruction isconstruc	12 80 FALSE corp.depth character deep shallow <na> 3 87 FALSE pres</na>	
## ## ## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld. Missing values Sorted Class		96 14 FALSE vaste-tai	103 12 FALSE ndcultiva	13 180 FALSE ator (fi	23 TRUI	incorp.me charact di cultivate FAI	2 1 SE eth incomes isc or) NA> 13 114 LSE mp.avg imeric	12 80 FALSE corp.depth character deep shallow <na> 3 87 FALSE pres numeric</na>	
## ## ## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld. Missing values Sorted Class Minimum		96 14 FALSE vaste-tai	103 12 FALSE ndcultivations among the mumer numer	13 180 FALSE ator (fine the state of the st	TRUI	incorp.me charact di cultivate FAI	2 1 SE eth incomes ser isc or) NA> 13 14 SE mp.avg imeric 2.4	12 80 FALSE corp.depth character deep shallow <na> 3 87 FALSE pres numeric 4</na>	
## ## ## ## ## ## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld. Missing values Sorted Class Minimum Maximum		96 14 FALSE vaste-tan	103 12 FALSE ndcultive ter numer 2 6 70	13 180 FALSE ator (fine charmonic charmonic charmonic) 2.5 at 2.6 at 2.	TRUI	incorp.me charact di cultivate FAI mp.app ten umeric nu 10 31	2 1 SE eth incore isc or) JA> 13 14 LSE mp.avg imeric 2.4 27.8	12 80 FALSE corp.depth character deep shallow <na> 3 87 FALSE pres numeric 4 119</na>	
## ## ## ## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld. Missing values Sorted Class Minimum Maximum Maximum Maximum Maximum Mean	NA)	96 14 FALSE vaste-tan	103 12 FALSE ndcultive ter numer 6 70 NA> 21	13 180 FALSE ator (fine charge) 2.5 2.6 3.6 3.8	TRUI ixed tine season ter cacter nu nutumn vinter <na></na>	incorp.me charact di cultivate FAI mp.app ten umeric nu 10 31 22.7	2 1 SE eth inconstruction (ser iscons) MA> 13 114 .SE mp.avg imeric 2.4 27.8 14.1	12 80 FALSE corp.depth character deep shallow <na> 3 87 FALSE pres numeric 4 119 41</na>	
## ## ## ## ## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld.	NA)	96 14 FALSE vaste-tar	103 12 FALSE ndcultive ter numer 2 6 70 NA> 21	13 180 FALSE ator (fine the strict charmonic	TRUI ixed tine season ter cacter nu autumn vinter <na> 5</na>	incorp.me charact di cultivate classification fAI mp.app tenumeric nu 10 31 22.7 8	2 1 SE eth inconstruction (SE) 13 114 SE mp.avg meric 27.8 14.1 28	12 80 FALSE corp.depth character deep shallow <na> 3 87 FALSE pres numeric 4 119 41 17</na>	
## ## ## ## ## ## ## ## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld. Missing values Sorted Class Minimum Maximum Maximum Mean Unique (excld. Missing values	NA)	96 14 FALSE vaste-tai	103 12 FALSE ndcultive ter numer 6 70 NA> 21 8 109	13 180 FALSE ator (fine the serie charse).5 2.5 2.6 3.8 89 6	TRUI Season ter racter no autumn winter <na> 5 0</na>	incorp.me charact cultivate cultivate FAI mp.app tenumeric no 10 31 22.7 8 179	2 1 SE eth inconstruction (ser iscons) NA> 13 114 .SE mp.avg meric 2.4 27.8 14.1 28 117	12 80 FALSE corp.depth character deep shallow <na> 3 87 FALSE pres numeric 4 119 41 17 176</na>	
## ## ## ## ## ## ## ## ## ## ## ## ##	Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld. Missing values Sorted Class Minimum Maximum Mean Unique (excld.	NA)	96 14 FALSE vaste-tai	103 12 FALSE ndcultive ter numer 2 6 70 NA> 21	13 180 FALSE ator (fine the serie charse).5 2.5 2.6 3.8 89 6	TRUI ixed tine season ter cacter nu autumn vinter <na> 5</na>	incorp.me charact di cultivate classification fAI mp.app tenumeric nu 10 31 22.7 8	2 1 SE eth inconstruction (SE) 13 114 SE mp.avg meric 27.8 14.1 28	12 80 FALSE corp.depth character deep shallow <na> 3 87 FALSE pres numeric 4 119 41 17</na>	

```
##
                       soil.type soil.clay
                                                 crop soil.dens soil.water
## Class
                                    numeric character
                                                         numeric
                       character
                                                                     numeric
                                                                        0.09
## Minimum
                       caly soil
                                       1.94
                                                grass
                                                            0.75
## Maximum
                       silt loam
                                                             4.5
                                                                        0.28
                                         64
                                               stubble
## Mean
                            <NA>
                                       22.3
                                                  <NA>
                                                            1.85
                                                                       0.166
## Unique (excld. NA)
                                8
                                          9
                                                     3
                                                                3
                                                                          13
## Missing values
                              83
                                        120
                                                   117
                                                              186
                                                                         175
                           FALSE
                                                FALSE
## Sorted
                                      FALSE
                                                           FALSE
                                                                       FALSE
##
##
                       emis.perc.TAN emis.perc.N emis.source
## Class
                             numeric
                                          numeric
                                                     character
## Minimum
                                    0
                                                0
                                                     Figure 14
## Maximum
                                  658
                                                       Table 7
                                                42
## Mean
                                 52.8
                                             9.35
                                                          <NA>
## Unique (excld. NA)
                                 173
                                                            19
                                               151
## Missing values
                                    3
                                                19
                                                              1
## Sorted
                                FALSE
                                            FALSE
                                                         FALSE
##
##
                                                              emis.ID
## Class
                                                           character
## Minimum
                       Aerobic, 24 h/Pig FYM, 1999, Uncompacted 24
## Maximum
                                                     Winter 2001, PP
## Mean
                                                                 <NA>
## Unique (excld. NA)
                                                                  135
## Missing values
                                                                   54
## Sorted
                                                                FALSE
##
##
## Class
## Minimum
## Maximum
                       Same data as in Sommer and Hansen (2022). Hansen and Birkmose writes that the soi
## Mean
## Unique (excld. NA)
## Missing values
## Sorted
##
##
                       row.in.file
                                       fTAN manure.source.nm incorp.depth.nm
## Class
                           numeric numeric
                                                    character
                                                                     character
## Minimum
                                  4 0.00621
                                                       Cattle
                                                                          Deep
## Maximum
                                198
                                       0.62
                                                      Poultry
                                                                       Shallow
## Mean
                                101
                                      0.219
                                                         <NA>
                                                                          <NA>
## Unique (excld. NA)
                                195
                                        104
                                                            3
                                                                             3
## Missing values
                                         14
                                                                             87
                                 0
                                                            1
## Sorted
                                      FALSE
                                                        FALSE
                             FALSE
                                                                         FALSE
##
##
                              meas.meth.nm season.nm source.key
## Class
                                  character
                                               factor
                                                           factor
## Minimum
                           Dynamic chamber
                                               Spring
                                                                1
## Maximum
                       {\tt Micrometeorological}
                                               Unknown
                                                                25
## Mean
                                       <NA>
                                                Autumn
                                                                16
## Unique (excld. NA)
                                          2
                                                     5
                                                                25
## Missing values
                                          1
                                                     0
                                                                 1
## Sorted
                                      FALSE
                                                FALSE
                                                            FALSE
```

##