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**MANURE MANAGEMENT BY SMALLHOLDER FARMERS
IN THE KANO CLOSE-SETTLED ZONE, NIGERIA**

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We would like to point out that as a result of an error during the printing process, parts of Table 1, Table 2 and Table 3 were accidentally removed from the tops of the respective pages. The publishers would like to offer their sincere apologies to the authors and to readers for this mistake. Please find Tables 1, 2 and 3 reprinted in full on the pages overleaf.

Table 1. Local knowledge concerning manure in the Kano close-settled zone

Type of manure	Source of manure	Targeted crops
Small ruminant manure	Small ruminants kept in pen, droppings mixed with grasses and shrubs. Some plants collected to act as 'bedding straw', to absorb urine, and to increase the overall bulk of the material. Dampness due to rain, urine and faeces results in the decomposition of plants. Sometimes domestic waste is also added	groundnut, sorghum, millet
Stored small ruminant manure	Manure removed from pen and stored	peppers
Cattle manure	Cattle kept tethered in the compound. Cattle are better able to trample refused fodder and other vegetation than are small ruminants.	millet
Donkey manure	No vegetation is added as bedding straw. The area where the donkey is tethered is swept every 3–7 days as donkeys do not like to stand in their own waste. The result is manure which is poor in consistency and poorly mixed with plant material. It is often mixed with ash from cooking fires. Some farmers complain that donkey manure, if used alone, increases the incidence of <i>Striga hermonthica</i> . If mixed with cooking ash, this problem is reduced.	
Ash	This is the result of burning household waste and it is often mixed with grain husks (and sometimes donkey manure). Occasionally this mixture is taken to livestock pens to be trampled and decompose. It is considered very 'hot': destructive if too much is applied. It is claimed it can soften hard clay soils. Farmers say that if cooking ash and grain husks are mixed in equal proportions and left exposed to rain, within 7–14 days a well decomposed and good quality 'manure' will result.	Groundnut, (often mixed with other fertilizers)
Bird manure	From domestic birds, particularly doves, but also chickens, guinea fowl, and ducks. This is considered to be very valuable and is applied in small quantities as inorganic fertilizer.	Peppers (often mixed with other fertilizer)

Source: Yusuf, field data.

Table 2. Analysis of nutrient concentration of manure.

Category	No. of samples		Total N (%)	Total P (%)	Potassium (%)	Magnesium (%)	Calcium (%)
Small ruminant manure and straw	15	mean	0.34	0.14	0.82	0.25	0.83
		cv (%)	47	44	72	51	57
Manure from rainy season (<i>takin shekarare</i>)	8	mean	0.32	0.20	0.70	0.21	0.72
		cv (%)	33	37	68	59	51
Manure from dry season (<i>takin rani</i>)	5	mean	0.25	0.20	0.83	0.20	0.76
		cv (%)	29	35	74	89	62
Ash and grass	4	mean	0.17	0.18	0.97	0.25	0.91
		cv (%)	19	49	58	62	50
Small ruminant and cow manure	2	mean	0.37	0.36	0.69	0.32	0.88
		cv (%)	55	16	11	38	3
Cow and donkey manure	1	mean	0.38	0.14	0.44	0.18	0.45
Donkey manure	1	mean	0.34	0.28	0.40	0.22	0.48
Ash	1	mean	0.21	0.28	1.66	0.56	2.86
All manure samples	37	mean	0.30	0.19	0.80	0.24	0.84
		cv (%)	43	47	73	58	65

Table 3. Application of manure to farmers' fields over three years.

Farmer and field	Year 1		Year 2		Year 3	
	Description	application	description	application	description	application
Farmer I 1		0	composted SR manure	9	small ruminant manure	9.3
			ash	1.5		
			donkey	1.5		
Farmer I 2	small ruminant manure	10.6				0
Farmer I 3	small ruminant manure	7.2				0
Total: Farmer I		4.1*		5.2*		5.1*
Farmer Y 1	small ruminant manure	1.9	small ruminant manure	4	small ruminant manure	0.6
			composted SR manure	2.3		
			ash and grass	1.2		
Farmer Y 2	SR and cow manure	0.7	small ruminant manure	2.5	small ruminant manure	2.1
	ash	0.3	composted SR manure	1.4		
			ash and grass	0.8		
Farmer Y 3: grain**	donkey manure	0.4	composted SR manure	1.9	small ruminant manure	5.3
	small ruminant manure	0.8	small ruminant manure	2.2		
	donkey and cow manure	0.3				
	composted SR manure	6.9				
Farmer Y 3:cassava	ash and grass	13.6			small ruminant manure	3.7
Farmer Y 4		0	small ruminant manure	1.7	small ruminant manure	10.9
			ash	0.9		
Total: Farmer Y		3.1*		5*		4.2*
Farmer S 1	SR manure and straw	8.9	composted SR manure	8.9		6.9
Farmer S 2	SR manure and straw	5.5	SR manure and straw	3.2		5.3
			composted SR manure	14.3		
Farmer S 3	SR manure and straw	1.7				0
Farmer S 4	SR manure and straw	2.4				8.4
Farmer S 5						0
Total: Farmer S		3.5*		4*		3.9*

*average application over whole landholding, including manured and non-manured plots

**This field was temporarily divided to create a cassava plot within the main field