Additional file 1

This file accompanies the manuscript “Movements of free-range pigs in rural communities in Zambia: an explorative study towards future ring interventions for the control of *Taenia solium*”.

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Additional file 1

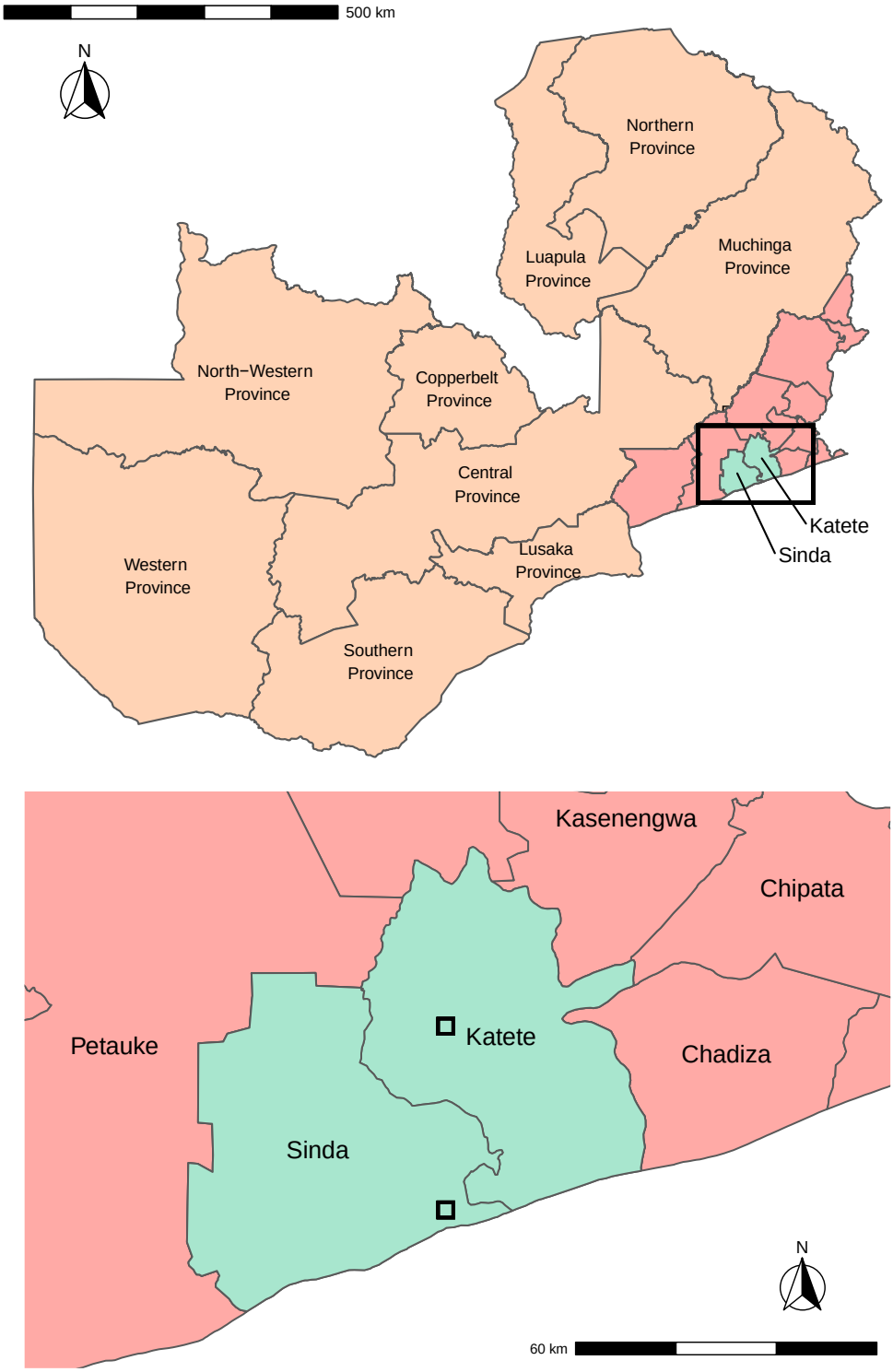
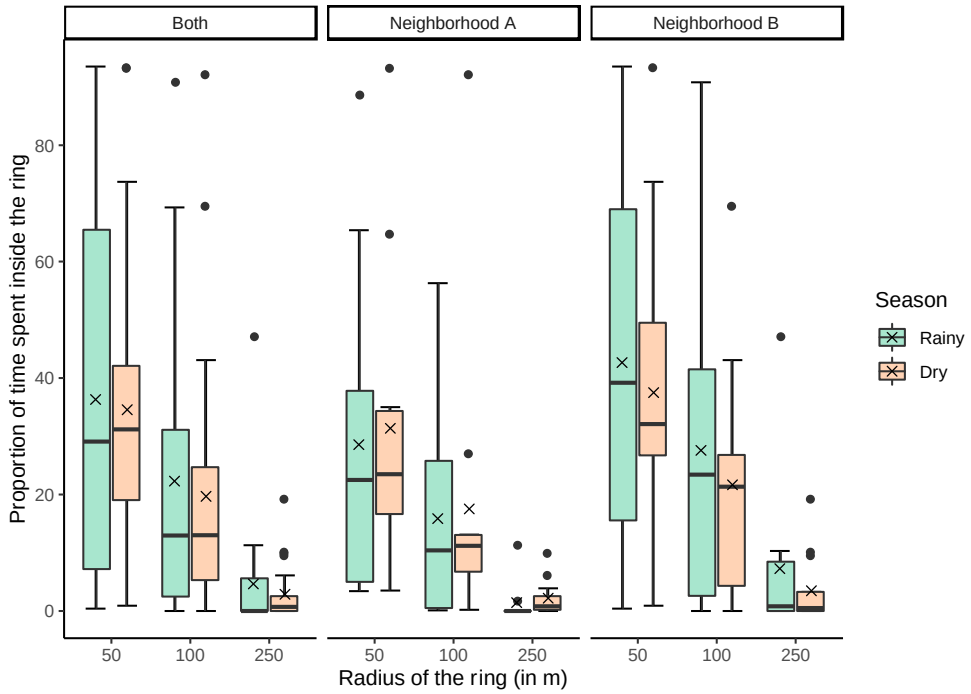


Figure S1. Map of the study areas.

The study areas are located in Sinda and Katete district (green), located in Eastern Province (red) of Zambia.

Figure S2. Pig with a GPS device in a waterproof case, secured to a harness for tracking.

A



B

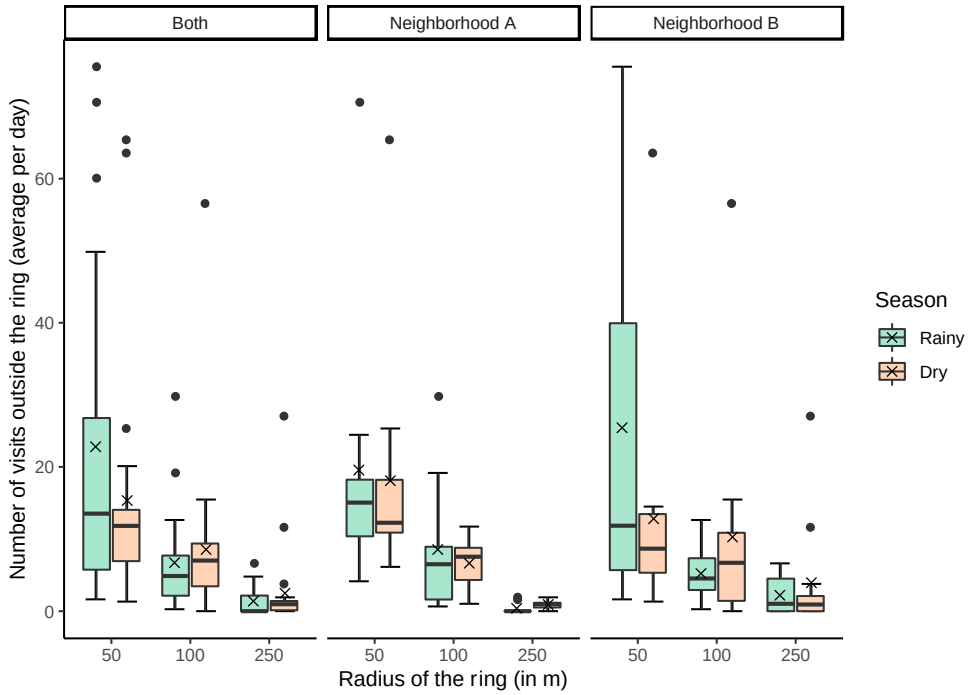


Figure S3. Boxplots of (A) the proportion of time and (B) the number of visits outside different rings around the household.

Results are presented for both neighborhoods, per season (rainy season, n = 20 pigs; dry season, n = 23 pigs). The horizontal line in the box represents the median value, the lower and upper hinges the first and third quartiles. The whiskers extend to the largest value no further than 1.5 times the inter-quartile range and the individual dots represent observations above the latter value. The mean is indicated with a cross-mark (x).

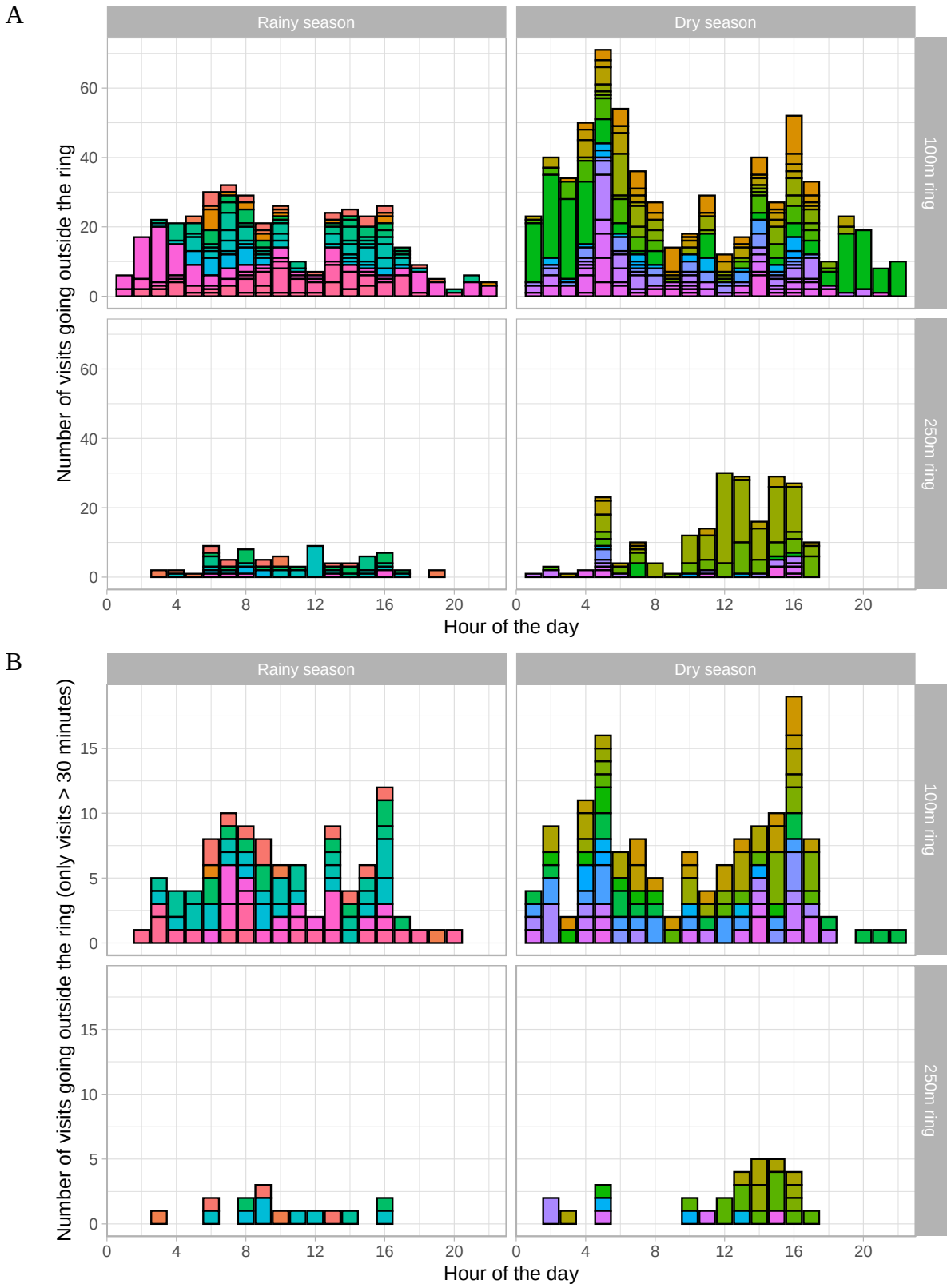


Figure S4. Number of visits outside the 100-m and 250-m ring according to the hour of the day.

A: including all visits; B: including only visits with a duration > 30 minutes (cutoff value chosen arbitrarily to exclude short visits, which may be caused by a track close to the ring). The hour of the day (X-axis) is based on the time when the pig went outside the ring (i.e. starting time of the visit). Different pigs are presented by a different color/box.

Table S1. Model output for the proportion of time outside the 50m ring.

A) Output of the full and final beta regression for the proportion of time outside the 50m ring, using the logit link function. Neighborhood, season and their two-way interaction were included in the model to account for the design (stratification per neighborhood and per season).

	Full model			Final model		
	Coefficient	**Standard error**	**p-value**	**Coefficient**	**Standard error**	**p-value**
Intercept	-1.22	0.53	0.022	-0.81	0.37	0.027
Neighborhood						
Neighborhood A	Ref.			Ref.		
Neighborhood B	0.60	0.50	0.228	0.41	0.49	0.405
Season						
Rainy	Ref.			Ref.		
Dry	0.47	0.50	0.347	0.25	0.49	0.615
Interaction						
Neighborhood B x dry season	-0.60	0.68	0.378	-0.33	0.66	0.623
Sex						
Female						
Male	0.68	0.44	0.121			
Age group						
Young (≤ 6 months)						
Old (> 6 months)	0.17	0.38	0.654			

B) Predicted proportion of time outside the 50m ring

Neighborhood	**Season**	**Predicted proportion [95% CI]**
A	Rainy	0.31 [0.18, 0.48]
B	Rainy	0.40 [0.26, 0.56]
A	Dry	0.36 [0.23, 0.52]
B	Dry	0.38 [0.25, 0.53]

Table S2. Model output for the proportion of time outside the 100m ring.

A) Output of the full and final beta regression for the proportion of time outside the 100m ring, using the logit link function. Neighborhood, season and their two-way interaction were included in the model to account for the design (stratification per neighborhood and per season). For two pigs that didn't go outside the 100m ring were given an arbitrary small value of 0.001.

	Full model			Final model		
	Coefficient	**Standard error**	**p-value**	**Coefficient**	**Standard error**	**p-value**
Intercept	-2.15	0.56	<0.001	-2.11	0.52	<0.001
Neighborhood						
Neighborhood A	Ref.			Ref.		
Neighborhood B	0.44	0.50	0.375	0.42	0.49	0.394
Season						
Rainy	Ref.			Ref.		
Dry	0.47	0.51	0.360	0.44	0.50	0.379
Interaction						
Neighborhood B x dry season	-0.40	0.69	0.559	-0.37	0.66	0.580
Sex						
Female	Ref.					
Male	0.08	0.44	0.856			
Age group						
Young (≤ 6 months)	Ref.			Ref.		
Old (> 6 months)	0.66	0.39	0.088	0.66	0.38	0.088

B) Predicted proportion of time outside the 100m ring

Neighborhood	**Season**	**Age group**	**Predicted proportion of time [95% CI]**
Neighborhood A	Rainy	Young	0.11 [0.04, 0.25]
Neighborhood B	Rainy	Young	0.16 [0.07, 0.32]
Neighborhood A	Dry	Young	0.16 [0.08, 0.30]
Neighborhood B	Dry	Young	0.17 [0.08, 0.30]
Neighborhood A	Rainy	Old	0.19 [0.10, 0.33]
Neighborhood B	Rainy	Old	0.26 [0.15, 0.41]
Neighborhood A	Dry	Old	0.27 [0.15, 0.43]
Neighborhood B	Dry	Old	0.28 [0.16, 0.44]

C) Estimated marginal effects of the proportion of time outside the 100m ring, at the margin of model terms neighborhood, season and pig age, .

Variable	**Predicted proportion of time [95% CI]**
Neighborhood A	0.20 [0.13, 0.29]
Neighborhood B	0.23 [0.16, 0.33]
Rainy season	0.20 [0.12, 0.29]
Dry season	0.24 [0.16, 0.34]
Young pigs	0.15 [0.08, 0.26]
Old pigs	0.25 [0.18, 0.34]

Table S3. Model output for going outside the 250m ring.

A) Output of the full and final logistic regression for going outside the 250m ring. Neighborhood, season and their two-way interaction were included in the model to account for the design (stratification per neighborhood and per season).

	Full model				Final model			
	Odds ratio ($e^{ß}$)	**95% CI**		**p-value**	**Odds ratio ($e^{ß}$)**	**95% CI**		**p-value**
Intercept	0.08	0.01	0.77	0.0440	0.29	0.04	1.18	0.1182
Neighborhood								
Neighborhood A	Ref.				Ref.			
Neighborhood B	5.03	0.70	51.42	0.1293	4.20	0.65	37.98	0.1532
Season								
Rainy	Ref.				Ref.			
Dry	26.72	2.88	438.19	0.0088	15.75	2.11	192.36	0.0138
Interaction								
Neighborhood B x dry season	0.09	0.00	1.51	0.1057	0.11	0.01	1.53	0.1119
Sex								
Female	Ref.							
Male	1.21	0.19	8.39	0.8407				
Age group								
Young (≤ 6 months)	Ref.							
Old (> 6 months)	3.57	0.72	21.89	0.1351				

B) Predicted probabilities of travelling more than 250m away, based on

Neighborhood	Season	Predicted probability [95% CI]
Neighborhood A	Rainy	0.22 [0.06, 0.58]
Neighborhood B	Rainy	0.55 [0.27, 0.80]
Neighborhood A	Dry	0.82 [0.49, 0.95]
Neighborhood B	Dry	0.67 [0.38, 0.87]

C) Estimated marginal effects of travelling more than 250m away, at the margin of model terms neighborhood and season.

Variable	Predicted probability [95% CI]
Neighborhood A	0.56 [0.29, 0.79]
Neighborhood B	0.61 [0.40, 0.79]
Rainy season	0.38 [0.19, 0.62]
Dry season	0.74 [0.53, 0.88]

Table S4. Model output for the maximum distance from home.

A) Output of the full and final generalized linear model, with gamma distribution and identity link function, for the maximum distance travelled from home. Neighborhood, season and their two-way interaction were included in the model to account for the design (stratification per neighborhood and per season).

	Full model			Final model		
	Coefficient	**Standard error**	**p-value**	**Coefficient**	**Standard error**	**p-value**
Intercept	159	52	0.004	152	49	0.003
Neighborhood						
Neighborhood A	Ref.			Ref.		
Neighborhood B	123	61	0.052	124	61	0.050
Season						
Rainy	Ref.			Ref.		
Dry	153	64	0.022	155	63	0.019
Interaction						
Neighborhood B x dry season	-208	88	0.024	-216	87	0.018
Sex						
Female	Ref.					
Male	-26	48	0.592			
Age group						
Young (≤ 6 months)	Ref.			Ref.		
Old (> 6 months)	91	44	0.047	95	44	0.036

B) Predicted maximum distance (in m)

Neighborhood	**Season**	**Age group**	**Predicted maximum distance [95% CI]**
Neighborhood A	Rainy	Young	152 [53, 251]
Neighborhood B	Rainy	Young	276 [157, 394]
Neighborhood A	Dry	Young	307 [194, 420]
Neighborhood B	Dry	Young	215 [135, 295]
Neighborhood A	Rainy	Old	248 [172, 324]
Neighborhood B	Rainy	Old	371 [268, 475]
Neighborhood A	Dry	Old	402 [290, 515]
Neighborhood B	Dry	Old	311 [222, 399]

C) Estimated maximum distance, at the margin of model terms neighborhood, season and pig age, based on the final model specified above.

Variable	**Predicted maximum distance [95% CI]**
Neighborhood A	304 [238, 369]
Neighborhood B	312 [250, 374]
Rainy season	287 [224, 350]
Dry season	327 [261, 393]
Young pigs	239 [172, 307]
Old pigs	335 [277, 393]