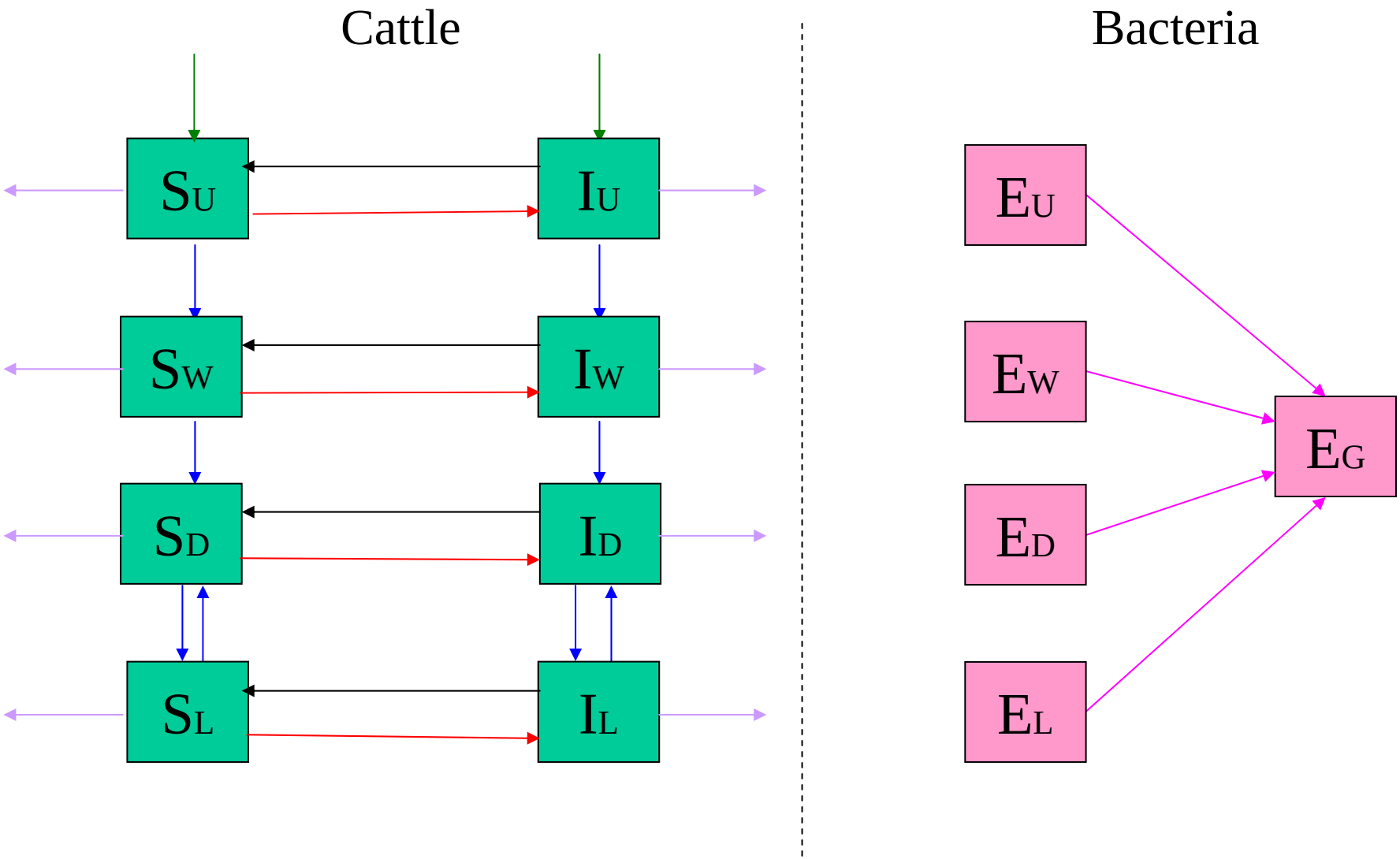
E. coli O157 in a dairy herd



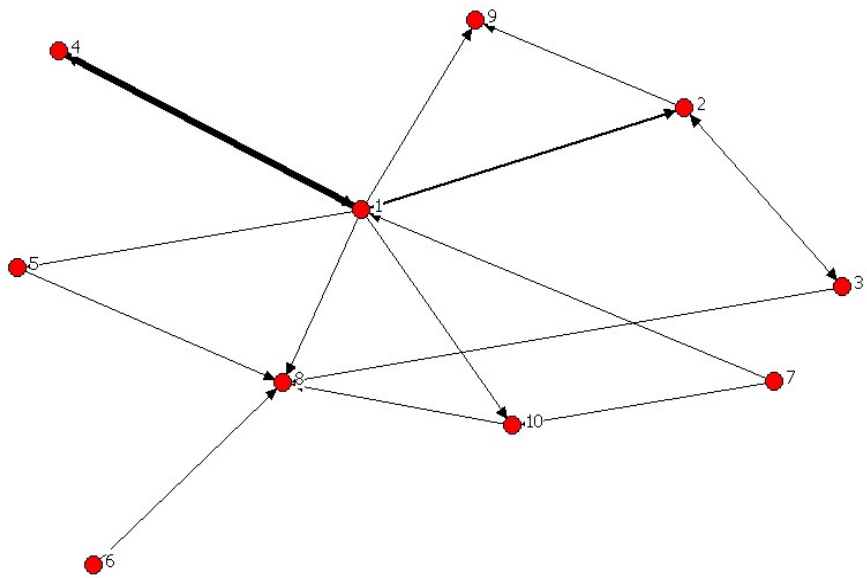
ETHOGRAM of cattle behaviours

CODE	POSTURE	BEHAVIOUR	INTERACTION	
LO	Lying down	Other		
LE		Eating		
LGS		Grooming	Grooming self	
LGA			Grooming allogrooming	
SO	Standing	Other		
SE		Eating		
SD		Drinking		
SGS		Grooming	Grooming self	
SGA			Grooming allogrooming	
M	Moving			
MB		Bulling / mounting		
BM		Being mounted		
IS		Interacting	Sniffing	
IT			Touching	
IL			Licking environment	
IR			Rubbing against	
IN			Nodding / shaking head towards another	
IC			Chasing another	
IP			Pushing	
IH2H			Head-to-head	
IHB			Head butting	
IB		Interacting being… Eg.IBP = being pushed, IBR = being rubbed		

Behaviour	Week	Events	Time (secs)	% of total observ time
SGA	1	4	22	0.091667
	2	13	185	0.770833
	3	7	81	0.3375
MB	1	0	0	0
	2	9	46	0.191667
	3	0	0	0
BM	1	1	2	0.008333
	2	6	25	0.104167
	3	0	0	0
IS	1	13	61	0.254167
	2	52	448	1.866667
	3	5	20	0.083333
IBS	1	8	35	0.145833
	2	11	66	0.275
	3	5	21	0.0875

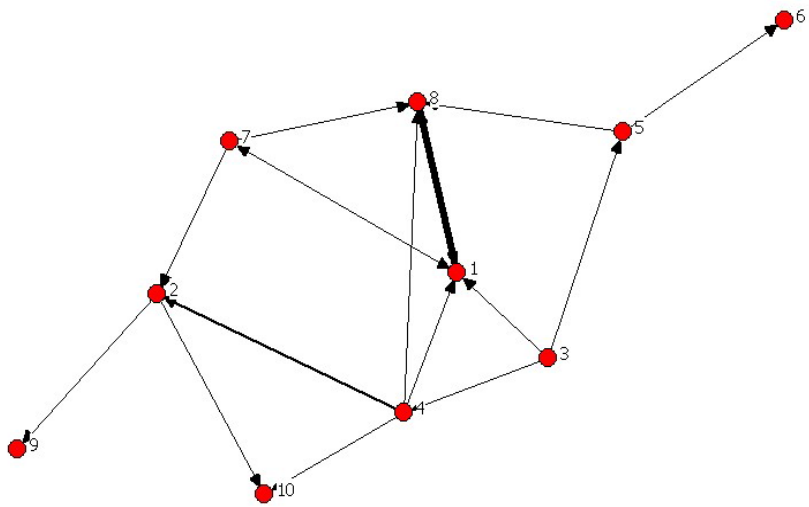
10 Weaned calves

Group a all ALLO										
	1	2	3	4	5	6	7	8	9	10
1	0	10	4	27	10	6	7	14	14	10
2	10	0	17	2	6	3	3	2	14	6
3	7	11	0	4	6	3	4	12	2	3
4	23	7	3	0	4	3	5	3	8	4
5	3	1	3	4	0	7	3	10	4	2
6	8	7	5	6	6	0	4	12	4	4
7	10	3	6	7	7	1	0	4	6	14
8	3	2	3	3	6	8	4	0	7	5
9	2	7	2	3	6	1	2	6	0	3
10	4	5	1	3	4	0	6	13	2	0



10 Weaned calves

Group b all ALLO										
	1	2	3	4	5	6	7	8	9	10
1	0	2	2	1	2	7	9	42	2	7
2	6	0	8	8	8	3	7	2	10	9
3	11	5	0	11	11	7	6	4	5	4
4	9	17	2	0	3	8	6	10	7	9
5	8	4	8	1	0	12	5	12	3	6
6	2	0	5	2	6	0	3	7	4	0
7	12	11	6	6	2	6	0	12	8	4
8	17	2	3	2	1	1	3	0	1	2
9	4	2	3	1	1	2	8	2	0	4
10	0	6	1	0	2	0	0	1	1	0



For any pair of animals i and j, take G(i, j) random, uniform on [0,1], fixed throughout the lifetimes of i, j.

Whenever i, j are in the same group (U,W,D,L), with

N = number of animals in group

n = target number of contacts per animal for this group

then there is a directed contact from i to j if

$$G(i, j) > n /(N-1)$$

Social grouping

Split each management group (U,W,D,L) into a number of social groups.

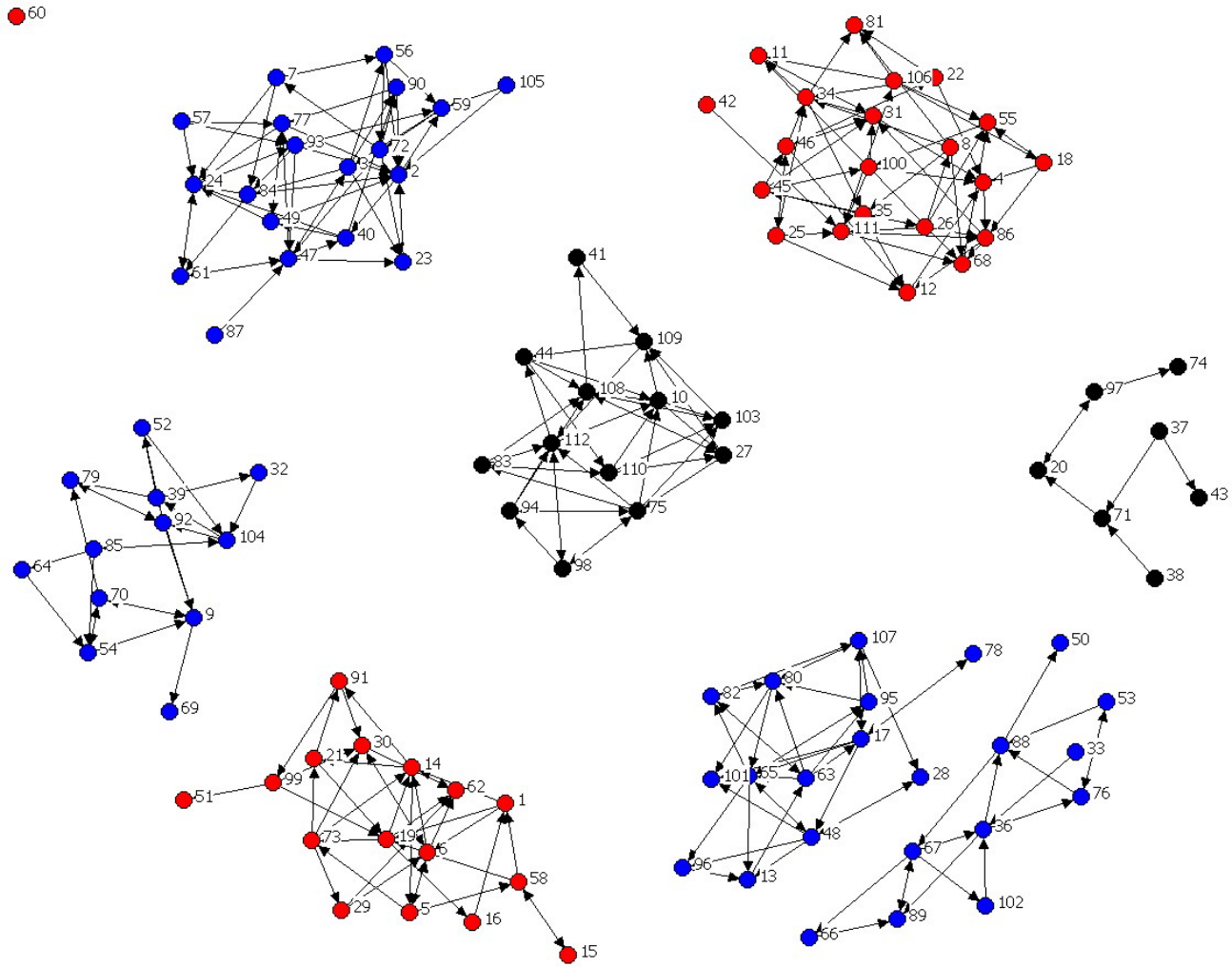
Within-group contacts more likely than between-group contacts.

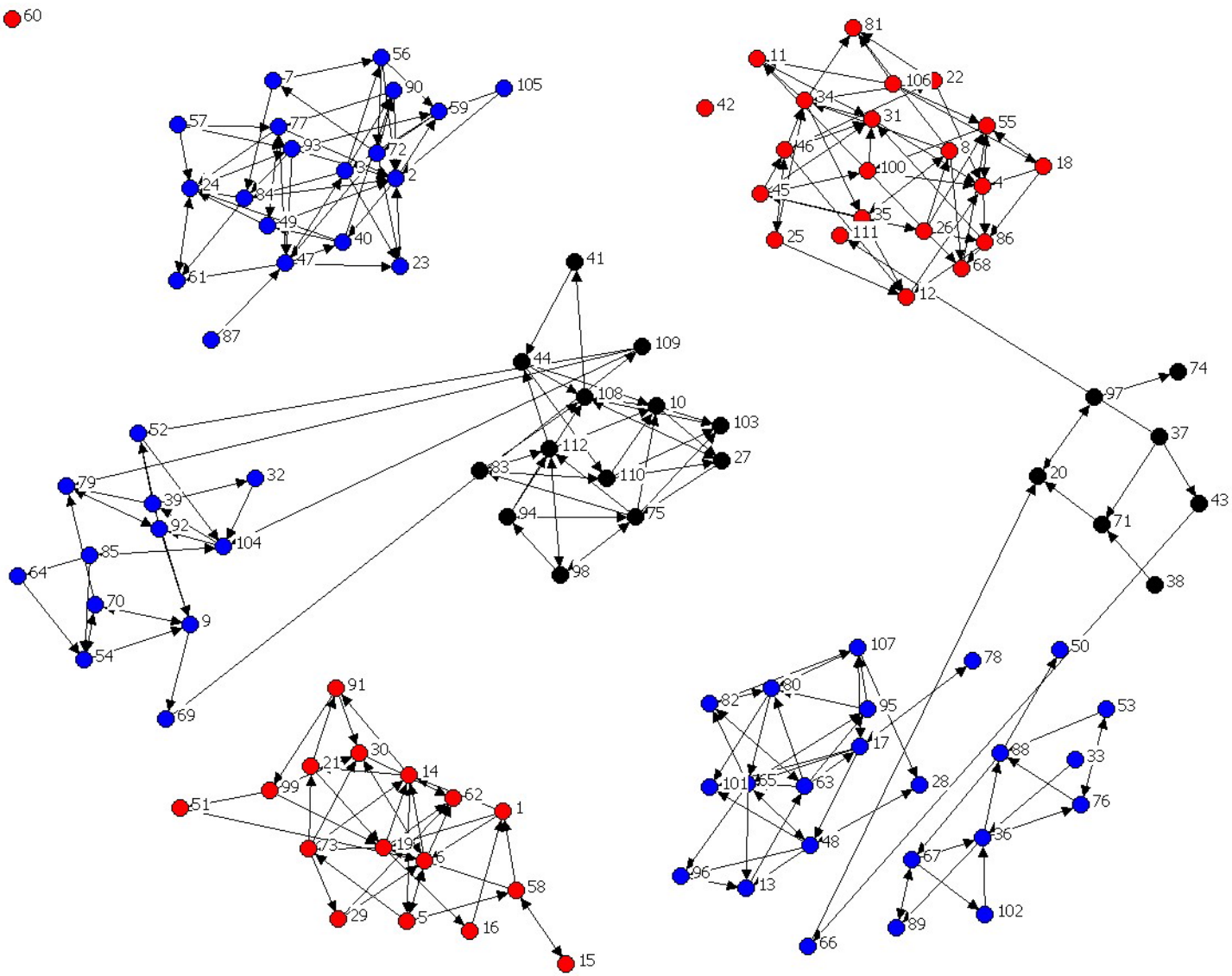
U:	1 social group	(2 animals)
W, D:	2 social groups	(32, 16 animals)
L:	4 social groups	(62 animals)

Each animal given a social group number (1,2,3,4), at random, which she keeps throughout her lifetime.

In W,D management groups, social groups 1+2 and 3+4 combined.

U: not shown, W: Red, D: Black, L: Blue




60
56
7
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111
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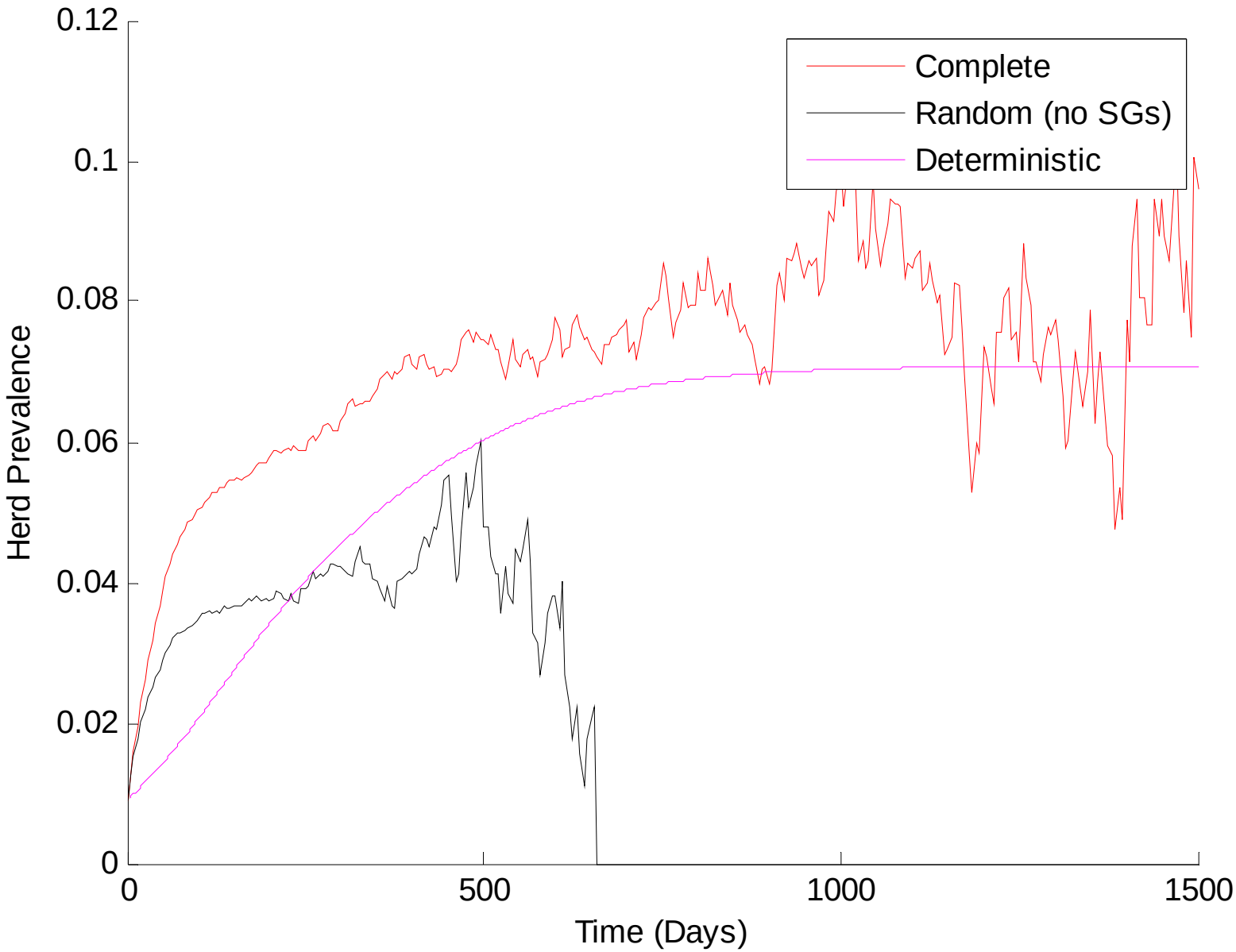
89
66


0.12
0.1
0.08
0.06
0.04
0.02
0
Herd Prevalence
0
500
1000
1500
Time (Days)
Complete
Random (no SGs)
Deterministic