

4. RESULTS

4.1 Results of *Salmonella* Isolation and Serotyping

4.1.1. Results of *Salmonella* Isolation

Table 8 shows the distribution of faecal prevalence of *Salmonella* obtained from 7 and 18 days-old-piglets, which ranged from 0-5% with an average of 1.25% (95% CI: 0.07-7.73). In the open house, the prevalence on day 7 and day 18 was 0% and 5% with an average of 2.5% (95% CI: 0.13-14.73), while in the closed house, the prevalence at day 7 and day 18 both was 0%. These 2 averages were not significantly ($p=1$) different.

Table 10: Distribution of faecal prevalence of *Salmonella* obtained from 7 and 18 days old piglets

Day	Faecal sample	No. positive	% proportion (95% CI)
Open house			
Day7	20	0	0
Day18	20	1	5%(0.26-26.94)
Closed house			
Day7	20	0	0
Day18	20	0	0
Total Open house	40	1	2.5%(0.13-14.73)
Total Closed house	40	0	0
Overall Total	80	1	1.25%(0.07-7.73)

Table 11 shows the distribution of skin swab prevalence of *Salmonella* obtained from 7 and 18 days old piglets, which was all negative.

Table 11: Distribution of skin swab prevalence of *Salmonella* obtained from 7 and 18 days old piglets

Day	Skin swab sample	No. positive
Open house		
Day7	20	0
Day18	20	0
Closed house		
Day7	20	0
Day18	20	0
Total	80	0

Table 12 shows the distribution of *Salmonella* isolates from animal (faecal swab, 25 g of feces or skin swab). On day 7, no *Salmonella* isolates was found. The number of *Salmonella* isolates increased from day 18 with the highest level of *Salmonella* isolates to be found on day 120 (34.88%; CI = 21.45-50.98). Overall prevalence of *Salmonella* in piglets was 12.32% (CI = 8.35-17.71). Most of *Salmonella* positive piglets were *Salmonella* positive 1 or 2 times during the investigation.

Table 12: Distribution of *Salmonella* isolates from animals samples by date

Day	7	18	60	90	120
Total sample	40	40	44	44	43
No. positive	0	1	5	5	15
% proportion (95% CI)	0 (0.23- 10.91)	5% (0.87- 18.21)	11.36% (4.26- 25.35)	11.36% (4.26- 25.35)	34.88% (21.45- 50.98)

Table 13 demonstrates a total of 513 samples tested for *Salmonella*. Overall *Salmonella* was isolated in 6.43% (33/513). From animal samples, a number of *Salmonella* isolation were 4.74% (10/211), 23.08% (15/65) and 1.93% (4/97) from faecal swab, 25 grams of feces and skin swab samples respectively.

From environmental samples reveals that the percentage number of *Salmonella* isolation was 10% (1/10), 20% (2/10) and 10% (1/10) from feed, floor swab and water respectively. Samples from day 120 had the highest proportion of the isolates, the lowest number of isolates was found on day 7.

Table 13: Proportion of *Salmonella* isolates from various samples in the farms

Day	Total isolated sample							Total positive (%)						
	Faecal Swab	25g feces	Skin swab	Feed	Floor	Water	Total	Faecal swab	25g feces	Skin swab	Feed	Floor	Water	Total
7	40	-	40	2	2	2	86	0	-	0	0	0	0	0
18	40	-	40	2	2	2	86	1 (2.5)	-	0	0	0	0	1 (1.16)
60	44	-	40	2	2	2	90	5 (11.36)	-	0	0	0	0	5 (5.56)
90	44	36	44	2	2	2	130	0	5 (13.89)	0	0	0	1 (50)	6 (4.62)
120	43	29	43	2	2	2	121	4 (9.3)	10 (34.48)	4 (9.3)	1 (50)	2 (100)	0	21 (17.36)
Overall Total	211	65	207	10	10	10	513	10 (4.74)	15 (23.08)	4 (1.93)	1 (10)	2 (20)	1 (10)	33 (6.43)

4.1.2. Results of *Salmonella* Serotyping

Table 12 displays the most frequently found serogroups of *Salmonella*. A total of 33 isolates was tested. The serogroup with the highest proportion was *Salmonella* group F-67 (75.76%), followed by group C (18.18%) and group B (6.06%). *Salmonella* group D and group E were not isolated from this study.

Table 14: Distribution of *Salmonella* serogroups in the farms

Day	Number of samples in each group					
	B	C	D	E	F-67	Total
7	-	-	-	-	-	-
18	-	1	-	-	-	1
60	-	-	-	-	5	5
90	1	1	-	-	4	6
120	1	4	-	-	16	21
Overall	2	6	-	-	25	33
Total (%)	(6.06)	(18.18)			(75.76)	

Faecal swab samples and 25 grams feces samples were found to be contaminated with *Salmonella* group F-67 in the highest frequency (80% and 81.25%). Skin swab samples were found to be contaminated with *Salmonella* group C and F-67 in the same frequency (50%). For environmental samples, Feed and water were found to be contaminated with *Salmonella* group B and F-67 respectively, while floor swab samples were found to be contaminated with *Salmonella* group C (50%) and F-67 (50%).

(Table 15)

Table 15: Distribution of *Salmonella* serogroups in each type of samples

Serogroup	Number and % positive					
	Faecal swab	25 g feces	Skin swab	Feed	Floor	Water
B	-	1 (6.67)	-	-	-	1 (100)
C	2 (20)	1 (6.67)	2 (50)	-	1 (50)	-
D	-	-	-	-	-	-
E	-	-	-	-	-	-
F-67	8 (80)	13 (86.67)	2 (50)	1 (100)	1 (50)	-
Total	10	15	4	1	2	1

Table 16 shows general distribution of *Salmonella* serogroup. There were 6.06% and 18.18% of samples contaminated with *Salmonella* Serogroup B1 and C1 respectively. 75.76% of samples were contaminated with *Salmonella* F-67.

Table 16: General distribution of *Salmonella* serogroup

Serogroups	Serotypes	No of positive	% positive	95% CI
B	S. Typhimurium	2	6.06	1.06-21.62
C	S.Rissen	6	18.18	7.62-36.08
F-67	-	25	75.76	57.37-88.26

Samples taken from animal and environment were found to be contaminated with *Salmonella* F-67 in the highest frequency. *Salmonella* serogroup C was found in 15.15% and 3.03% in animal and environment respectively. (Table 17)

Table 17: Distribution of *Salmonella* serotypes of *Salmonella* isolates separated by group of samples

Serogroups	Serotypes	Animal	% proportion (95% CI)	Environ mental	% proportion (95% CI)
B	<i>S. Typhimurium</i>	1	3.03 (0.16-17.51)	1	3.03 (0.16-17.51)
C	<i>S. Rissen</i>	5	15.15 (5.71-32.67)	1	3.03 (0.16-17.51)
F-67	-	23	69.7 (51.13-83.79)	2	6.06 (1.06-21.62)

4.2 Correlation between a number of *Salmonella* isolation from faecal swab and 25 grams of Feces

Table 16 shows the correlation between the number of *Salmonella* isolation from faecal swab and 25 grams of feces samples. Faecal swab and 25 grams of feces samples were taken from 70 pigs on day 90 and day 120. 5.71% (4/70) of pigs were faecal swab positive and 21.43% (15/70) were 25 grams of feces positive. Only 1 pig was found to be positive in both faecal swab and 25 grams of feces samples. 52 pigs were found *Salmonella* negative in both. 14 pigs were found *Salmonella* positive in 25 grams of feces but negative in faecal swab. Three pigs were found to be *Salmonella* negative in 25 grams of feces but positive in faecal swab. The total number of pigs with the same result (both tests were positive or negative) was 53.

As a result, the correlation between the two types of sample was found to be very low ($\kappa = 0.017$).

Table 18: Correlation of *Salmonella* isolation from faecal swab and 25 g of feces

Type		Faecal swab		Total
		Positive	Negative	
25 g of feces	Positive	1	14	15
	Negative	3	52	55
Total		4	66	70

4.3 Incidence of *Salmonella*

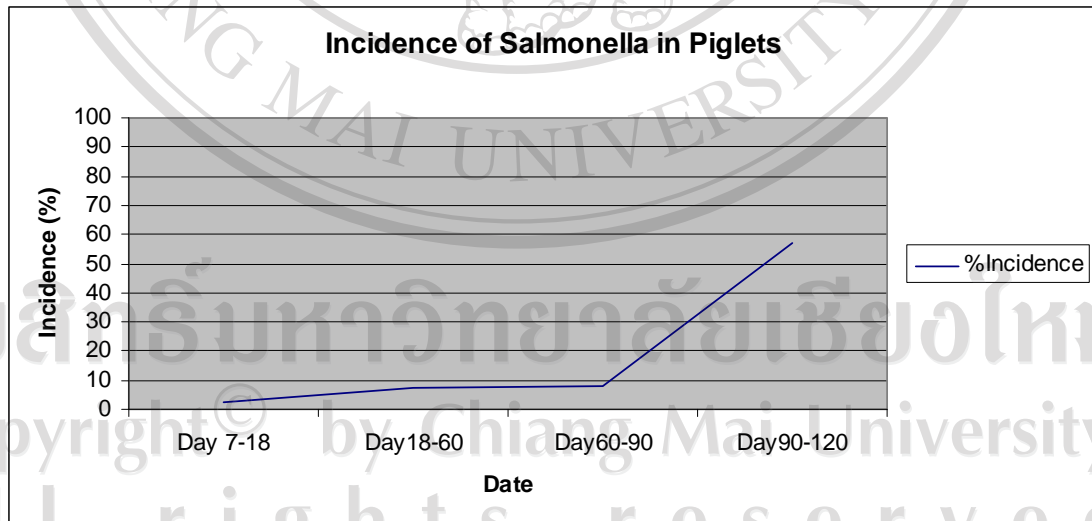


Figure 5 shows the incidences of *Salmonella* during day 7-18, 18-60, 60-90 and 90-120 respectively.

The incidence of *Salmonella* in piglets during day 7-18, 18-60, 60-90 and 90-120 were 2.5%, 7.41%, 8.11% and 57.14% respectively. The highest incidence of *Salmonella* was during day 90-120, the lowest incidence of *Salmonella* was during day 7-18.



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