THE RELATIVE PREVALENCE OF K88, K99, and 987P-BEARING ESCHERICHIA COLI IN PIGLETS WITH COLIBACILLOSIS

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Colonization of the small intestines of neonatal animals by enteropathogenic E. coli is facilitated by adherence pili. Three pilus antigens have been described for those E. coli which infect piglets: K88, K99, and 987P. A study was conducted to determine the relative prevalence of E. coli with each of the 3 pilus types in piglets with colibacillosis in the upper midwestern United States.

One or more piglets with diarrhea from 367 farms in South Dakota, Minnesota, Iowa, and Nebraska were examined at necropsy to determine the cause. Animals were examined by routine diagnostic procedures, including histopathology, parasitology, bacteriology, and virology, to identify the causal agent(s) of the diarrhea. Additionally, impression smears of ileal mucosa were made and gram-stained to aid in identifying piglets with colibacillosis. Piglets with smears having more than 10 gram-negative rods per 1,000x microscopic field were considered potential candidates for colibacillosis. Indirect fluorescent antibody tests were performed on similar impression smears from these piglets using absorbed K88, K99, and 987P antiserum. E. coli isolates from potential colibacillosis cases were serotyped. Piglets with ileal smears having >10 fluorescing bacteria per 400x microscopic field, and/or diffuse bacterial adherence to villous epithelium as observed by light microscopic examination were presumed to have colibacillosis.

Pilus-bearing E. coli were identified by IFA and/or seroagglutination in 154 of the 162 cases judged to be colibacillosis. Bacterial adherence to villous epithelium was observed in sections of formalin-fixed intestine from piglets in all except 8 of the 162 cases. Of these 8 cases, 2 had sufficient post mortem autolysis to render the intestines unsatisfactory for histopathology. Intestines were not submitted to the laboratory for histopathology in 2 other cases. No or few adherent bacteria were observed in intestinal sections prepared for histopathology in the remaining 4 cases. The ilea of all 8 pigs were either heavily colonized with E. coli as determined by gram stain and IFA, or were at least moderately colonized as determined by the same criteria and yielded E. coli isolates which expressed K88.

Distribution of the 162 colibacillosis cases by piglet age, adherence factor, and presence or absence of a co-infecting agent is shown in Table 1. K88-bearing E. coli were the most commonly identified agents of colibacillosis. However, 987P-bearing E. coli were more frequently identified in piglets one week old or younger. K88-bearing E. coli were found in all ages of piglets examined, but 987P- and K99-bearing E. coli generally were found only in piglets less than 2 weeks old. An exception to this pattern was the co-infection by K99-bearing E. coli of 5 piglets aged 4-6 weeks with rotavirus infections. Two other piglets over 4 weeks old with K99 E. coli also had villous atrophy although no virus was identified. Perhaps these were rotavirus infections in the convalescent stage of the disease. Two additional cases of K99 E. coli scours in piglets over 2 weeks old had no evidence of other enteric infections. Piglets of 6 cases had evidence of being dually infected with E. coli of two different adherence pili types. No adherence antigen was identified by IFA or seroagglutination in piglets of 8 cases, all of which showed bacterial adherence in intestine sections. These may represent infections by E. coli with a yet unidentified adherence antigen type.

Selected references: Smith, H.S., and M.A. Linggood: J. Med. Microbiol., 1971, 4, 467; Isaacson, R.E., B. Nagy, H.W. Moon: J. Infect. Dis., 1977. 135, 531; Francis, D.H., G.A. Remmers, and P.S. DeZeeuw: J. Clinic. Microbiol., 1982 (In Press).

TABLE 1

DISTRIBUTION OF COLIBACILLOSIS BY PIGLET AGE, ADHERENCE FACTOR, AND PRESENCE OR ABSENCE OF A CO-INFECTING AGENT

Agent	Adherence Antigen Identified	Piglet Age (Days) <7	8-14	15-21	22-28	>28	NG
E. coli	K88	22[a,b,c]	12[d]	2	7	6	1
	K99	16[c]	4[e]	1	0	1	2
	987P	34[a,b]	5[d,e]	0	0	0	4
	None	3	1	0	1	2	1
Rotavirus & E. coli	K88	4[f]	2	1	2	1	1
	K99	3[f]	0	0	3	2	0
	987P	12[f]	0	0	0	0	1
	None	0	0	0	0	0	0
E. coli & Other	K88	1	5[g]	0	0	2[h,i]	0
	K99	0	0	0	0	2[h,i]	0
	987P	1	0	0	0	0	0
	None	0	0	0	0	0	0

NG = Not given.
Each letter represents a single case
a,b,d = Dual infections with K88- and 987P-bearing E. coli.
c = Dual infection with K88- and K99-bearing E. coli.
e,f = Dual infections with K99- and 987P-bearing E. coli.
g,h,i = Villous atrophy present in intestine suggesting previous viral infection.