

Brief Communication

EXPERIMENTAL INFECTION OF NEWBORN PIGLETS
AND WEANLING PIGS WITH HAEMOLYTIC E. COLI,
STRAIN A₁, SEROTYPE 0149:K91:H10

The first outbreak in Denmark of enteritis in newborn piglets due to infection with *E. coli* serotype 0149:K91:H10 was demonstrated in the autumn 1966 (*Knox & Dam* 1970). Since then this serotype has spread rapidly and is to-day responsible for the vast majority of cases of enteric *E. coli* infection in newborn piglets, while among pigs at weaning age it occurs with much the same frequency as haemolytic *E. coli* serotypes 08:K87, 0138:K81, and 0141:K85 ab.

The widespread occurrence of serotype 0149:K91:H10 in connection with diarrhoea in newborn piglets has raised the need of an immuno-prophylaxis through serum treatment of newborn piglets or vaccination of pregnant sows. As a prelude to an evaluation of the effect of such immuno-prophylaxis, the pathogenicity of strain A₁ of this serotype was tested on 12 newborn piglets and three weanling pigs by oral administration of 20-hr.-old broth culture.

The newborn piglets were from two litters. Three (Nos. 1, 2, and 3) from one litter were allowed colostrum until they were inoculated at the age of two days, whereafter they were fed artificially. Five piglets (Nos. 4—8) of another litter (of nine) were deprived of colostrum until 12 hrs. after birth, when three of them were inoculated; of the four remaining piglets of this litter, which were allowed colostrum right from birth, three (Nos. 10, 11, and 12) were inoculated 12 hrs. after birth. Blood samples for sero-agglutination tests were drawn from five of the piglets before inoculation, and collected at killing from seven.

The results of the experiments with newborn piglets will appear from Table 1. With doses of 1 and 10 ml of culture, pigs with no antibodies to 0149:K91:H10 succumbed to *E. coli* enterotoxaemia and at post-mortem showed pure culture of *E. coli* in all parts of the intestinal tract and in some cases also in the

Table 1. Oral infection of newborn piglets

Pig. no.	Colostrum	Dose in ml of 20 hrs. broth culture 0149:K91:H10	Result	Blood aggl. titer to 0149 before infection	Blood aggl. titer to 0149 at killing	Bacteriological findings			
						spleen	liver	kidney	lung
1	allowed for 2 days	0.1	† day 5	0		0	9(0)	5(4)	9(0)
2		1	† day 5	0		30(10)	0	50(10)	2(1)
3		10	† day 5	0		0	0	1(1)	0
4	allowed from 12 hrs. after birth	0.1	killed day 5		0	0	0	0	0
5		1	† day 1			10 ^x (10)	0	0	0
6		10	† day 1			10 ^x (10)	10 ^x (10)	10 ^x (10)	4(4)
7	allowed from 12 hrs. after birth	0	killed day 7	0	0	0	0	0	0
8		0	killed day 5		0	0	0	0	0
9	allowed immediately after birth	0	killed day 7	1/20	1/16	0	0	0	0
10		1	killed day 6		1/8	0	0	0	10 ^x (0)
11		10	killed day 6		1/8	10 ^x (0)	0	0	10 ^x (0)
12		0.1	killed day 5		1/16	0	0	0	0

†: death.

with varying doses of *E. coli* 0149:K91:H10.

Bacteriological findings								
intest. lymph. nodes	heart blood	gastric contents	contents of duodenum	contents of jejun. anterior part	contents of jejun. posterior part	contents of ileum	contents of colon	contents of rectum
—	10 ^x (0)	10 ^x (7)	10 ^x (10) ^P	10 ^x (7) ^P	10 ^x (9)	10 ^x (9)	10 ^x (2)	10 ^x (6)
—	10 ^x (9)	5(2)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)
10 ^x (10)	10 ^x (10)	few (0)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)
15(0)	10 ^x (0)	0	10 ^x (0)	10 ^x (0)	10 ^x (0)	10 ^x (0)	10 ^x (0)	10 ^x (0)
10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)
10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)	10 ^x (10)
3(0)	0	25(0)	10 ^x (0)	10 ^x (0)	10 ^x (0)	10 ^x (0)	10 ^x (0)	10 ^x (0)
10(0) ^P	0	0	8(0)	10 ^x (0)	10 ^x (0)	10 ^x (0)	10 ^x (0)	10 ^x (0)
0	50(0)	50(0)	10 ^x (0)	10 ^x (0) ^P	10 ^x (0)	10 ^x (0)	10 ^x (0)	10 ^x (0)
10 ^x (0) ^P	10 ^x (0)	0	6(0)	10 ^x (0) ^P	10 ^x (0) ^P	10 ^x (0) ^P	10 ^x (0) ^P	10 ^x (0)
0	0	0	10(0)	10 ^x (0)	10 ^x (0)	10 ^x (0) ^P	10 ^x (0) ^P	10 ^x (0) ^P
0	0	0	10 ^x (0)	10 ^x (0)	10 ^x (0)	10 ^x (0)	10 ^x (0) ^P	10 ^x (0)

Unbracketed figures indicate numbers of haemolytic *E. coli* colonies on blood-agar plates. 10^x: countless such colonies.

Bracketed figures indicate colonies (out of maximum 10) typed as 0149:K91:H10.

—: not examined.

P: proteus.

parenchymatous organs. In the surviving piglets, sacrificed from five to eight days after infection, *E. coli* 0149:K91:H10 could not be demonstrated in organs or in intestinal contents.

The different outcome in piglets 1, 2, and 3, and piglets 9—12 may be ascribed to the content of antibodies to *E. coli* 0149 in the colostrum of the mother of piglets 9—12. These antibodies were probably produced in response to haemolytic *E. coli* 0117, which was found to be present in the intestinal contents of the sow. Serotype 0117 is closely related to serotype 0149:K91:H10 as regards agglutinating antibodies and possibly also as regards protective antibodies, but of little, if any, pathogenicity.

In the three weanling pigs, even enormous doses of broth culture of *E. coli* 0149:K91:H10, i. e. 100—200 ml daily for four days, gave rise to no symptoms at all, even though daily examination of rectal swabs revealed pure culture of *E. coli* 0149:K91:H10. When the pigs were sacrificed after four days, no gross lesions were found at necropsy. In the colon a pure culture was found of haemolytic *E. coli* 0149:K91:H10, but unlike natural, fatal cases of enteric colibacillosis in weanling pigs, *E. coli* 0149:K91:H10 could not be demonstrated in the duodenal and jejunal contents.

A. Dam

The State Veterinary Serum Laboratory,
Copenhagen, Denmark.

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