CONTROL OF ESCHERICHIA COLI-INDUCED MASTITIS IN SOWS WITH APRAMYCIN

R. F. Ross* and B. J. Zimmermann
Iowa State University
Ames, Iowa USA

Evidence has been presented that mastitis associated with E. coli infection is frequent in sows with lactational failure (Bertschinger et al. 1977 and Ross et al. 1981). Methods used for treatment and prevention of the disease have long been directed at coliforms; however, specific, highly effective regimens are not available.

Experimentally-induced E. coli mastitis and agalactia in sows (Ross et al. 1980) is a useful model for development and evaluation of control measures. In the work presented, apramycin, an aminoglycoside antibiotic, was evaluated for control of the experimentally induced disease.

Methods: Crossbred, first litter sows were purchased during the third trimester of pregnancy and farrowed in crates with slotted steel floors. Sows were allotted to treatment groups sequentially as they farrowed. In trial 1, treatment groups consisted of 4 sows each; sows in group 1 were infected with E. coli and were not medicated whereas sows in groups 2-6, also infected with E. coli, received either 3 s.i.d. (6.25 mg/kg, 12.5 mg/kg, 25 mg/kg) or 6 b.i.d. (6.25 mg/kg, 12.5 mg/kg) doses of apramycin. In trial 2, sows in group 1 were infected with E. coli and were not medicated while sows in groups 2-4 were given different levels (3.125 mg/kg, 6.25 mg/kg or 12.5 mg/kg) of apramycin b.i.d. for 3 days. Medication was given as a 200 mg/ml suspension intramuscularly.

The time of birth of the first pig was determined for each sow, then the sows were examined and piglets were weighed 8, 24, 48 and 72 hours and 7 and 14 days later. Mortality of piglets was also tabulated. Milk collected prior to inoculation (8 hour sample) from each gland was cultured to ascertain that preexisting coliform infections were not present.

E. coli strain 78-1 (O6:K23:H1) grown 4 hr in tryptose phosphate broth and stored at -70 C prior to use was diluted to contain $10^{2.5}$ to $10^{4.5}$ CFU/ml depending on the susceptibility of sows used. Diluted culture was inoculated via teat canal into anterior and posterior segments of each of 12 mammary glands at 8 hours after birth of the first pig and the appropriate medication was then initiated.

Results: Results obtained in Trial 1 are summarized in Table 1. In that trial, medication with 12.5 mg/kg or 6.25 mg/kg of apramycin b.i.d. significantly reduced the death loss of pigs in comparison to sows receiving those amounts s.i.d. and sows that were not medicated. Weight gain of pigs surviving to 14 days of age did not differ among the groups. Temperatures of infected, nonmedicated sows at 24 and 48 hours postpartum were higher in nonmedicated sows than in all medicated groups but significant differences were not achieved.

Table 1. Trial 1

Group	Treatment	% Pigs Died	Pig Gain(kg) to 14 days
1	Nonmedicated	71.9^{a}	2.63^{a}
2	6.25 mg/kg s.i.d.	$24.4^{a,b}$	1.54^{a}
3	6.25 mg/kg b.i.d.	12.5^{b}	2.15^{a}
4	12.5 mg/kg s.i.d.	$44.5^{a,b}$	1.44^{a}
5	12.5 mg/kg b.i.d.	8.9^{b}	1.97^{a}
6	25 mg/kg s.i.d.	$22.6^{a,b}$	1.72^{a}

^{a,b}Means in a given column with different letters differ ($p<0.05$).

Results obtained in Trial 2 are summarized in Table 2. Medication with 12.5 mg/kg or 6.25 mg/kg b.i.d. of apramycin reduced the death loss of pigs in comparison to sows receiving 3.125 mg/kg b.i.d. or nonmedicated sows. Weight gains of pigs surviving to 14 days of age when 12.5 mg/kg b.i.d. was used were best. Pigs nursing sows in the other medicated groups also gained somewhat better than in the nonmedicated group. Medication with 6.25 mg/kg and 12.5 mg/kg prevented temperature elevation in sows at both 24 and 48 hours post partum.

Table 2. Trial 2

Group	Treatment	% Pigs Died	Pig Gain(kg) to 14 days
1	Nonmedicated	65.8^{a}	2.62^{c}
2	3.125 mg/kg b.i.d.	61.0^{a}	$3.26^{b,c}$
3	6.25 mg/kg b.i.d.	8.9^{b}	$3.12^{a,b,c}$
4	12.5 mg/kg b.i.d.	2.5^{b}	3.64^{a}

^{a,b,c}Means in a given column with different letters differ ($p<0.05$).

Conclusions: Medication of sows with experimentally induced E. coli mastitis with apramycin at 6.25 or 12.5 mg/kg b.i.d. significantly reduced pig death loss, reduced clinical severity of mastitis and in one trial improved pig gains. Results obtained suggested that apramycin would be beneficial in field cases of mastitis caused by E. coli Similar results were obtained in other trials using experimentally induced klebsiella mastitis. The practicality of using 6 b.i.d. injections is questionable. Possibly a shorter course of b.i.d. injection would be efficacious. The model disease used closely resembles that seen in naturally occurring agalactia. The continuing high incidence of piglet starvation death loss in many swine raising areas indicates the need for continued evaluation of methods for reducing this loss.

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Selected References: Bertschinger, H. U. et al.: Schweiz Arch. Tierheilk. 1977, 119:223; Ross, R. F. et al. 1980. Proc. 6th Cong. IPVS Copenhagen, 66; Ross, R. F. et al.: Amer. J. Vet. Res. 1981, 42:949.