Although studies in the prevalence of salmonellosis and the salmonella carrier state in healthy slaughter pigs have been carried out before in Taiwan ROC, little information is available on the scouring pigs from the intensive pig farms in Taiwan ROC. An increasing incidence of drug-resistant salmonella strains has been reported when using these drugs for therapy, prophylaxis or growth promotion and thus may have implications for public health. This study was made in an attempt to investigate the prevalence of salmonellosis among pigs from various districts of the country to understand the drug resistance pattern of salmonella isolates.

The nine intensive pig farms distributed throughout the country, each containing 10,000 to 60,000 pigs, used the drugs for prophylaxis, therapy or growth promotion: streptomycin, kanamycin, sulfonamide, chloramphenicol, streptomycin, ampicillin and neomycin. During the period between September 1979 and May 1980, rectal swab samples were collected from: 1) 337 nursing pigs, 6 to 8 weeks old; 2) from 34 growing pigs, 8 to 16 weeks old; 3) from 35 suckling pigs, 4) from 16 sows nursing with 35 babies. In addition, a total of 45 samples of gall bladder wall and mesenteric lymph nodes were obtained from the feeder pigs which had died of scouring.

Both fecal and tissue samples were collected aseptically. The fecal swabs were placed into 60 ml of triatephionate broth (TPB), or sulfonamide broth (TSB), or Rapaport broth (MRB) for enrichment. Both thiophionate and selenite broths were incubated at 63°C, while Rapaport broth was incubated at 37°C as recommended by Harvey. After 18 hr, subcultures were made on McConkey agar, salmonella-shigella agar (BSA) and bismuth sulfite agar (BSA), and incubated overnight at 37°C. Three colonies presumed to be salmonella were picked up from each plate and transferred onto McConkey agar for purification. Isolates suspected of being salmonella were inoculated into triple sugar iron agar (BSA) and subjected to the usual biochemical and serological tests. Serological differentiation was carried out with salmonella anti-O and anti-H sera from Difco, U.S.A. and Behringwerke AG, Germany.

Drug susceptibility testing of salmonella isolates was done as previously described by Bauer et al. The following drug disks (Baltimore Biologic Laboratory) were used: sulfadiazine (30 μg), streptomycin (25 μg), streptomycin (10 μg), chloramphenicol (30 μg), kanamycin (30 μg), ampicillin (30 μg), neomycin (50 μg), nalidixic acid (30 μg), colistin (10 μg), polymyxin B (300 units) and gentamicin (10 μg). Plates were incubated for 18 to 24 hr at 37°C. Any inhibition zones with diameters less than the maximum defined as "susceptible" were re-inoculated in triplicate and interpreted as "resistant". For daily control of susceptibility, Escherichia coli ATCC 25922 and Staphilococcus aureus NCTC 6571 (Difco Bacterial-Disk, Set B, 1829-30) were used as test cultures described.

Results

Salmonella were isolated from 54(10%) of the 537 pig farms investigated. Three Remedial pigs, 2 nursing pigs and one sow were isolated from one animal. However, salmonella were not isolated from any samples collected from sucking pigs and from the sows nursing those piglets. The 65 salmonella belonged to 10 different serotypes, S. typhimurium being most frequently isolated (27.4%), followed by S. stanley (14.21%) and S. Panama (10.8%). Of the 45 samples of tissue examined, 24 (53.36%) were positive for salmonella. The salmonella belonged to 7 serotypes. Salmonella typhimurium was the serotype most frequently isolated (47.15%), followed by S. stanley (16.67%) and S. Panama (10.8%). Of the 45 samples of tissue examined, 24 (53.36%) were positive for salmonella.

Conclusion

The rectal sample survey revealed salmonellosis in 54 (10.6%) of 537 scouring pig farms. Salmonella isolated belonged to 10 different serotypes. Of these, S. typhimurium was the serotype most frequently isolated, followed by S. stanley and S. Panama. Of 45 scouring pigs with enteric disorder necropsied, 26 (57.77%) were positive for salmonellosis. Salmonella isolated belonged to 7 different serotypes. Of these, S. typhimurium was the most common serotype (30%), S. heidelberg (17%), and S. paratyphi A accounted for the second. Of 55 salmonella isolates examined for drug susceptibility, 95.45% were resistant to one or more drugs. Resistance to streptomycin was the most common (59.09%) followed by tetracycline and streptomycin (52.00%). The predominant pattern of resistance was to streptomycin, sulfadiazine and tetracycline (34 strains). The next most frequent pattern was to streptomycin, sulfadiazine and tetracycline (18 strains).