The use of gallamycin* for controlling infectious atrophic rhinitis in bacon pigs

by M. A. MacDonald**

SUMMARY

The use of Gallamycin to control nasal deterioration and permit increased growth rates in bacon type pigs was studied. Litters were randomly divided according to sex into treatment and control groups. Animals were treated by injection with 2.5 mgm of Gallamycin per pound liveweight at weekly intervals commencing during the first through the fifth week of age. Treatments ceased during the eighth week of age. Gallamycin treatment did not reduce significantly the percentage of nasal turbinate degeneration nor increase the rate of gain per day of treatment compared with control animals within litters. Possible explanations of results obtained are hypothesized.

Introduction

Infectious atrophic rhinitis has been known in Northern Europe for over a century (2). It was first reported in Canada in 1934 and in the United States ten years later (4). It is now considered a major disease of swine in North America.

The causes of infectious atrophic rhinitis are not known (10). Satisfactory methods of diagnosis have yet to be determined, hence infected animals may be present in a herd for years before the presence of the disease is evident (3, 13). In Uzbekistan, where a mortality of 80 to 90 per cent among piglets in some herds was recorded, only 10 to 15 per cent of infected animals developed facial deformity (9). In another study (11) there were indications that rhinitis was introduced into the herd almost three years before it was discovered.

In spite of concern over the incidence and undesirable effects of infectious atrophic rhinitis throughout the Canadian swine industry, little progress has been made toward establishing simple effective management methods for preventing or controlling this disease. Many methods of control have been attempted. The removal of a whole herd of animals showing symptoms of the disease may be advocated if sources of clean animals are available readily and the salvage value at slaughter is relatively high in comparison with the cost of replacements (15). Removal of litters by Ceasarian section is impractical on most farms; rearing piglets denied colostrum is hazardous and the removal of litters from sows after permitting them colostrum is regarded with suspicion (4).

The effect of infectious atrophic rhinitis on growth rate in swine has been studied in both Canada and the United States. It was found that rhinitis-infected pigs were significantly lighter at 56, 84, 112, 140 and 168 days of age than their normal littermates (7). An analysis of birthweights of infected pigs and their non-infected littermates indicated that pigs which were born light in weight may be somewhat more susceptible to infection than their heavier littermates (7). Shuman and Earl (11) found that infectious atrophic rhinitis had no measurable effect on sow productivity but did have a definite inhibitory effect on the pig rate of growth from 56 days of age to approximately 215 pounds liveweight under record-of-performance conditions. The average weight of normal pigs at 56 and 140 days of age exceeded the affected pigs by 3.9 and 6.4 per cent. The incidence of rhinitis on a herd basis was 45.9 per cent. Others (16) found that a growth depressing effect of infectious atrophic rhinitis was not obvious from pigs slaughtered at approximately 200 pounds liveweight.

Gwatkin *et al.* (5, 6) found that treatment of experimental animals with penicillin and streptomycin inhibited infectious agents when added to the inoculum before installation in the noses of susceptible pigs.

*Gallamycin U.S.P. (50 mg./ml. as Erythromycin Ethyl Succinate for injection) was kindly supplied by Abbott Laboratories Ltd., Montreal, Canada.

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TABLE I — Comparative Response of Swine to Gallamycin* Injections given at weekly intervals commencing at ages from one to five weeks inclusive

Age at Which injection commenced and No. of injections		Number of Pigs	Ave. Birth Weight (lb.)	WEIGHT (LB.) AT VARIOUS AGES (WK.)								Ave. Difference in Weight at 8 Weeks (lb.)	Ave. Market Weight (lb.)	Ave. Age at Slaughter (Days)	Ave. Daily Gain (lb.)	Percentage of Nasal Deterioration at Slaughter
AGE (Wks)	Treatment			1	2	3	4	5	6	7	8					
5	3 injections	10	2.3						16.9	21.1	25.2	1.4	194	186	1.03	58
	Control	9	2.5						16.0	20.0	23.8		195	192	1.01	65
4	4 injections	10	3.5					19.0	22.8	28.8	34.8	1.2	193	177	1.08	44
	Control	12	3.4					19.0	22.0	28.5	33.6		194	182	1.07	28
3	5 injections	5	3.9				17.2	21.2	25.7	30.7	40.3	− 0.8	201	157	1.26	0
	Control	5	3.8				16.7	20.3	25.0	29.8	41.1		196	196	1.19	0
2	6 injections	13	3.1			12.4	13.8	17.2	21.4	25.0	28.8	1.3	193	187	1.02	17
	Control	12	3.2			11.8	13.1	16.5	19.5	23.5	27.5		192	186	1.01	14
1	7 injections	12	2.9		7.3	10.9	12.9	25.1	18.5	21.8	25.7	1.2	195	177	1.09	11
	Control	13	3.0		7.3	11.0	13.5	24.8	18.8	21.4	24.5		192	184	1.03	54
0	8 injections	31	2.8	5.2	8.8	11.6	13.5	15.8	18.2	21.8	26.6	2.3	198	186	1.05	50
	Control	29	2.9	5.2	8.3	11.1	12.9	14.9	16.8	20.0	24.3		195	190	1.03	29
AVERAGE	TREATMENT	81	2.9	5.2	8.4	12.1	14.1	16.5	19.4	23.4	28.1	1.3	196	183	1.06	31
	CONTROL	80	3.0	5.2	7.5	11.2	13.3	16.1	18.6	22.6	26.8		194	186	1.04	36

*Treatment animals were injected with 25 mgm. per pound liveweight.

Intramuscular injections of streptomycin administered three times during the first month after birth reduced but did not eliminate the incidence of infectious atrophic rhinitis.

This study was undertaken to evaluate weekly injections of Gallamycin (Erythromycin Ethyl Succinate) in the control of infectious atrophic rhinitis as measured by nasal turbinate degenerations and interrelationships with weight-for-age in bacon-type swine.

Materials and Methods

Litters born in the Macdonald College swine herd during the spring of 1961 were utilized as experimental animals. Within litters and within sexes, animals were randomly selected for either the treatment or control groups.

All piglets were weighed at birth, offered prestarter rations commencing at 10 days of age, weaned at 21 days of age, and provided with rations prepared according to Quebec Feed Board and U.S.-N.R.C. nutrient recommendations for bacon type pigs (8, 14). At a liveweight of approximately 50 to 60 pounds, animals were introduced to and fed Grower Rations containing approximately 16 per cent crude protein and 75 per cent total digestible nutrients (TDN). At liveweights of from 110 to 125 pounds, Finisher Rations containing approximately 14 per cent crude protein and 67 to 70 per cent TDN were provided for the animals. Water was available at all times; bedding material was a combination of straw and/or wood shavings.

When heat lamps were employed, a local environment of approximately 80°F. was available in a building maintained at an environmental temperature of approximately 60°F. The use of heat lamps was discontinued when litters reached 56 days of age.

Treatment animals were injected intramuscularly in the ham, once weekly at a rate of 2.5 mgm of Gallamycin per pound liveweight. Treatments began during one, three, four or five weeks of age and all treatments ceased during the eighth week of age.

All animals were slaughtered during the week in which liveweight exceeded 190 pounds. Following slaughter and cooling the right side of each pig was cut according to the Canada Department of Agriculture Record of Performance (ROP) Requirements for Swine (1). The left side was partitioned into Montreal commercial trimmed wholesale cuts.

A cross section of the nose anterior to the eyes was made and the nasal turbinates examined of all animals from which the heads were not severed and removed inadvertently during slaughter. Visual estimates of the degree of degeneration were made and recorded on a percentage basis. Photographs were taken to permit subsequent reexamination and comparison. The percentage nasal deterioration was assumed to represent unit degrees of rhinitis.

Data were analysed employing analysis of variance as recommended by Snedecor (12).

Results and Discussion

There was no significant differences in the degree of turbinate degeneration within litter, within breed, or within treatment groups employed in this study. Treatment piglets weighed as much or more than their control counterparts during weekly weighings following the time of the first injection. The subgroup that received seven weekly injections was an exception but otherwise all treatment group average weights exceeded their control group equivalents at all ages studied. That group recorded greater weights of controls compared with those of treatment groups during the third, fourth and sixth weeks of age. The degree of nasal deterioration varied and exhibited no relationship commensurate with the age at which treatment began. However, the overall percentage nasal degeneration was slightly higher for control compared with treatment groups.

The analysis of least square estimate of litter X treatment effect revealed that (+) 0.529 more pigs on treatment suffered nasal deterioration than those in the control group.

An analysis of variance showed that treatment had no significant effect on litters. The "F" value for treatment was 2.49, and was not significant at the 5 per cent level. The "F" value for litters was 2.00 and was not significant at the 5 per cent level. Treatment by litter interaction, significant at the 1 per cent level, yielded a 5.20 "F" value. The experimental error mean square value was 1.31.

Several hypotheses may be advanced to explain the results obtained in this study. The first is that the treatment substance,

Gallamycin (Erythromycin Ethyl Succinate), is ineffective against the agent or agents causing nasal deterioration. A second possible hypothesis is that the level of treatment employed was too low to be effective. Third, treatment may have been insufficiently frequent to maintain an adequate therapeutic level of the antibiotic studied. Fourth, treatment may not have started sufficiently early enough to insure beneficial results. Little or no support for the last mentioned hypothesis is evident in the data since nasal deterioration did not increase with the age in weeks during which first treatment commenced. Data also suggest that effective treatment may necessitate treatment of sows during pregnancy rather than treatment of piglets *per se*. Fifth, successful prevention of nasal deterioration may require a combination of the procedures hypothesised as necessary.

It must be concluded that with the techniques and dosages employed nasal deterioration was not prevented and the daily rate of gain of treatment animals was not significantly increased by the use of Gallamycin.

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REFERENCES

1. **ANONYMOUS.** National bacon policy. Record of performance and advanced registry for purebred swine. Production and marketing service. Can. Dept. Agr. Ottawa. 14 pp. 1959.
2. **DOYLE, L. P., C. R. DONHAM,** and **L. M. HUTCHINGS.** Report on a type of rhinitis in swine. J. Amer. Vet. Med. Assoc. **105**: 132. 1944.
3. **DUTHIE R. C.,** 1. Chronic atrophic rhinitis and congenital deformity of the skull. Can. J. Comp. Med. Vet. Sci. **11**: 250. 1947.
4. **GWATKIN, R.,** Rhinitis in swine. Canada Department of Agriculture Publication No. 1085. 21 pp. 1960.
5. **GWATKIN, R., L. Dzenis, A. S. GREIG,** and **C. GRINEWITSCH.** Rhinitis of swine. IX. Further studies on aetiological agents. Can. J. Comp. Med. Vet. Sci. **18**: 341. 1954.
6. **GWATKIN, R., J. G. PLUMMER, J. L. BYRNE,** and **R. V. L. WALKER.** Rhinitis of swine. III. Transmission to baby pigs. Can. J. Comp. Med. Vet. Sci. **13**: 15. 1949.
7. **KRISTJANSSON, F. K.,** and **R. GWATKIN.** The effect of infectious atrophic rhinitis on weight for age in swine. Can. J. Agr. Sci. **35**: 139. 1955.
8. **QUEBEC PROVINCIAL FEED BOARD.** Feeders' Guide and Formulae for Meal Mixtures. 30th ed. 2nd Printing: 73 pp. 1962.
9. **SAMOVODOV N. M.,** and **N. K. SHEVCHENKO.** Infectious atrophic rhinitis of swine. Veterinariya. **35**: 51. 1958.
10. **SCHOEFIELD, F. W.,** and **T. L. JONES.** The pathology and bacteriology of infectious atrophic rhinitis in swine. J. Amer. Vet. Med. Assoc. **116**: 120. 1950.
11. **SHUMAN, R. D.,** and **J. L. EARL.** Atrophic rhinitis. VIII. A study of the economic effect in a swine herd. J. Amer. Vet. Med. Assoc. **129**: 220. 1956.
12. **SNEDECOR, G. W.** Statistical methods. 4th ed. The Iowa State College Press, Ames, Iowa. 1946.
13. **SWITZER, W. P.** Infectious atrophic rhinitis. J. Amer. Vet. Med. Assoc. **134**: 211. 1959.
14. **UNITED STATES. N.R.C.-N.A.S.** Nutrient requirements of domestic animals. II. Nutrient requirements of swine. Publication 648, Washington 4, D.C. 1959.
15. **VAN DEN BORN, J. M.** Tijdschr. Diergeneesk. Oct. 1, 915. 1958 (Quoted in J. Amer. Vet. Med. Assoc. **134**: 8. 1959).
16. **YOUNG, GEORGE, A., J. D. CALDWELL,** and **N. R. UNDERHALL.** J. Amer. Vet. Med. Assoc. **134**: 231. 1959.

Tracer dyes in intrammary preparations as a method of rapid indirect detection of antibiotic residues in milk — a review.

The concern over the contamination of milk with residues of antibiotics was the stimulus for this work. This contamination occurs mainly through the use of milk from quarters treated for mastitis with various antibiotic infusions. Investigations into the use of a dye in these preparations to provide a rapid visual means of detecting these contaminants have been investigated. To be satisfactory these dyes must be: 1. Harmless to the consumer. 2. Non-irritant to the mammary tissues of the cow. 3. Non-destructive to the antibiotic agent during storage. 4. Be soluble in milk. 5. Be excreted at same time as antibiotic. 6. Be readily visible to the eye in milk containing low concentrations of antibiotic, as low as 0.1 i.u./ml penicillin, which is the level at which starter growth is compromised. The dye which most nearly fulfilled the above requirements was Green S, a water soluble triphenyl methane dye. This dye could be detected at concentrations as low as 0.2 mgm/h by the naked eye. The inclusion of 50 mg. for 100,000 i.u. of penicillin in all intrammary preparations seemed to provide a good means of detecting antibody residues in milk without harming the cow, consumer and dairy product manufacturer, and without reducing the therapeutic efficiency of the preparations.

Van den Heever, L. W. J. S. Afr. Vet. Med. Assn. 33: 29-33, 1962.