The Influence of Penicillin, Aureomycin and 3-Nitro-4-Hydroxyphenylarsonic Acid on the Growth of Goslings

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(Received for publication March 14, 1955)

PENICILLIN has been reported by Slinger *et al.* (1953) to stimulate growth in cross bred male goslings up to 2 weeks but not at 4, 6 or 8 weeks of age. This improvement was noted on birds fed pelleted rations, and pellets plus grain. Branion and Hill (1952) observed growth stimulation in goslings from aureomycin, procaine penicillin, diamine penicillin, streptomycin and terramycin fed at the level of 50 p.p.m. in a mash ration.

No reports could be found relative to the use of 3-nitro-4-hydroxyphenylarsonic acid in gosling rations. Several workers have, however, observed growth stimulation in other avian species with this arsonic acid (Morehouse and Mayfield, 1946; Bird *et al.*, 1948, 1949, with chickens; Morehouse, 1949, with turkeys; and Scott *et al.*, 1954, with pheasant chicks). The experiments to be reported were therefore conducted to determine the influence of 3-nitro-4-hydroxyphenylarsonic acid and two antibiotics on the growth of goslings.

PROCEDURE

Day old sexed Pilgrim goslings were used in the two experiments to be reported. The birds were individually weighed and placed in weight groups, from which they were subsequently allotted in a random manner to the various experimental lots. The experiments were conducted in similar floor pens located in a thermostatically controlled brooder house. Brooding heat was supplied with infra-red lamps. Individual weights and feed consumption on a pen basis were recorded weekly during the course of the 2 trials. The various diets were pelleted and fed *ad libitum.*

TABLE 1.—*Composition of basal ration*

Ingredient	Lbs. per 100 lbs.
Ground yellow corn	15
Ground oats	22
Ground wheat	18
Wheat middlings	19
Fish meal (65% Protein)	4
Dried skim milk	5
Soybean oil meal (44% Protein)	8.6
Dried brewer's yeast	4
Dehydrated cereal grass	3
Bone meal	2
Ground limestone	0.75
Fish oil (1,500A–200D)	0.50
Iodized salt	0.1
Choline chloride (25%)	120 grams
Riboflavin supplement (8 mg./gm.)	11 grams
Manganese sulphate	6 grams
Niacin	1 gram

The basal ration used in this study is shown in Table 1. It will be noted that this ration contains niacin and brewer's yeast since several investigators have shown the need for these components to protect goslings from leg weakness (Scott, 1952; Slinger *et al.*, 1953; Battig *et al.*, 1953; and Aitken *et al.*, 1954).

The weekly weight data were analyzed according to the method of analysis of variance (Snedecor, 1946).

RESULTS AND DISCUSSION

Experiment 1. Duplicate groups of 8 male and 7 female goslings were fed the basal ration, and this ration supplemented with either 25 p.p.m. of procaine

Table 2.—*Effect of penicillin and 3-nitro-4-hydroxyphenylarsonic acid on growth and feed efficiency of goslings*

Treatment	Sex	Average weight (gm.)[3] Weeks 1	2	3	4	Feed/gain ratio 0–4 weeks
Basal	M	270	667	1,349	1,926	
	F	273	628	1,255	1,808	
	M&F[2]	272	649	1,306	1,847	1.92
Penicillin (25 p.p.m.)	M	259	633	1,299	1,809	
	F	254	616	1,196	1,706	
	M&F	257	624	1,246	1,753	1.87
Arsonic Acid[1] (50 p.p.m.)	M	286	662	1,325	1,908	
	F	239	553	1,035	1,602[4]	
	M&F	264	611	1,189	1,765	1.87

[1] 3-nitro-4-hydroxyphenylarsonic acid.
[2] Unweighted mean for males and females.
[3] All weights are averages of duplicate groups.
[4] Significantly less (P <0.05) than the corresponding group on the basal diet.

penicillin (22.5 gms./ton) or 50 p.p.m. of 3-nitro-4-hydroxyphenylarsonic acid (45 gms./ton). The data are shown in Table 2.

It may be seen that penicillin failed to improve weights of the goslings. Although non-significant statistically, the addition of penicillin appeared to reduce the weight of both males and females. The addition of 3-nitro-4-hydroxyphenylarsonic acid has no influence on the weights of the male goslings but in the case of the females, weights were significantly reduced ($P<0.05$) as compared to those on the basal ration.

In view of these results and the report by Branion and Hill (1952) that several antibiotics at 50 p.p.m. enhanced gosling growth, experiment 2 was run to confirm the results of experiment 1 and to test penicillin and aureomycin at two levels.

Experiment 2. Fourteen male goslings per group were used in this test. The procedure was the same as previously described. The plan and results are shown in Table 3.

The data show that 25 and 100 p.p.m. of penicillin and 100 p.p.m. of aureomycin improved growth up to 2 weeks of age but by 5 weeks the control group had attained a greater weight than did those goslings receiving the antibiotics, regardless of the levels used. Slinger *et al.* (1953) observed a significant response to penicillin at 2 weeks of age in males, but beyond this age, little if any response was evident.

The addition of 3-nitro-4-hydroxyphenylarsonic acid failed to stimulate gosling growth, which is in agreement with the results of the former trial.

Feed efficiency (Table 3) in general paralleled weights and was not influenced to any extent by the various additions to the basal ration.

The results of this experiment do not confirm those of the previous trial with

Table 3.—*Effect of penicillin, aureomycin and 3-nitro-4-hydroxyphenylarsonic acid on growth and feed efficiency of goslings*

Treatment	Average weight (gm.) (14 male goslings per group) Weeks 1	2	3	4	5	Feed/gain ratio Weeks 1	2	3	4	5
Basal	274	728	1,375	2,014	2,685	1.45	1.64	1.84	2.29	2.38
Penicillin (25 p.p.m.)	317†	815†	1,306	1,984	2,466	1.24	1.51	1.72	2.00	2.20
Penicillin (100 p.p.m.)	301†	766	1,387	2,031	2,431	1.20	1.47	1.69	2.11	2.44
Aureomycin (25 p.p.m.)	280	751	1,395	2,034	2,372	1.34	1.49	1.64	2.10	2.48
Aureomycin (100 p.p.m.)	308†	810†	1,449	2,048	2,586	1.23	1.35	1.65	2.02	2.20
Arsonic acid (50 p.p.m.)*	284	750	1,395	2,038	2,575	1.10	1.47	1.67	2.16	2.39

* 3-nitro-4-hydroxyphenylarsonic acid.
† Significantly greater ($P<0.05$) than corresponding weight for the basal.

respect to the influence of antibiotics during the first 2 weeks of age. Nevertheless beyond this age the results of both experiments indicate no growth response to the antibiotics tested. This is not in agreement with the data of Branion and Hill ((1952). However, in view of the reports by Coates *et al.*, (1951, 1952); Bird *et al.*, (1952); and Hill *et al.*, (1953), regarding the influence of environment on the antibiotic response with chicks, it may well be that the disagreement between the results reported herein and those of Branion and Hill (1952) is due, in part at least, to the different environments encountered.

SUMMARY AND CONCLUSIONS

Two experiments were conducted to determine the influence of antibiotics and 3-nitro-4-hydroxyphenylarsonic acid on the growth of goslings.

The results show that at 4 and 5 weeks of age gosling weights were not increased by the addition of either procaine penicillin or aureomycin HCl at the levels of 25 and 100 p.p.m. However an increase in weight was observed in experiment 2 up to 2 weeks of age with 25 and 100 p.p.m. of procaine penicillin and 100 p.p.m. of aureomycin HCl.

The addition of 3-nitro-4-hydroxyphenylarsonic acid had no beneficial effect on the growth of male goslings and reduced the weights of female goslings.

ACKNOWLEDGEMENTS

The authors wish to express their thanks to Lederle Laboratories, Pearl River, New York, for the aureomycin; to Merck and Company Limited, Montreal, for the penicillin; and to Dr. Salsbury's Laboratories, Charles City, Iowa, for the 3-nitro-4-hydroxyphenylarsonic acid used in this study.

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