SOME EFFECTS OF FURAZOLIDONE AND ARSANILIC ACID FOR TURKEY BREEDER HENS [1]

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Several workers have reported that dietary supplements of furazolidone or arsanilic acid improve the growth rate and/or livability of chicks and turkey poults. No published information is available concerning the possible nutritional effects of these antibacterial supplements in turkey breeder feeds. Both compounds have been used in layer and breeder diets for chickens. Dean and Stephenson (1) have reported furazolidone to improve egg production and hatchability of heavy-type hens. In their work as well as in some work at this station (2), the combination of furazolidone and arsanilic acid was even more effective than furazolidone alone.

The use of arsanilic acid in layer and breeder diets for chickens has been reviewed by the senior author (3). Briefly, the arsonic acids (3-nitro 4-hydroxyphenylarsonic acid and arsanilic acid) have shown improved egg production to the extent of an average of about 3%, and have shown a tendency towards improved feed utilization. Lillie *et al.* (4) showed detrimental effects in one experiment with each arsonic acid, but only where a very high energy diet with added fat was used.

The work reported here was conducted in the regular hatching seasons of 1957 and 1958 and considered the use of single supplements of furazolidone or arsanilic acid in diets for turkey breeder hens.

EXPERIMENTAL

Turkeys of three strains were used in these studies, two commercial Broad Breasted Bronze strains and the native medium type strain used at this station over the past several years. The commercial strains were used in the studies with furazolidone and the native strain was used in the studies with arsanilic acid. Twenty to twenty-three hens were used per group. They were kept on a high fiber maintenance ration from 28 to approximately 36 weeks of age, during which the natural day length averaged about 9-10 hours.

[1]Poultryman and Assistant Poultryman, respectively.

[2]Published with the approval of the Dir. of the So. Dak. Agric. Exp. Sta. as Journal Series No. 438.

TABLE I

FURAZOLIDONE AND ARSANILIC ACID FOR TURKEY BREEDERS—EXP. 1

	Control* Strain			Furazolidone 25 gm/ton Strain			Control*	Arsanilic Acid 90 gm/ton
	A	B	Ave.	A	B	Ave.	Native Strain	Native Strain
Egg Production, % Hen Day (Feb.-June)	47.0	51.3	49.2	56.5	48.0	52.3	54.1†	44.2†
Hatch of Apparent Fertile Eggs, %	59.0	59.3	59.2	57.8	65.0	61.9	69.5	64.5
All Eggs, %	46.1	36.4	41.3	40.9	48.8	44.9	60.5	52.0
No. Poults/Hen	30.3	24.0	27.2	33.0	31.6	32.3	26.0	17.0
% May Body Wt. of Feb. Weight	92.8	94.0	93.9	91.4	95.1	93.3	93.7	93.1
Lbs. Feed/Hen/Day	.58	.59	.59	.58	.60	.59	.61	.61
Progeny Growth—Weight at 3 weeks of age—gm.								
Hatch No. 9 Control**	362	387	375	342	378	360	346	305
Hatch No. 11 Control**	336	342	339	331	347	339	314	288
Furazolidone 12.5 gm/ton	342	354	348	331	348	340	319	292

* Containing in percent: grd. yellow corn 74, soybean meal 11, meat scraps 5, alfalfa meal 2, dried buttermilk 2, steamed bonemeal 2, fish meal 3, salt mix 0.5, and vitamins to supply, per lb., 1800 I.U. Vit. A, 675 I.C.U. Vit. D, 2 mg. riboflavin, 276 mg. choline, 2 mg. pantothenic acid, 12 mg. niacin, 10 I.U. Vit. E and 4.5 mcg. cobalamine.

** Typical turkey starter with 30% protein, containing in percent, grd. yellow corn 40, 50% protein soybean meal 48, fish meal 2, fish solubles blend (Dynasol 80-S) 2, dried buttermilk 2, alfalfa meal 2, grd. limestone 2, salt mix 0.5, and to supply per lb., 3600 I.U. Vit. A, 1350 I.C.U. Vit. D, 4 mg. riboflavin, 4 mg. pantothenic acid, 506 mg. choline, 4.5 mcg. cobalamine, and 2 mg. penicillin.

† Data through February, March and April only.

TABLE II

FURAZOLIDONE AND ARSANILIC ACID FOR TURKEY BREEDER HENS—EXP. 2

	Control* Strain			Furazolidone 15 gm/ton Strain			Control*	Arsanilic Acid 45 gm/ton
	A	B	Ave.	A	B	Ave.	Native Strain	Native Strain
Egg Production, % Hen-Day (Feb.-June)	49.5	46.5	48.0	46.0	50.7	48.4	42.2	38.5
Hatch of Apparent Fertile Eggs, %	63.7	67.5	65.6	58.8	69.2	64.0	61.3	60.7
All Eggs, %	44.6	56.1	50.3	22.5	49.5	36.0	43.7	46.5
No. Poults/Hen	28.7	30.7	29.7	13.7	31.7	22.7	23.4	23.4
June Body Wt. as % of Feb. Wt.	90.0	92.0	91.5	89.2	91.3	90.3	85.8	86.7
Lbs. Feed/Hen/Day	.55	.52	.54	.50	.52	.51	.45	.49
Progeny Growth—Weight at 3 weeks of age—gm.								
Hatch No. 9**	368	360	364	382	360	371	313	319
Hatch No. 11	340	350	345	359	345	352	301	323
Average			355			362	307	321

* As Table I.
** Same as control diet used in Experiment 1, except that 0.20% Vigofac and 5 lbs. of Pro-Strep/ton of feed were used.

When the stock was approximately 34 weeks old, the toms were given 14 hours of light each day by supplementing artificial light with incandescent light. Two weeks later the hens were put on this lighting regime. At that time the hens were leg-banded, saddled, blood-tested for pullorum disease, and placed on their respective breeder diets as shown in Tables I and II. Two toms were placed with each pen of hens and were rotated between treatments, but within strains, each week. No artificial insemination was practiced. It was thus possible to determine the relative natural fertility of the different strains.

The hens used for the furazolidone studies were housed in the rammed earth house with cobblestone yards, previously described (5). The hens used for the arsanilic acid studies were housed in a relatively new frame building with no access to the outside and with cement floors. Straw was used for litter in both houses and was removed and replaced when necessary.

Feed consumption data, 28-day body weight changes, and egg production data were among the records obtained. All settable eggs produced were incubated; the settings were made every 14 days. Although it was recognized that setting every 7 days may have resulted in superior overall hatchability, it was felt that possibly a holding period for the eggs would place an additional stress on the developing embryos. Therefore it might be possible to show greater differences between the effects of the supplemented and the control diets. Data were also obtained on fertility (apparent fertility as detected by candling at 25 days), hatchability of apparently fertile eggs, and growth of some of the progeny. Because of the question on true fertility, the data are reported as hatch of all eggs set.

The arsanilic acid phase of Experiment 1 was terminated after thirteen weeks of production due to a severe outbreak of infectious sinusitus, whereas the furazolidone phase continued through twenty-one weeks of production. Experiment 2 was terminated after nineteen weeks of egg production.

RESULTS AND DISCUSSIONS

Whereas strain A appeared to show a good egg production response to furazolidone at the 25 gram/ton level, strain B showed almost the opposite effect. In experiment 2 where furazolidone was used at the 15 gram/ton level, the data show the reverse effects with the same strains. It is not likely that the 15 gram/ton level had any real effect upon egg production, whereas the effect of the higher level in this instance was quite likely beneficial to the A strain of hens. The combination of slightly superior egg production, fertility, and hatchability of apparently fertile eggs in Experiment 1, shown by the average of the groups receiving furazolidone, all contribute

to the average of 5.1 more poults produced per hen. The very poor fertility in Experiment 2, shown by the A strain hens receiving furazolidone, accounts for the poor showing in this regard.

There was no consistent effect of the furazolidone supplements upon feed efficiency, maintenance of body weight, or progeny growth rate. In Experiment 2, the strain A progeny from dams receiving furazolidone grew at a faster rate, however this was not evident with the strain B progeny.

Although furazolidone did not greatly influence the reproductive performance of turkey hens in these studies, there should be further consideration made of the possible value of this drug as a feed additive for this purpose. The work herewith reported is not extensive in covering wide ranges of the drug levels, but as used would indicate that 25 grams per ton was superior to 15 grams per ton. Further work is necessary to establish these observations and to determine what the recommendations for the drug should be.

ARSANILIC ACID

The hens receiving arsanilic acid in Experiment 1 laid fewer eggs, which in turn showed poorer hatchability than their respective controls. Progeny growth was poorer also, which indicates that arsanilic acid at the level of 90 grams per ton of feed should not be used for turkey breeder hens. Body weight or feed consumption was not affected by arsanilic acid. However, it was observed that these hens consumed much more water. Their litter needed removing and replacing much more frequently than that of the hens which received no arsanilic acid.

In Experiment 2, the level of arsanilic acid was reduced to 45 grams per ton. Although this level may have interfered slightly with egg production, it had no effect upon hatchability of eggs or the average number of poults produced per hen. It is possible that arsanilic acid at this level increased feed consumption; the hens again drank more water and their litter was soiled more rapidly. The progeny from the arsanilic acid-fed hens grew more rapidly, as contrasted with the findings of the previous experiment.

Since arsanilic acid appeared to show toxicity at the 90 gram/ton level, it appears that arsanilic acid should not be recommended for use in turkey breeder diets, at least at this level. Why arsanilic acid was detrimental cannot be ascertained from this work. However, the responses noted here are similar to the detrimental effects reported by Slinger *et al.* (6) with penicillin for turkey breeder hens. A possible explanation is that arsanilic acid inhibited the growth of certain beneficial microflora.

That all of the nutritive requirements for turkey breeder hens

are not known is evident from the general results of this work. Much remains to be done in improving the hatchability of fertile eggs from the 50 to 70% figures reported here to 90 and 95% as is common for certain lines of chickens. Holding eggs an additional 7 days was not so detrimental to hatchability as to reduce it more than 5% on the average, as determined by separation of eggs according to age from several hatches.

SUMMARY

Furazolidone at 15 and 25 grams per ton and arsanilic acid at 45 and 90 grams per ton were used as supplements to a turkey breeder diet.

In one experiment furazolidone at the 25 gm. level increased the rate of egg production of one commercial strain of Broad Breasted Bronze turkeys, but not that of another strain. An average of 5.1 more poults per hen for both strains was produced by the hens receiving furazolidone in this experiment. In the second experiment, furazolidone at the 15 gram level showed no consistent effects upon the reproductive performance observed.

Arsanilic acid at 90 grams per ton showed detrimental effects upon egg production, hatchability of fertile eggs, and progeny growth. At 45 grams per ton there were no great effects observed upon the reproductive performance.

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