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EFFECTS of FEEDING BORON to HENS to PREVENT FLIES

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Flies are a problem to poultrymen with caged layers. If not controlled, they cause wet droppings, strong odors, and in some instances can be a health menace in cage houses.

Many insecticides and larvacides are used to combat flies. Materials such as DDT, malathion, diazinon, lindane, and pyrethrum are used to kill adults and larvae of common house flies. The use of these materials is laborious, time consuming, and costly. In many cases it may fail to properly control flies. For several years cage operators have dusted manure with Polybor-3 (disodium octoborate tetrahydrate) to prevent fly development in the droppings.

TESTS

In tests by the Agricultural Experiment Station of the Alabama Polytechnic Institute during the summer of 1957, boron in the form of Polybor-3 was fed to caged layers in an attempt to control fly breeding in manure. This boron product is stable, easily mixed with feed, and inexpensive.

Single Comb White Leghorn pullets of laying age were used in the tests. They were kept in individual cages in an open shed-type house. Rations fed contained 4 ounces, 2 ounces, and 1 ounce of Polybor-3 per 100 pounds of ration. There were 7 birds in each lot during the 135-day test. Fifty-pound lard cans (15-inch diameter) were used to trap emerging flies. These traps were placed over manure 5 times. Each time the traps were left for 2 weeks. Flies emerging were killed and counted and traps were placed over new areas.

In 1958 tests hens were fed Polybor-3 at the rate of 4 ounces, 3 ounces, 2 ounces, 1 ounce, ½ ounce, and ¼ ounce per 100 pounds of ration. The hens were kept in colony cages, 15 hens per cage, in a typical laying house with concrete floor. Length of the test was 183 days.

A second test in 1958 was conducted with two 200-hen flocks kept on the floor. One flock was fed 4 ounces of Polybor-3 per 100 pounds of ration and the other was kept as a check. These birds were mated at two different periods. The eggs were saved and incubated to observe the effects of boron on fertility and hatchability. The hens were fed boron in the ration for 14 weeks before saving eggs in the first period and 22 weeks in the second period.

FLY CONTROL

Fly development in manure from hens fed different levels of boron was reduced in all tests.

In the 1957 test of 135 days the average adult flies per trap were:

Rate Polybor-3 per 100 lb. ration	Av. adult flies per trap, no.
4 oz.	5
2 oz.	7
1 oz.	8
No treatment	188

In the 1958 test of 183 days the average number of fly larvae and pupae was as follows:

Rate Polybor-3 per 100 lb. ration	Av. larvae and pupae per lb. manure, no.
4 oz.	0
3 oz.	0
2 oz.	0
1 oz.	0
½ oz.	67
¼ oz.	88
Check	86

Many fly larvae were observed in the manure of hens fed one ounce of Polybor-3, but they died before maturing. Manure under cages of hens fed 1 ounce or more of boron was much drier and had less odor than the check. Water appears to evaporate much faster from manure when hens are fed boron than from hens not receiving boron. There were no watery droppings from hens fed boron as are often seen in some cage houses during extremely hot weather. Fresh droppings from hens fed boron and hens receiving no boron were analyzed and found to contain about 70 per cent moisture. The apparent dry condition of the manure from hens fed boron may be the result of no fly larvae in the manure.

EGG PRODUCTION

Polybor-3 fed at a level of 4 ounces per 100 pounds of ration reduced feed intake and markedly reduced egg production. However, one ounce of boron or less in the feed had no such effect. Birds receiving a ration of 3 ounces of Polybor-3 per 100 pounds or less showed no visible outward effects.

The egg production for these tests is given in Table 1. Results indicate that 1 ounce or less per 100 pounds of ration did not affect rate of egg production.

TABLE 1. EFFECT OF POLYBOR-3 IN RATION ON EGG PRODUCTION

	Polybor-3 per 100 pounds ration						
	4 oz.	3 oz.	2 oz.	1 oz.	½ oz.	¼ oz.	0
	pct.	*pct.*	*pct.*	*pct.*	*pct.*	*pct.*	*pct.*
1957							
Egg production (135 days)	52	—	57	61	—	—	—
1958 A							
Egg production (183 days)	42	50	55	61	71	65	58
1958 B							
Egg production (180 days)	45	—	—	—	—	—	51

FERTILITY AND HATCHABILITY

A flock of 200 Leghorn hens on floor with 10 males were fed an all mash ration containing 4 ounces of Polybor-3 for a period of 14 weeks before saving eggs to test fertility and hatchability. A same number was used as a check. All eggs were saved for 2 days for this test. A total of 208 eggs from boron-fed hens was incubated and the fertility and hatchability were 89.4 and 81.2 per cent, respectively. There were 229 eggs incubated from control pens with 82.9 per cent fertility and 72.5 per cent hatchability. Chicks from these eggs were brooded in batteries and fed normal broiler ration for one month. There were no losses in chicks from boron-fed hens.

In the second test conducted on the same birds 8 weeks later, 180 eggs were incubated from each pen. The fertility of eggs from boron-fed hens was 80 per cent and hatchability was 53.8 per cent, whereas, eggs from the control pen had 77.2 per cent fertility and 70 per cent hatchability. These chicks were brooded in battery brooders and fed a normal ration. Mortality for these chicks was approximately the same for both groups. These data indicate the 4 ounces of Polybor-3 per 100 pounds breeder ration had no serious effect on fertility or livability of chicks. However, this level of boron reduced egg production and produced physical signs of toxicity in some hens.

BORON IN EGG AND TISSUES

Polybor-3 fed to layers at the rate of 4 ounces per 100 pounds of ration increased the boron content of the eggs and body tissues. The boron content found in body tissues is given in Table 2.

TABLE 2. BORON CONTENT OF EGGS AND FOWL TISSUES, 1957*

Item	Control group	4 oz. per 100 lb. feed Polybor-3 for 135 days
	p.p.m.	*p.p.m.*
Yolk	5.4	36.0
Albumen	17.5	39.5
Breast meat	7.5	30.0
Liver	1.7	62.4
Fat	1.8	45.1
Kidney	3.1	45.1
Feathers	—	97.5

* Boron content determined by Agronomy and Soils Department.

The boron content of eggs and body tissues of birds fed this high level of boron was not as high as is normally found in some other foods. For example; dried apricots had 38 p.p.m., carrots, 41.6 p.p.m., and turnips, 30.6 p.p.m. This compares with 36 p.p.m. for egg yolk and 39.5 p.p.m. for albumen from hens fed Polybor-3 for 135 days as given in Table 2.

In 1958 hens fed a ration containing different levels of boron for 183 days produced eggs with the amounts of boron given in Table 3.

TABLE 3. BORON CONTENT OF EGG PARTS

Polybor-3 100 lb. feed	Boron in albumen		Boron in yolk	
	90 days	183 days	90 days	183 days
	p.p.m.	*p.p.m.*	*p.p.m.*	*p.p.m.*
4 oz.	15.4	10.0	3.9	3.7
3 oz.	8.1	8.1	3.7	2.5
2 oz.	7.3	6.9	2.8	2.5
1 oz.	4.9	5.6	2.5	3.1
½ oz.	4.5	3.7	2.4	2.5
¼ oz.	2.9	3.1	2.0	1.3
0	2.5	1.9	1.8	1.3

SUMMARY

Polybor-3 fed in small quantities to laying hens will greatly reduce fly development in manure under cages.

Boron added to feed and consumed by hens increases the boron found in eggs and body tissues.

The addition of 1 to 2 ounces of Polybor-3 per 100 pounds ration will control flies in cage houses and will not greatly increase boron content of eggs produced.

The addition of 4 ounces of Polybor-3 per 100 pounds ration will reduce egg production and show signs of toxicity. No harmful effects to fertility and hatchability of eggs from hens fed this ration for 14 weeks were noted. Hatchability was reduced when this level was fed for 22 weeks.

The Pure Food and Drug Administration must give permission before Polybor-3 can be mixed in the poultry ration.