Swine Internal Parasites: Effect of Anthelmintic and Management System

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Story in Brief

A total of 96 growing-finishing swine were used to study the effect of an anthelmintic treatment regime and management system on pig performance, liver lesions and intestinal worm burdens. Anthelmintics had no significant effect on rate of gain in pigs fed in confinement or in pasture lots. Feed efficiency was significantly ($P<.01$) improved by anthelminics only during the grower phase of pigs fed in pasture lots. Anthelmintics were effective in reducing the number of internal parasites in both confinement and pasture management systems. The type of parasites involved as well as the type of management system used may determine the most economical internal parasite control system for each swine producer.

Introduction

Infections of swine by internal parasites cause sizeable monetary losses in the swine industry because of growth retardation, uneconomical gains and occasional deaths. These losses have been estimated to average as much as $3.00 per pig.

A number of drugs with anthelmintic properties are available. However, conflicting results appear in the literature regarding the effectiveness of these compounds in improving rate of gain and efficiency of feed utilization. These inconsistent responses may result from environmental differences and/or disease variables. Swine reared in total confinement may require a different parasite control program than those reared in pasture lots.

The purpose of this study was to determine the effect of two anthelmintic treatment programs on rate of gain, efficiency of feed conversion, liver damage and number of internal parasites in Specific Pathogen Free (SPF) pigs fed in total confinement or in pasture lots.

Materials and Methods

A total of 90 SPF Yorkshire pigs and 6 SPF crossbred pigs (York x Hamp) from the Oklahoma State University research and teaching herd were used in this experiment. Sows that served as the source for the experimental pigs were treated

with dichlorvos (Atgard) at approximately 110 days of gestation. The pigs were reared in total confinement facilities cleaned with water pressure and disinfectant. No additional anthelmintic was administered before allotment to treatment. The pigs, averaging 50 lb initially, were randomly allotted to one of six pens on pasture or total confinement in pens with solid concrete floors. One crossbred pig was assigned to each management treatment subclass. Each pen contained a self feeder and automatic waterer. All pens had been used in a continuous swine feeding program for years. Care was taken to clean and disinfect the concrete growing-finishing pens prior to the initiation of the trial. Composition of the basal diet used throughout the trial is shown in Table 1. Treatments were as follows:

Treatment 1: Basal diet with no anthelmintic.

Treatment 2: Basal diet plus dichlorvos (Atgard) at 348 grams/ton fed as the sole ration for 2 consecutive days at the initiation of the trial and at monthly intervals thereafter.

Treatment 3: Basal ration plus 12 grams/ton of Hygromycin fed continuously.

Pigs were removed from the trial at an average weight of 232 lb. At the end of the trial, pigs were examined for liver lesions, and an intestinal parasite count was made. In addition, a fecal egg count was made on a fecal sample obtained from the digestive tract.

Table 1 Composition of basal diet

Ingredient	%
Yellow corn	75.50
Soybean meal (44%)	21.15
Dicalcium phosphate	1.50
Calcium carbonate	0.75
Salt	0.50
Vitamin trace-mineral mix[a]	0.50
CTC-50[b]	0.10
Total	100.00

[a]Supplied 4,000,000 IU vitamin A, 300,000 IU vitamin D, 4 g riboflavin, 20 g pantothenic acid, 30 g niacin, 800 g choline chloride, 15 mg vitamin B_{12}, 10,000 IU vitamin E, 2 g menadione, 200 mg iodine, 90 g iron, 20 g manganese, 10 g copper, 90 g zinc and 100 mg selenium per ton of feed.
[b]Contains 50 g chlortetracycline per lb of premix.

Results and Discussion

Performance data are presented in Table 2. Anthelmintics had no significant effect on rate of gain in pigs fed in solid concrete pens or in pasture lots. Average daily gain over the entire trial was 1.72, 1.74 and 1.73 pounds for the untreated control, Atgard and Hygromycin treatments, respectively. It should be noted that during the growth phase average daily gain was similar for both management systems.

Anthelmintics had no significant effect on the efficiency of feed utilization during both the grower and finishing phases in pigs fed in solid concrete pens. However, in pigs fed in pasture lots, the efficiency of feed utilization was improved ($P<.01$) by both the periodic and continuous anthelmintic treatment when compared with the untreated control during the grower phase, but not during the finishing phase. When compared to the untreated control diet, this represented a 14.5 percent improvement in feed efficiency in pigs treated with Atgard

Table 2. Effect of anthelmintics and management system on average daily gain and feed efficiency

Management	Treatment		
	Control	Atgard	Hygromycin
Concrete			
Avg. daily gain, lb			
Grower phase (50-120 lb)	1.66	1.55	1.67
Finishing phase (120 lb-market)	1.86	1.97	1.83
Total (50 lb-market)	1.78	1.80	1.76
Feed per lb gain, lb			
Grower phase (50-120 lb)	2.67	2.80	3.23
Finishing phase (120 lb-market)	3.65	3.35	3.77
Total (50 lb-market)	3.28	3.16	3.56
Pasture			
Avg. daily gain, lb			
Grower phase (50-120 lb)	1.45	1.50	1.52
Finishing phase (120 lb-market)	1.84	1.84	1.85
Total (50 lb-market)	1.67	1.69	1.70
Feed per lb gain, lb			
Grower phase (50-120 lb)	3.37[a]	2.88[b]	2.84[b]
Finishing phase (120 lb-market)	3.75	4.01	3.86
Total (50 lb-market)	3.61	3.56	3.44

[ab]Means with different superscripts within management system are significantly different (P<.01).

and a 15.7 percent improvement in feed efficiency in pigs treated with Hygromycin during the growing phase. The improvement in feed efficiency in treated pigs on pasture, but not confinement, is similar to trends observed in previous studies (Maxwell et al., 1980).

The effects of anthelmintics and management system on necropsy evaluation are presented in Table 3. The number of liver lesions was not significantly affected by treatment in pigs fed on pasture or concrete. Ascarids and whipworms were the only parasites found in the intestine upon necropsy. The total number of both parasites was extremely small in pigs on all treatments and both management systems but tended to be lower in pigs on either anthelmintic treatment. This reduction was significant in the number of ascarids (P<.05) in pigs fed Atgard in confinement and the number of whipworms (P<.1) in pigs fed Atgard on pasture. Pigs fed Atgard at 348 grams/ton of ration for 2 consecutive days and at monthly intervals thereafter on pasture or concrete had no ascarids or whipworms. The fecal egg counts followed the same trends as the intestinal parasite counts with the number of fecal ascarid eggs being higher for pigs on the untreated control diet. Both Atgard and Hygromycin reduced the fecal ascarid egg count (P<.01)in pigs fed in confinement and the whipworm fecal egg count (P<.1) in pigs fed in pasture lots.

These data indicate that anthelmintics are available which can effectively control ascarids and whipworms in swine fed on pasture or in total confinement. The type of parasite involved as well as the type of management system used should be considered in determining the most economical control system for each swine producer.

Table 3. The effect of anthelmintics and management system on average number of liver lesions, intestinal parasites and fecal egg counts

Management	Treatments		
	Control	Atgard	Hygromycin
Concrete			
Liver lesions	7.70	6.94	14.00
Ascarids			
Intestinal parasites	2.25[c]	0.00[d]	.51[cd]
Fecal egg count	71.79[a]	0.00[b]	0.21[b]
Whipworms			
Intestinal parasites	0.00	0.00	0.00
Fecal egg count	0.07	0.00	0.00
Pasture			
Liver lesions	17.63	20.96	10.44
Ascarids			
Intestinal parasites	1.68	0.00	1.00
Fecal egg count	34.32	0.43	3.38
Whipworms			
Intestinal parasites	6.36[e]	0.00[f]	1.81[ef]
Fecal egg count	0.14[e]	0.00[f]	0.00[f]

[ab]Means in the same row with different superscripts are significantly different (P<.01).
[cd]Means in the same row with different superscripts are significantly different (P<.05).
[ef]Means in the same row with different superscripts are significantly different (P<.10).

Literature Cited

Maxwell, C.V. et al. 1980. Oklahoma State Agr. Exp. Sta. Rep. MP-107; 162.