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Livestock Research

Internal Parasites in Organic Hog Production - Ivermectin Trial

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Funding By:
Walton Family Foundation
Organic Valley

Web Link:
http://bit.ly/pfi_livestock

In a Nutshell

- Organic livestock production is characterized by the avoidance of many antibiotics and antimicrobials.
- This trial seeks to determine the detrimental effects, if any, of low-level internal parasites on finishing hogs in organic systems.
- The Frantzens raise organic hogs, but were willing and able to market some that were separately managed and marketed as non-organic.
- To test for the detrimental effects of low-level parasite loads, one group of hogs was given a dose of Ivermectin, a common dewormer.
- Hogs not treated with Ivermectin achieved gains similar to those treated for internal parasites.
- This study suggests little or no parasite effect on the animals' growth and weight gain.

Project Timeline:
March–June 2013
June–November 2013

James Frantzen describes the Frantzen Farm's organic hog system to the group at the organic and niche pork research field day in March 2013.

Tom and Irene Frantzen and their son James raise hogs for Organic Valley on their farm in New Hampton, Iowa. They also grow organic row crops and raise beef cattle, employing holistic principles to manage their land responsibly and sustainably.

Background

Organic agriculture is characterized by the avoidance of many antibiotics and antimicrobials. Proper and holistic management helps maintain good immune system status in animals, and naturally precludes illness from parasites, bacteria, or viruses. Appropriate stocking density, nutrition, and sanitation, coupled with a good monitoring program and treatment and removal of sick animals, keeps organic herds healthy.

Yet, organic hogs tend to have lower efficiencies of gain compared to conventional hogs (Stender and Swantek, personal communication, 2013). The reasons why are unclear. Internal parasites may not cause any outward symptoms of illness in hogs, but reduce feed efficiency (and thus weight gain and profit) through nutrient leaching (Roepstorff et al. 2011). Indeed, organic and free-range farms in the Netherlands generally had greater parasite loads than did conventional farms (Eijck and Borgsteede 2005). Parasite eggs are shed in feces and may remain in the environment despite sanitation efforts. This trial seeks to determine the detrimental effects, if any, of low-level internal parasites on finishing hogs in organic systems.

Materials and Methods

The Frantzens raise organic hogs, but were willing and able to market some that were separately managed and marketed as non-organic. Two pens of finishing hogs – balanced for initial weight and gender – were housed in adjacent pens with access to an outdoor concrete pad. To test for the detrimental effects of low-level parasite loads, one group of hogs was given a dose of Ivermectin, a common dewormer, at the initiation of the trial; the other was not. Treated (with Ivermectin) and untreated (without

Ivermectin) hogs were fed the same ration, managed identically, and were butchered when they reached slaughter weight. Feed consumption and weight gain were tracked to determine feed efficiency. Rounds were conducted from March-June 2013 and June-November 2013.

Results - Round 1

Twenty-two hogs, eleven each treated and untreated, were used in round 1 (March-June 2013). Two hogs died in the untreated group early in the trial, and one died in the treated group later in the trial. Both groups of hogs were fed an organic ration of corn, protein supplement, some small grains, and a vitamin-mineral premix. **Table 1** summarizes the amount and costs of feed.

Treated hogs consumed slightly more feed and thus had a greater feed cost; they also gained slightly more weight and were heavier at the end than untreated hogs. However, untreated hogs had a slightly (but not significantly) lower feed-to-gain ratio – they required less feed to gain one pound of weight – and thus had a lower cost of gain.

In round 1, two hogs died in the untreated and one died in the treated groups before harvest. Without accounting for them somehow, the data reflects feed consumed by all hogs (whether they lived or not) but does not reflect all the weight gained from that feed. By adding the weight of the dead hogs to the "final hog weight," a better picture is presented of the actual amount of gain realized through the feed dispensed. These "adjusted" values give a more accurate picture of a successful hog's performance, **Table 3**; however, when comparing diets or management systems in the hog industry, mortalities are still included in calculations. It should be noted that analysis could not be done to determine statistical differences, and since these numbers were so close, it is hard to say if the difference is due to anything more than chance.

Untreated and treated hogs were not able to be processed at the same slaughter plant or locker, so it is difficult to compare post-harvest data. The untreated hogs were sent to a plant that is able to take some carcass quality measurements; the hogs on average had a dressed weight of 187.5 lb, a hot carcass yield of 74.6%. Treated hogs averaged a dressed weight of 160.3 lb and a yield of 66%; however, different handling techniques at the non-organic locker likely accounts for much of the difference, not treatment.

Results - Round 2

The round was repeated (June-November 2013), and to try and correct for environmental factors, the treated and untreated pens were swapped. Ten hogs were placed in each treatment. No hogs died in either treatment.

Both groups of hogs were fed an organic diet of about 81.1% corn, 16.3% protein supplement, and 2.6% vitamin-mineral premix. Feed consumption was tracked throughout the trial, and was very similar between pens (**Table 4**).

Hog weight gains, feed-to-gain ratio, and cost of gain is reported in **Table 5**.

Hog weights between the two treatments were extremely similar at both the beginning and end of the trial. Since feed consumption was also similar, the feed-to-gain and cost of gain of the groups were the same.

The hogs were taken to different lockers, depending on treatment, and so it is not easy to compare post-harvest data. On average though, the untreated hogs dressed to 198 lb, whereas the treated hogs averaged 181 lb. This translates to 76 and 69% yields, respectively. Again, differences between the two processors may account for the discrepancies in carcass breakdown.

Total feed consumption of the hogs, weight gain, feed-to-gain ratio, and costs of gain are shown in **Table 2**. Feed-to-gain calculates the amount of feed required for the animals to gain a pound of bodyweight. A lower value is better, indicating that the animal can gain more weight on less feed. More fibrous feeds tend to have higher feed-to-gain, because the fiber slows digestion and is not very digestible on its own. Meanwhile, easily-digestible energy sources such as corn grain will reduce feed-to-gain.

Table 1

Amount and cost of feed - Round 1					
		Treated		Untreated	
Feed	Value ($/lb)	Amount used (lb)	Total value ($)	Amount used (lb)	Total value ($)
Corn	0.21	4184	895.40	4346	930.05
Protein	0.45	908	408.44	939	422.57
Starter Premix	0.65	19	12.03	19	12.03
Premix	0.38	117	44.36	121	46.15
Small Grain	0.13	150	19.20	150	19.20
Total	**0.26**	**5377**	**1379.43**	**5575**	**1429.99**

Table 2

Feed consumption, gain, and feed-to-gain ratio - Round 1			
	Untreated	Treated	Mean of both treatments
Sold hog weight (lb)	2236	2300	4536
Beginning hog weight (lb)	860	900	1760
Net hog weight gain (lb)	1376	1400	2776
Total feed consumed (lb)	5332	5660	10992
Feed-to-gain	3.88	4.04	3.96
Cost of gain ($/lb)	1.01	1.05	1.03

Table 3

Adjusted feed consumption, gain, and feed-to-gain ratio - Round 1			
	Untreated	Treated	Overall
Sold hog weight (lb)	2236	2300	4536
Dead hog weight (lb)	235	200	435
Total hog weight	2471	2500	4971
Beginning hog weight (lb)	860	900	1760
Net hog weight gain (lb)	1611	1600	3211
Total feed consumed (lb)	5332	5660	10992
Feed/Gain	3.31	3.54	3.42
Cost of gain ($/lb)	0.86	0.92	0.89

Table 4

Amount and cost of feed - Round 2					
		Treated		Untreated	
Feed	Value ($/lb)	Amount used (lb)	Total value ($)	Amount used (lb)	Total value ($)
Corn	0.08	5520	443.57	5547	445.74
Protein	0.55	1088	598.40	1091	600.05
Premix	0.35	167	58.45	167	58.45
Total	**0.16**	**6775**	**1100.42**	**6805**	**1104.24**

Table 5

	Feed consumption, gain, and feed-to-gain ratio - Round 2		
	Untreated	Treated	Mean of both treatments
Total sold hog weight (lb)	2605	2611	5216
Total beginning hog weight (lb)	580	560	1140
Net hog weight gain (lb)	2025	2051	4076
Total feed consumed (lb)	6775	6850	13625
Feed-to-gain	3.35	3.34	3.34
Cost of gain ($/lb)	0.54	0.54	0.54

Comparison of Rounds 1 and 2

Table 6 contrasts the first and second rounds.

The rounds differed in several ways. The hogs in round 2 started at a much lower weight than they did in round 1, so it took longer for them to reach market weight. This explains the greater feed consumption and greater net gain for round 2 compared to round 1. Comparing feed-to-gain ratios must be done with consideration. Younger, smaller animals are more efficient at gaining weight; because round 2 hogs started at a lower weight, a more efficient period of their growth was captured in the trial than for the round 1 hogs. In addition, the ration during round 1 contained small grains, which typically are higher in fiber and thus lower in digestibility than corn. This may have reduced the efficiency of gain. Overall, round 2 hogs had a 15% lower feed-to-gain ratio than round 1 hogs, though only a 2.4% advantage over round 1 adjusted values. The price of feed was much lower in round 2 on a per-pound basis, which reduced the cost of gain and total feed cost, even though the round 2 hogs consumed more feed. Total feed expense was $2809.42 for round 1, and $2207.28 for round 2.

As discussed earlier, carcass values cannot easily be compared between the untreated and treated hogs, but can be compared somewhat between the first and second rounds. Untreated hog carcass value per pound was the same in both trials ($1.50), but since round 2 hogs finished at larger weights, they were worth more per hog. Round 2 untreated hogs were also slightly leaner, meaning that the carcass yielded a greater amount of salable meat (74.6% in round 1, 76.1% in round 2). Treated hogs also weighed less at harvest in round 1 and had lower yields (66% in round 1, 69.2% in round 2).

Conclusions and Next Steps

In both rounds of the study, hogs not treated with Ivermectin achieved gains similar to those treated for internal parasites, suggesting little or no parasite effect on the animals' growth and weight gain. While internal parasites are only part of the whole picture, this supports the theory that with proper management and nutrition, organic hogs can achieve gains similar to hogs managed more conventionally. Tom is repeating the trial a third time to gain more statistical power, and also to document the growth and gain of young hogs during the winter.

PFI staffer Margaret Dunn helps sort piglets on the Frantzen Farm.

Table 6

Comparison of individual hog growth, performance, and economics									
	Round 1			Round 1, Adjusted			Round 2		
	Untreated	Treated	Overall	Untreated	Treated	Overall	Untreated	Treated	Overall
Length (days)			107			107			152
Initial hog weight (lb/pig)	78	82	80	78	82	80	58	56	57
Final hog weight (lb/pig)	203	209	206	225	227	226	261	261	261
Net gain (lb/pig)	125	127	126	146	145	146	203	205	204
Total feed consumed (lb/pig)	485	515	500	485	515	500	678	685	681
Feed-to-gain ratio	3.88	4.04	3.96	3.31	3.54	3.42	3.35	3.34	3.35
Cost of feed ($/lb)			0.26			0.26			0.16
Cost of gain ($/lb)	1.01	1.05	1.03	0.86	0.92	0.89	0.542	0.541	0.5415

References

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PFI Cooperators Program

PFI's Cooperators' Program gives farmers practical answers to questions they have about on-farm challenges through research, record-keeping, and demonstration projects. The Cooperators' Program began in 1987 with farmers looking to save money through more judicious use of inputs.