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Livestock Research

Internal Parasites in Organic Hog Production - 2014

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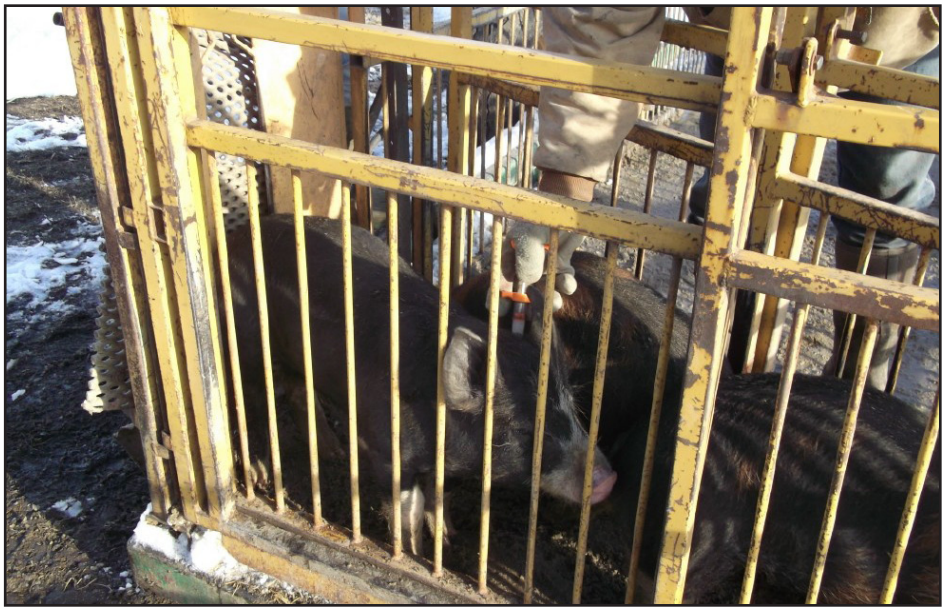
Organic Valley

In a Nutshell

- Organic hogs typically grow slower and are less efficient than conventional hogs. Even a low level of parasite infection can reduce feed efficiency and gain in growing hogs, especially finishing organic hogs which cannot be treated with dewormers.
- Hogs treated with Ivermectin™ were raised side-by-side with untreated hogs, and were fed the same diet.
- Treated and untreated hogs did not differ in feed consumption, gain, or efficiency.
- Key findings
  - Feed consumption, total weight gain, feed-to-gain ratio, and days to finish were similar between treated and untreated hogs.
  - Finishing organic hogs may have residual parasite protection from their dams, which may be treated with Ivermectin.
  - Internal parasites are not a likely source of the reduced efficiency seen in organic as compared to conventional hogs.

Project Timeline:
November 2013 - April 2014



One group of hogs received a dose of Ivermectin (a common dewormer) at the beginning of the trial, while the other did not. Treated and untreated hogs were otherwise handled identifcally.

Background

Organic agriculture focuses on preventative, holistic management to ensure livestock health and productivity, rather than feed additives, antimicrobials, and other "chemicals." When properly managed, the system naturally reduces the incidence of illness and loss from parasites, bacteria, viruses, and other pathogens. Animals are maintained at appropriate stocking densities, are fed quality feedstuffs, and are monitored for signs of disease.

However, organic hogs tend to be less efficient than conventional hogs, requiring additional feed and time to reach finishing weight (Stender and Swantek, per. comm., 2013). Contributing factors include breeds and genetics not tailored for extremely high lean gain and fast growth, fibrous (less digestible) diets including small grains and pasture, and exposure to the environment (cold, wet, and/or disease). Internal parasites may reduce feed efficiency by preventing optimal nutrient utilization (Reese et al., 1985; Roepstorff et al., 2011), but will not necessarily cause outward symptoms of disease. A study in the Netherlands found that organic and free-range farms generally had greater parasite loads than did conventional farms (Eijck and Borgsteede, 2005). While organic sows may be given some vaccines and antimicrobials, such as Ivermectin, market hogs cannot.

This trial was designed to investigate the effects (if any) of Ivermectin treatment on finishing organic hogs' feed consumption, gain, and efficiency.

Materials and Methods

The Frantzens raise organic hogs marketed through Organic Valley, but for this trial, they agreed to manage and market hogs treated with Ivermectin separately. The trial was repeated three times (three 'rounds'), with two groups of hogs in each round. Hogs were of the same age and were balanced by gender and weight at the start of the trial, and were housed in adjacent pens with access to outdoor con-

crete pads. One group of hogs received a dose of Ivermectin (a common dewormer) at the beginning of the trial, while the other did not. While not directly measured, it was assumed that Ivermectin would reduce or eliminate internal parasites in the treated hogs. Treated (with Ivermectin) and untreated (without Ivermectin) hogs were fed the same rations and managed identically, and were butchered when they reached appropriate slaughter weight. Feed consumption and weight gain were reported. Rounds were from March-June 2013, June-November 2013, and November 2013-April 2014. Results from Rounds 1 and 2 were reported in Dunn (2013) and are also considered here.

Results and Discussion

Round 3

Twenty hogs averaging 30 lb each were split into two groups, balanced for initial bodyweight and gender. One group was injected with Ivermectin, and hogs from both treatments were fed from mid-November 2013 through mid-April 2014. No hogs died in either group. For the first month the hogs were on a starter diet of corn, protein supplement, whey, and a starter premix. The finishing diet was comprised of about 81% corn, 16.5% protein supplement, and 2.6% vitamin-mineral premix. All ingredients were certified organic.

Hogs were weighed at the beginning of the trial and just before being shipped off for slaughter. **Table 1** displays the total feed consumption and weight gain of all 10 hogs in each treatment.

The untreated hogs finished at slightly heavier weights than did the treated hogs, and gained more weight each day, but also consumed slightly more feed. Dividing the total feed consumed by the total weight gain yields the feed-to-gain ratio. A lower value is better, indicating a more efficient animal: one that requires less feed to gain a pound of weight. In this trial, the untreated hogs had a slightly lower feed-to-gain ratio, which is not expected (Stender and Swantek, per. comm., 2013). The "average" conventional operation has a feed-to-gain ratio of about 3.00, so these hogs were about on par (van Heugten, 2009).

Table 1

	Feed consumption, gain, and feed-to-gain ratio of hogs treated or untreated with Ivermectin		
	Untreated	**Treated**	**Mean of both treatments**
Sold hog weight (lb)	30	29	30
Beginning hog weight (lb)	255	233	244
Net hog weight gain (lb)	224	204	214
Average daily gain (lb/d)	1.56	1.42	1.49
Total feed consumed (lb)	669	627	648
Feed-to-gain	2.98	3.07	3.02

Treated and untreated hogs could not be processed at the same facilities, but were handled identically prior to being shipped to minimize differences. Still, information from the processors cannot be used to compare treatments. Untreated animals sent to the organic processor had an average dressing weight of 188 lb with a 74% yield (where yield = dressed weight ÷ live weight x 100). Treated animals sent to a conventional locker averaged 167 lb dressed weight, with 72% yield. Tom has observed differences of almost 10% in dressing percentages before; even though all animals are managed similarly and of similar liveweight at slaughter, there is some inefficiency or loss in small lockers compared to larger packing plants.

Comparison of All Rounds

The results from Rounds 1 and 2 have been reported previously (Dunn 2013). In summary:

- Final weight of treated and untreated hogs did not differ.
- Total feed consumption was slightly greater for treated compared to untreated hogs in Round 1, but did not differ in Round 2.
- Feed-to-gain ratio of treated hogs was greater than that of untreated hogs in Round 1, but did not differ in Round 2.

Table 2 shows the basic information for all three rounds, side-by-side.

Hogs in Round 3 had much lower (more efficient) feed-to-gain ratios compared to the previous trials, and had a greater average daily gain. Younger and lighter animals are more efficient than older and heavier animals (Reese et al., 1985); since Round 3 hogs started smaller, this could slightly lower overall feed-to-gain. At the same time, the Round 3 hogs were growing during the winter. Cold weather causes animals to eat more feed simply to keep warm, which reduces efficiency and daily gain, and should increase feed-to-gain (Lammers et al., 2007). Surprisingly, the Round 3 hogs consumed less feed than the Round 2 hogs, and not much more than the Round 1 hogs, despite the differences in age and environment.

Table 2

	Feed consumption, gain, and feed-to-gain ratios of three rounds of hogs treated or untreated with Ivermectin								
	Round 1			Round 2			Round 3		
	Untreated	**Treated**	**Mean**	**Untreated**	**Treated**	**Mean**	**Untreated**	**Treated**	**Mean**
Length (days)			107			152			144
Initial hog weight (lb/pig)	78	82	80	58	56	57	30	29	30
Final hog weight (lb/pig)	225	227	226	261	261	261	255	233	244
Net gain (lb/pig)	146	145	146	203	205	204	225	204	214
Average daily gain (lb/d)	1.37	1.36	1.36	1.33	1.35	1.34	1.56	1.42	1.49
Total feed consumed (lb/pig)	485	515	500	678	685	681	669	627	648
Feed-to-gain	3.31	3.54	3.42	3.35	3.34	3.35	2.98	3.07	3.02

Table 3 shows the same data, averaged over all three rounds of the trial. Averaged over all three rounds of the trial, untreated hogs had a feed-to-gain ratio of 3.21, lower than the 3.32 ratio of treated hogs. In conventional hog production, a feed-to-gain ratio of 3.00 is "average" (van Heugten 2009); organic operations may be closer to 4.0 (Stender and Swantek, per. comm.). To achieve feed-to-gain ratios that approach industry levels is impressive and suggests that non-conventional hog production can achieve the same sorts of efficiencies through management and nutrition. "Nice to get information that confounds what we think we know!" remarks Tom Frantzen.

Table 3

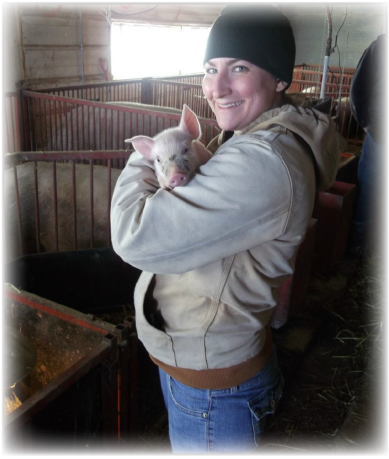
	Feed consumption, gain, and feed-to-gain ratio of hogs treated or untreated with Ivermectin		
	Untreated	**Treated**	**Mean of both treatments**
Length (days)			134
Initial hog weight (lb/pig)	55	56	56
Final hog weight (lb/pig)	247	241	244
Net gain (lb/pig)	191	185	188
Average daily gain (lb/d)	1.42	1.38	1.40
Total feed consumed (lb/pig)	610	609	610
Feed-to-gain	3.21	3.32	3.26

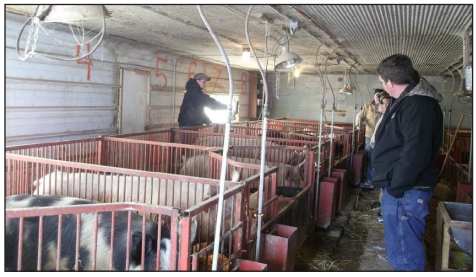
Conclusions and Next Steps

After three rounds, data from animal weight gain and feed-to-gain ratios suggests that animals treated with Ivermectin do not perform better – and sometimes perform worse – than those not treated. In addition, feed-to-gain ratios of the third round of hogs were comparable to conventional industry standards, suggesting that with proper nutrition, care, and management, organic producers can achieve production efficiencies similar to conventional producers. Data suggests that because no differences were observed between treated and untreated hogs, that internal parasites are not a contributing factor in reducing feed efficiencies of organic hogs compared to conventional hogs.

Tom was amazed during the trial, particularly the third round. "Now how in the hell did this happen? I have to laugh - we all 'know' that antibiotics and pharmaceuticals are a MUST HAVE for efficient MODERN pork yet here we have the best gains in an old building without any chemicals."

This particular project is at its end, but Tom and his family will continue to investigate other areas of swine nutrition that can close the gap between organic and conventional production efficiencies. Next up is comparing hogs on a corn-based diet to those finished on whole small grains, an idea Tom got while at an organic meeting last winter. Beyond that, he wants to investigate the effects on hog performance of apple cider vinegar supplementation in the diet.





Left: Margaret Chamas (then Dunn) helps process animals for the study. Above: 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.

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