

Effects of Echinacea on Daily Feed Intake of Nursery Pigs with and without PRRS

Charlwit Kulchaiyawat, minority agriculture intern,
Joe Hermann, research assistant, and
Mark Honeyman, associate professor,
Department of Animal Science

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Summary and Implications

A demonstration was conducted with nursery pigs by using diets supplemented with Mecadox, no supplementation, and Echinacea. The study lasted for 4 weeks. The nursery pigs were weighed and the feed intake was measured. The results suggested that Echinacea does not suppress feed intake or the weight gain in nursery pigs compared with the no supplement or Mecadox diets. Half of the pigs were inoculated with the PRRS virus in the second week of the study. No major differences in the daily feed intake or weight gain was recorded. Further research in this area is warranted. This study was not replicated and no statistical analysis was conducted. Echinacea may have promise as a substitute additive for pig diets as a subtherapeutic antibiotic, however, more research is needed.

Introduction

Consumers have a growing awareness about food safety. Most swine operators today use subtherapeutic antibiotics in pig feed to improve growth rate and feed efficiency and to help prevent disease outbreaks. Some consumers are concerned about the effects of antibiotics in pig feed on human health. Echinacea is a natural herb, which may substitute for antibiotics as a feed additive because of its potential immune-enhancing abilities. If effective, Echinacea could be fed to swine replacing subtherapeutic antibiotics (12).

Nursery pigs are recently weaned, young small swine. The trend today is to wean pigs earlier (less than 3 weeks of age) with the help of antibiotics and improved growing techniques. It is a stressful time for pigs because they are going through many transitions, which may reduce their appetite. Nursery pigs are leaving the sow and litter and joining a larger group of other pigs. The diet of nursery pigs is changing from a liquid milk diet to a dry grain-based diet. Many are allowed to eat ad libitum. Nursery pigs are growing rapidly, but have small digestive tracts, therefore maximum nutrient intake is important (6,11).

Echinacea is also known as purple coneflower. The three most popular varieties of Echinacea are purpurea, angustifolia, and pallida. It has dense foliage and oval, coarsely toothed leaves. The flower is purple with a center cone that has orange-tipped bristles on the flower heads. Purple coneflower can be found growing as a wildflower in the prairies of the Midwest and as far south as Texas because it is a native plant in North America (2).

The herb was first noted and used by Native Americans for coughs, colds, sore throats, infections, toothaches, and other ailments. It was popularly used in the United States and in Europe, especially in Germany. The Germans have studied and produced the best scientific documentation on the uses of Echinacea (1,3,5,8).

Echinacea's roots, flower heads, seeds, and juice can all be used to make different products. It reportedly has properties that can help support the immune system against respiratory infections. The plant is mostly used by humans to prevent and treat the common cold, influenza, and infections. Although, an individual compound responsible for the different benefits has not been identified, research is being conducted in this area (4,5,8).

Porcine Respiratory Reproductive Syndrome (PRRS) is the official name for a virus that was identified and studied in the past 10 years. The strain has been found in Europe and North America. The different strains have given it many names, including swine infertility and respiratory syndrome (SIRS), Blue-ear disease, and porcine epidemic abortion and respiratory syndrome (PEARS). The cause of the disease is a virus that can be airborne up to 3 km, but it is believed to be spread mostly by pig-to-pig contact (7,10,13).

PRRS has been characterized by reproductive disorders such as late-term abortions and premature farrowings. Stillborns, mummies, and weak live pigs are results of the disease, too. There is a high piglet mortality rate. The causes of death range from respiratory diseases to secondary disease enabled by the virus (7,10).

There is a vaccine available but it is not totally effective and may have the possibility of giving the pig the virus. Recommended prevention from PRRS is to purchase seronegative animals, have isolation of stock for at least 30 days, and use strict sanitation procedures when handling swine (7,10).

The objective of the study was to compare the performance of nursery pigs fed an Echinacea-supplemented diet, an antibiotic-supplemented diet, and a diet with no supplement. The second objective was to monitor daily feed intake of nursery pigs with and without PRRS on the different diets.

Methods

The study was conducted at the Iowa State University Veterinary Medicine Research Institute's Livestock Infectious Disease Isolation Facility in Ames. Data were collected on feed intake of the different diets for each period. Materials used included two disinfected rooms, eight pens (each a 5 x 7 ft totally slatted deck), eight feeders, four different diets, 40 nursery pigs, a scale, and eight waterers.

The nursery pigs were allotted five per pen with four pens in each of two rooms. The allotment was balanced for pig weight and litter. All of the pigs ate the same diet for the first week. At the beginning of the second week the supplemented diets were given ad libitum. In each room, each pen received a different diet. The feed was corn and soybean meal-based. The four diets were supplemented with 1) Mecadox (an antibiotic, 50 g/ton), 2) control (no additive), 3) 2% Echinacea, and 4) 4% Echinacea. The Echinacea was supplemented at 2 and 4% of the total diet. The Echinacea was a powder of the leaves, stems, and blossoms of the plant. It was supplied by Nature's Cathedral, 78th St., Blairstown, IA 52209 (9).

The bag of feed was weighed as the beginning. Then the bag of feed was weighed at the end to calculate how much the pigs had eaten during the period. The weight left in the bag was subtracted from the original weight of the bag. Pigs were weighed weekly.

One room was infected with the PRRS virus. The pigs were infected on the 7th day of the experiment. The nursery pigs were inoculated with the virus nasally.

Some general observations of the pigs' appearance were made during the experiment to note any abnormalities or changes in the pigs' health or condition. Observations were made outside the window of the room before entering the room.

Results and Discussion

Most of the pigs were sleeping before the room was entered. They were alert and up when people entered the room and disturbed them. There was one pig in the control room that was scouring and one pig in the PRRS-positive room that had an abscess on its nose. Most of the pigs looked healthy with no sign of any illness. The PRRS titer was confirmed in the 4th week.

Average daily feed intakes for weeks 1, 2, and 3–4 are shown in Table 1 and Figure 1. The feed intake for the PRRS-negative pigs increased as the pigs became

older. For week 2, when the treatment diets were started, the Echinacea-supplemented pigs had slightly lower feed intake than the control pigs (no additive), but higher than the Mecadox diet. For weeks 3 and 4 combined the Echinacea-supplemented pigs had a greater average daily feed intake than the control pigs (no additive) and the Mecadox pigs.

The average daily feed intake for the PRRS-positive pigs also increased with time. For week 2, the Echinacea pigs had a higher feed intake than the control and the Mecadox. For weeks 3 and 4 combined, the Echinacea pigs had a lower average daily feed intake than the Mecadox pigs and similar feed intake to the control pigs.

The nursery pig weights are shown in Table 2 and Figure 2. The pigs weighed 12–12.3 lb at the beginning of the trial. At the end of the first week the pigs weighed 14.4–16.2 lb. The pigs weighed 16.9–19.5 lb at the end of the 2nd week. At the end of the 4th week the pigs weighed from 29.9 to 32.8 lb. Surprisingly, the PRRS-positive pigs weighed slightly more than the PRRS-negative pigs at the end of the 2nd week and slightly more at the end of the 4th week, except for the pigs fed with the Mecadox diet.

Conclusions

This was a preliminary study with no replication or statistical analyses. However, it appears that Echinacea does not suppress daily feed intake of nursery pigs. Overall, feed intakes were similar in each diet. The data show that nursery pigs consumed the Echinacea-supplemented diets readily.

The data suggest that the nursery pigs with the PRRS virus tended to eat less of the Echinacea-supplemented diets during weeks 3 and 4 than the PRRS-negative pigs. The virus may have suppressed feed intake. The PRRS-negative pigs fed Echinacea may have eaten more feed than the PRRS negative pigs fed Mecadox, resulting in the reduction of intake the next weigh period. However, the opposite was shown for the PRRS-positive pigs.

The weights of the nursery pigs, fed with the various supplements, were similar at each weigh day with some possible differences. The data suggest that the pigs fed 2% Echinacea were the heaviest.

Ideas for further study are to expand the research and conduct it over a longer period of time. Replicating the trials for statistical analyses would be beneficial. The feeders could be weighed more often to achieve more sensitivity in the study.

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Figure 1.

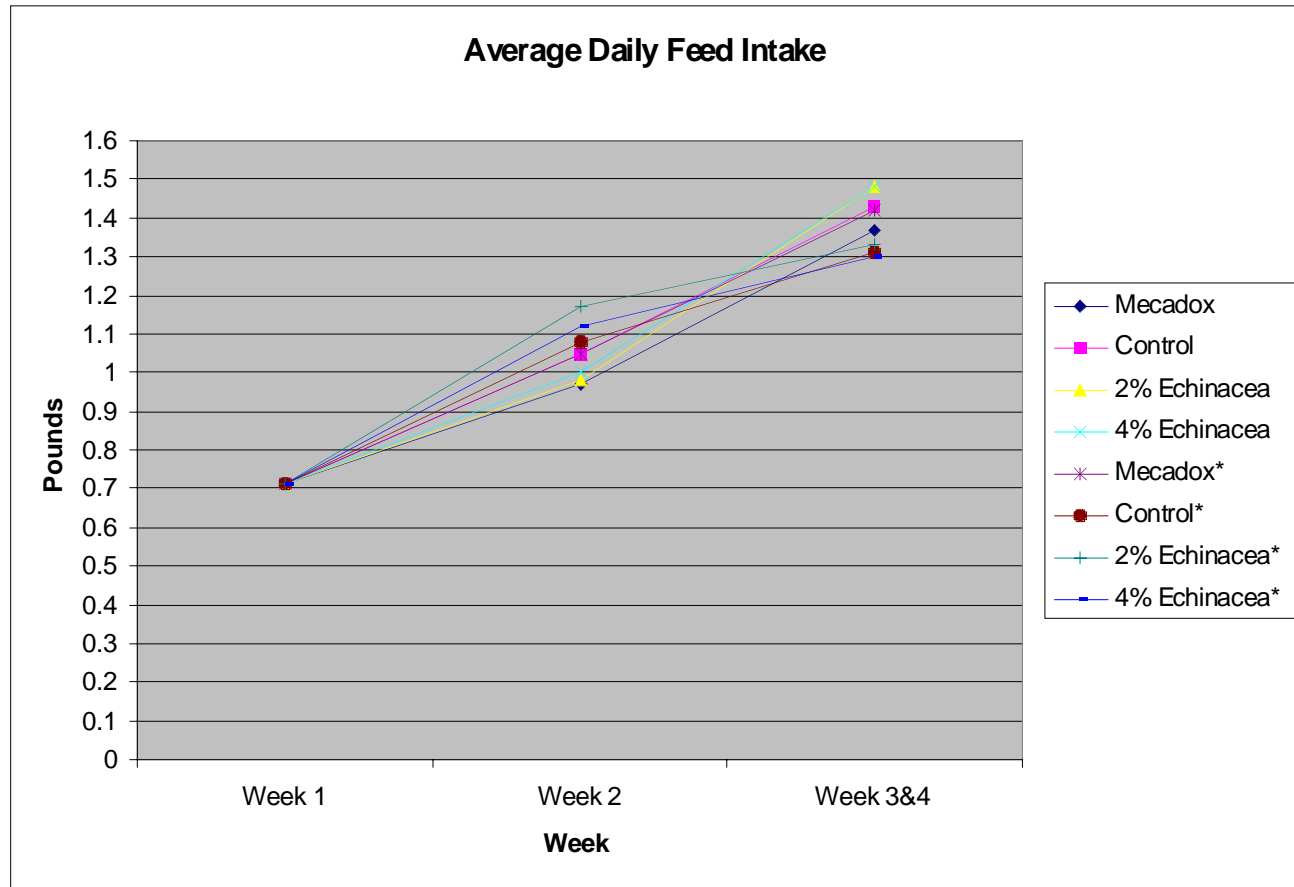


Table 1. Average daily feed intake of nursery pigs (PRRS negative and positive) supplemented with Echinacea and Mecadox.

	Pre-trial	PRRS negative	PRRS positive	PRRS negative	PRRS positive
	Week 1	Week 2	Week 2	Week 3&4	Week 3&4
Mecadox	0.71	0.97	1.05	1.37	1.42
Control	0.71	1.05	1.08	1.43	1.31
2% Echinacea	0.71	0.98	1.17	1.48	1.33
4% Echinacea	0.71	1.00	1.12	1.48	1.30

Figure 2.

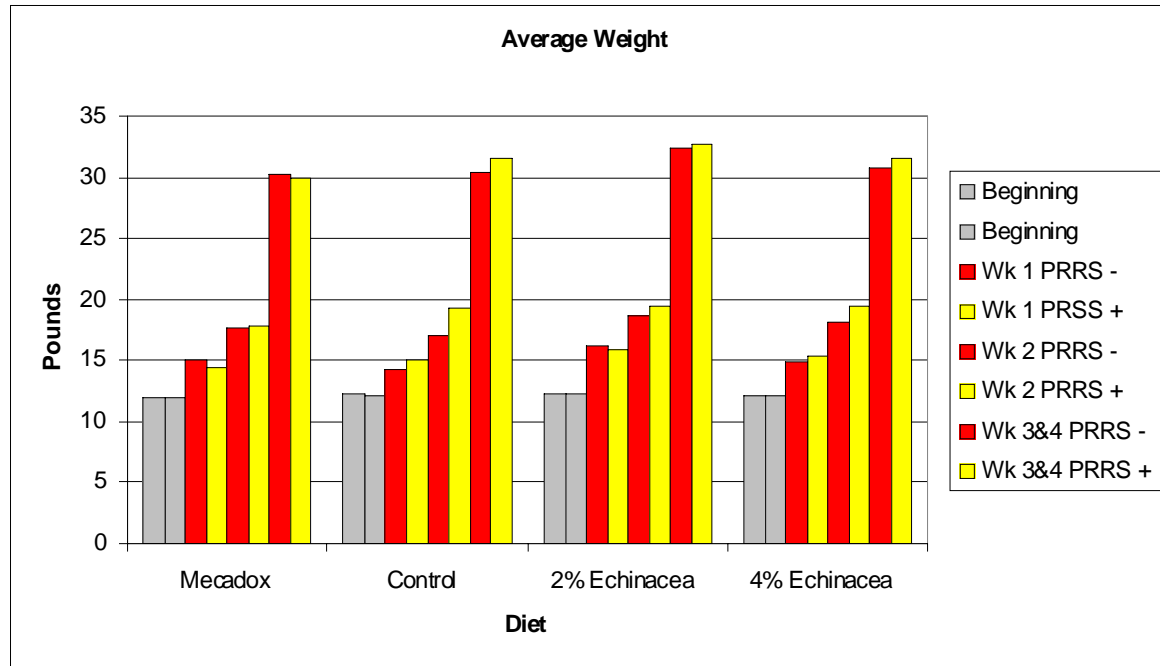


Table 2. Average weight of PRRS negative and positive nursery pigs on Echinacea, Mecadox, and no supplement

	Pre-trial		PRRS negative			PRRS positive		
	Beginning	Beginning	Week 1	Week 2	Week 3 & 4	Week 1	Week 2	Week 3 & 4
Mecadox	12.02	12.00	15.00	17.64	30.24	14.42	17.80	29.90
Control	12.28	12.18	14.24	16.94	30.38	15.12	19.22	31.64
2% Echinacea	12.26	12.32	16.22	18.60	32.36	15.92	19.42	32.78
4% Echinacea	12.12	12.12	14.84	18.08	30.72	15.42	19.46	31.60