Ergot bodies growing in wheat heads.

ERGOT IN GROWING-FINISHING SWINE RATIONS

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Ergot has been both a friend and a foe of mankind since antiquity. Long before the reasons for effects of ergot ingestion were known, it was used in both positive and negative remedies. Accidental human ingestion was more common than planned ingestion and was responsible for the death of numerous people.

Ergot bodies (or sclerotia) contain alkaloids, extremely toxic compounds which are capable of producing drastic changes in body chemistry. There are many alkaloids and the potency of each varies with changes in the basic chemical structure. Unfortunately, ergot from different growing sites may contain varying levels of total alkaloids as well as different proportions of the individual alkaloids.

Excellent discussions of ergot's life cycle as a plant "parasite" and as an animal poison have been presented by Lloyd **et al** (1971), and by Gilles **et al** (1972). Kingsbury (1964) has presented an exhaustive review of the literature in terms of plant species affected and physiologic effects in animals.

All cereal grains appear to be susceptible to ergot infestation, with rye reported to be highly susceptible. Triticale is also susceptible, while wheat is less frequently infested. Some varieties or selections of rye, triticale and wheat are more often and more severely infested with ergot bodies than other varieties or selections. Barley and oats are occasionally infested with ergot, but sclerotia found in these grains have frequently been attributed to cultivated or wild rye.

Table 1. Composition of the Basal Ration.

Ingredient	Amount
Barley[1]	86.5
Soybean meal	11.0
Dicalcium phosphate	0.85
Limestone	0.75
Trace mineralized salt	0.50
Vitamin premix	0.30
Zinc oxide	+

[1] *Ergot replaced an equal amount of barley in the rations.*

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Table 2. Results of Swine Experiment 164 (54 Days)

Item:	Per Cent Ergot in Diet 0	0.10	0.20	0.30
No. Pigs	10	10	10	10
Avg. Initial Wt.	98.0	90.4	95.5	95.3
Avg. Wt. 55 Days	183.5	162.2	162.9	156.6
Wt. Gain	85.1	71.8	67.4	61.3
Avg. Daily Gain	1.58	1.33	1.25	1.14
Avg. Daily Feed	5.87	5.06	5.00	4.80
Avg. Feed/Gain	3.223	3.808	4.010	4.230
	Relative Performance (Basal = 100)			
Avg. Daily Gain	100	82	79	72
Avg. Daily Feed	100	86	85	82
Avg. Feed/Gain	100	102	108	114

Most of the ergot in wheat or rye is removed when the grain is cleaned. Therefore, most of the ergot in livestock rations will be added through the use of screenings as a component of rations. If reports from North Dakota livestock producers are accurate, financially disastrous losses have occurred as a result of feeding ergoty screenings. The majority of the reports have been concerned with resorption of fetuses by gestating sows or failure of sows to produce milk after farrowing. Losses due to ergot ingestion undoubtedly occur in other classes of farm animals, but are not as dramatic. These less noticeable losses would include reduced weight gain and more feed required per pound of gain.

Objectives of the experiments to be reported were to determine:

1. The effects of low levels of ergot in swine rations.
2. If visual indicators of ergot toxicity in swine could be detected.

Procedure

Graded levels of ergot from various sources were mixed into barley-soy rations calculated to contain 15 per cent crude protein and were fed to growing pigs in a series of three experiments.

Experiment 164. Rations containing 0, 0.1, 0.2 or 0.3 per cent ergot were fed to 10 pigs per treatment for a period of 54 days. The average initial weight of the pigs was approximately 95 pounds.

Experiment 168. Each treatment (0,0.05, 0.10 and 0.20 per cent ergot) was fed to 12 pigs having an average initial weight of approximately 63 pounds. An additional ration containing 3.0 per cent ergot was fed to six gilts having an average initial weight of 57 pounds to determine possible toxicity symptoms. The experimental period was 63 days.

Experiment 172. Pigs with an average initial weight of 31 pounds were fed rations containing either 0, 0.05, 0.10, 0.20 or 0.40 per cent ergot for 112 days. Each ration was fed to 12 pigs, half receiving a pelleted ration and half receiving meal rations.

Results and Discussion

The results of the first experiment (164) indicated a linear depression of gain with increasing ergot content of the rations. The pigs used in this experiment were heavy when placed on the experiment and responded rapidly to the ergoty feeds. Feed intake was reduced with a resulting restriction in average daily gain and increased feed required per unit of gain. Most of the ergot fed in this experiment had been stored less than one year.

Table 3. Results of Swine Experiment 168 (63 Days)

Item:	Per Cent Added Ergot 0	0.05	0.10	0.20	3.0
No. Pigs	12	11	12	12	6
Avg. Initial Wt.	63.33	63.36	63.58	63.50	57.17
Avg. Final Wt.	151.25	153.36	142.25	153.58	91.00
Avg. Wt. Gain	87.92	90.00	78.67	90.08	36.83
A.D.G., lb.	1.396	1.429	1.249	1.430	0.576
A.D.F., lb.	4.829	4.796	4.628	4.729	4.664
F/G, lb.	3.461	3.436	3.707	3.307	8.104

[1] *A.D.G. = Average daily gain*
[2] *A.D.F. = Average daily feed*
[3] *F/G = Feed per gain*

Table 4. Results of Swine Experiment 172 - (112 Days)

Item:	Per Cent Added Ergot 0	0.05	0.10	0.20	0.40
			Pelleted Rations		
No. Pigs	5	6	6	6	5
Avg. Initial Wt.	29.60	31.17	30.67	31.33	32.20
Avg. Final Wt.	177.20	182.17	189.17	178.00	159.60
Avg. Wt. Gain	147.60	151.00	158.50	146.67	127.40
A.D.G., lb.	1.318	1.348	1.415	1.310	1.138
A.D.F., lb.	4.593	4.690	4.644	4.208	4.339
F/G, lb.	3.350	3.479	3.286	3.214	3.949
			Meal Rations		
No. Pigs	6	6	5	6	5
Avg. Initial Wt.	30.00	31.33	32.40	31.67	31.20
Avg. Final Wt.	171.50	169.17	164.40	167.50	138.00
Avg. Wt. Gain	141.50	137.84	132.00	135.83	106.80
A.D.G., lb.	1.263	1.231	1.179	1.213	0.954
A.D.F., lb.	5.485	4.301	5.176	4.528	3.713
F/G, lb.	4.342	3.495	4.706	3.734	4.227

[1] *A.D.G. = Average daily gain*
[2] *A.D.F. = Average daily feed*
[3] *F/G = Feed per gain*

Ergot which had been stored for two years was used in Experiment 168 and was fed to pigs initially averaging 63 pounds. The erratic pattern of response to ergot at up to 0.2 per cent of the ration did not permit estimation of a minimum toxic level. In contrast, pigs fed 3.0 per cent ergot gained less than 0.6 pound per day, or about 40 per cent of the gain of the rest of the pigs in the experiment.

Apparent feed intake was not markedly affected by the dietary treatments, but the feed per pound of gain was noticeably higher for the pigs fed a ration containing 3.0 per cent ergot. Pigs fed 3.0 per cent ergot wasted an extremely large amount of feed.

Ergot from samples which had been stored one and two years was fed in the third experiment (172). Only the rations containing 0.4 per cent ergot reduced the gain of pigs started on experiment at an average initial weight of 31 pounds. Consideration of the results of each weight-period (14 days) would suggest that the experiment was long enough to allow the pigs to adapt to the presence of ergot in the rations. Any effect of pelleting decreasing the detrimental effects of ergot-containing rations was slight, at best.

The only recent reports relating to the effects of ergot in swine dealt with reproductive criteria. Campbell and Burfening (1972) observed that 0.53 per cent ergot in rations for gilts reduced reproductive performance. Peace and Shaw (1967) noted that as little as 0.1 per cent ergot for a period of 54 days could reduce udder development and milk secretion.

These experiments reveal the difficulty in attempting to evaluate the toxicity of a highly variable feed contaminant. In addition, the length of time that the ergot had been stored was variable, as were the initial weights of the pigs used and the duration of each experiment. Despite these variables, it can be calculated that the average reduction in rate of gain from feeding 0.10 per cent ergot was approximately 10 per cent. It is because of the diverse nature of these experiments that this value (a 10 per cent reduction in gain associated with 0.10 per cent dietary ergot) becomes meaningful. Swine producers thereby have a means of estimating the potential loss in gain due to low levels of ergot in their rations.

No visible toxicity symptoms were noted when 3.0 per cent ergot was fed to six gilts. Extreme growth restrictions and excessive feed wastage were the only effects noted.

LITERATURE CITED

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