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A Study of Distillers By-Products in
Growing-Finishing Swine Rations

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Several by-products of the distillery, fish and cheese industries have been reported to give growth responses when added to swine rations thought to be adequate in known nutrients. It is known that these by-product feeds are good sources of many vitamins and minerals and it has been postulated that they may contain other "Unidentified Growth Factors" (UGF) that may be required by the pig.

The experiments reported herein were conducted to study the effect of distillers dried grains with solubles (DDG/S) on ration digestibility as well as its effect on growth and feed conversion of growing-finishing swine.

Experimental Procedure

In the first experiment 48 weanling crossbred pigs weighing approximately 39 lbs. were randomly allotted into eight lots of six pigs each. Two lots received each of the following experimental treatments:

1. Corn-soybean meal basal
2. Basal plus 5% DDG/S
3. Basal plus 10% DDG/S
4. Basal plus 20% DDG/S

The composition of the rations fed is shown in table 1. Feed and water were provided ad libitum, waterers were located in the house while feeders were in connecting outside pens. Digestibility was determined by the chromic oxide indicator method on three separate days. The trial was terminated when the pigs averaged approximately 200 lbs.

In trial II, 100 pigs were allotted, 5 pigs per lot, into two replicated groups of 10 lots each. The rations shown in table 2 were similar to those used in trial I except that lard was added as an energy source to those rations containing distillers by-products in order to equalize all rations in energy content. Lysine was added to the rations fed to treatments 6 through 10 in order to equalize these rations at 0.75% lysine. The pigs averaged approximately 42 pounds initially and were removed at a weight of about 125 lbs. The experimental treatments were as follows:

1. Corn-soybean meal basal
2. Basal plus 2% distillers solubles

3. Basal plus 5% DDG/S
4. Basal plus 10% DDG/S
5. Basal plus 20% DDG/S
6. Basal plus 0.10% lysine
7. Treatment 2 plus 0.11% lysine
8. Treatment 3 plus 0.13% lysine
9. Treatment 4 plus 0.17% lysine
10. Treatment 5 plus 0.25% lysine

Results

Trial I

Results of the first trial are summarized in table 3. Average daily gain was not significantly different in any of the lots although the pigs receiving the 20% level of distillers dried grains with solubles gained slightly slower in both replicates. Pigs in replicate 1 gained significantly faster than those in replicate 2. These pigs were heavier and also younger at the start of the experiment and thus had exhibited faster pre-weaning gains which were maintained from weaning to market weight.

Feed efficiency was significantly reduced when pigs were fed rations containing the high (20%) level of DDG/S. This higher feed requirement may be due, at least in part, to a higher fiber, lower energy and lower lysine content of this ration. Apparent digestibility of crude protein and dry matter was reduced in the rations containing DDG/S with the greatest reduction being when the ration contained 20% DDG/S.

Trial II

The growth performance data for trial II are summarized by treatment in table 4. Data for the two replicated lots per treatment are combined since lot differences were small. Gains were quite similar between lots although pigs fed the 20% level of DDG/S again gained at the slowest rate. Feed efficiency was also decreased when pigs were fed the 20% DDG/S. However, when lysine was added to this ration feed efficiency was similar to that of the other treatments.

It would appear that in rations of equal energy content levels of up to 10% DDG/S can be used without affecting rate or efficiency of gain. There was no evidence in this trial of unidentified growth factors being present. Replacing 20% of the corn and soybean meal in this ration with DDG/S reduced the lysine content 0.15% which may have affected rate and efficiency of gain since the main benefit from lysine supplementation in this trial was in the ration containing 20% DDG/S.

Summary

Two experiments were conducted and failed to show any presence of unidentified growth factors in rations containing distillers dried grains with solubles at levels of 5, 10 or 20%. Gains and feed efficiency of pigs

fed rations containing 5 or 10% DDG/S were equal to those of pigs fed a corn-soybean meal ration. Slightly slower gains and a higher feed requirement were found when pigs received rations of 20% DDG/S. Pig performance was improved when lysine was added to this ration.

Apparent digestibility of crude protein and dry matter was reduced when distillers dried grains with solubles was added to a corn-soybean meal ration.

Table 1. Composition of Rations (percent), Trial I

	Basal	5% DDG/S	10% DDG/S	20% DDG/S
Ground yellow corn	82.4	79.45	76.3	70.3
Soybean meal, 50%	15.0	13.0	11.15	7.2
DDG/S	--	5.0	10.0	20.0
Limestone	0.75	0.75	0.8	0.9
Dicalcium phosphate	0.85	0.80	0.75	0.6
T M salt (0.8% Zn)	0.5	0.5	0.5	0.5
Vitamin-antibiotic mix ^a	0.5	0.5	0.5	0.5
Zinc oxide, gm.	3.5	3.5	3.5	3.5

^a Provided 1500 I.U. vitamin A, 150 I.U. vitamin D, 0.5 mg. riboflavin, 2.5 mg. calcium pantothenate, 7.5 mg. niacin, 50 mg. choline, 8 mcg. vitamin B₁₂ and 10 mg. Pro-Strep per pound of ration.

Table 2. Composition of Rations (percent), Trial II

	Basal	2% DS	5% DDG/S	10% DDG/S	20% DDG/S
Ground yellow corn	82.3	81.1	79.2	75.9	70.0
Soybean meal, 50%	15.0	14.2	13.0	11.0	6.6
Distillers Dried Sol.	--	2.0	--	--	--
DDG/S	--	--	5.0	10.0	20.0
Limestone	0.7	0.7	0.7	0.8	0.8
Dicalcium phosphate	1.0	1.0	0.9	0.8	0.7
T M salt (0.8% Zn)	0.5	0.5	0.5	0.5	0.5
Vitamin-antibiotic mix ^a	0.5	0.5	0.5	0.5	0.5
Lard	--	--	0.2	0.5	0.9

^a Provided 1125 I.U. vitamin A, 340 I.U. vitamin D, 2 mg. riboflavin, 4 mg. calcium pantothenate, 9 mg. niacin, 10 mg. choline chloride, 10 mcg. vitamin B₁₂ and 10 mg. chlortetracycline per lb.

Table 3. Results of Feeding DDG/S to Growing - Finishing Swine

	Replicate	Basal	5% DDG/S	10% DDG/S	20% DDG/S
No. of pigs	1	6	6	6	6
	2	6	6	6	4 ^a
Av. init. wt., lb.	1	40.3	40.5	40.5	40.5
	2	37.5	37.5	37.5	39.5
Av. final wt., lb.	1	204.8	210.3	203.3	201.2
	2	198.0	201.3	194.7	195.5
Av. daily gain, lb.	1	1.79	1.89	1.77	1.72
	2	1.68	1.69	1.67	1.56
	Av.	1.73	1.79	1.72	1.65
Av. feed per lb. gain, lb.	1	3.36	3.09	3.19	3.60*
	2	3.06	3.30	3.15	3.57*
	Av.	3.21	3.20	3.17	3.59*

^a Two pigs removed.

* Significant (P < .05).

Table 4. Gain and Feed Efficiency Data, Trial II

Treatments	No. of pigs	Av. initial wt., lb.	Av. final wt., lb.	Av. daily gain, lb.	Av. feed per lb. gain, lb.
Basal	10	42.4	126.0	1.67	2.78
2% Distillers Sol.	10	42.4	123.2	1.58	2.82
5% DDG/S	9 ^a	42.8	124.7	1.65	2.87
10% DDG/S	10	42.4	125.6	1.70	2.87
20% DDG/S	10	42.3	117.2	1.50	3.28
Basal + 0.1% lysine	10	42.3	125.8	1.70	2.97
2% DS + 0.11% lysine	10	42.4	125.8	1.67	2.82
5% DDG/S + 0.13% lysine	10	42.4	126.2	1.68	2.82
10% DDG/S + 0.17% lysine	10	42.3	124.0	1.70	2.73
20% DDG/S + 0.25% lysine	10	42.3	123.8	1.60	2.89

^a One pig died.