

Comparison of Complex and Simple Mineral Mixtures for Pigs

J. H. LONGWELL, *Chief, Division of Animal Industry*
and

AL. SEVERSON², *Associate Animal Husbandman*

A NUMBER of commercial mineral mixtures are being sold to North Dakota livestock producers. Some of these are relatively simple mixtures, containing bonemeal, ground limestone or other high calcium material, salt and usually small amounts of iodine and iron. Others are complex mixtures made up of a large number of ingredients, of which only a few have any value in animal feeds. Some are claimed to have medicinal or tonic properties. A part of these ingredients are of no known value in animal nutrition, some of them are obviously inert materials included as filler, and others may be injurious. The complex mixtures usually are quite high priced, and unwarranted claims of their value are often made.

INGREDIENTS IN COMMERCIAL MINERALS

The ingredients as named on the containers of three commercial mineral mixtures which are sold in North Dakota are as follows:

Mixture A (7 ingredients)	Mixture B (21 ingredients)	Mixture C (13 ingredients)
*Steamed bone meal	Potassium carbonate	Sulfate of soda
*Ground limestone	Potassium hydroxide	(Glaubers Salt)
*Salt	(lye)	*Spent boneblack
Molasses	Sodium bicarbonate	*Pulverized limestone
Iron Oxide	(baking soda)	Hardwood charcoal
Copper sulfate (blue vitriol)	Manganese sulfate	*Rock phosphate
*Potassium iodide	*Calcium carbonate	Bicarbonate of soda
	Sodium Salicylate	(baking soda)
	*Calcium phosphate	Sulfur
	Iron sulfate	Copperas
	(copperas)	(ferrous sulfate)
	Iron oxide	Iron oxide
	Turpentine	Powdered ginger
	Charcoal	Colombo (bitters)
	Sulfur	(b) Cod liver oil
	*Salt	*Potassium iodide
	Cobalt sulfate	
	*Potassium iodide	
	Copper sulfate	
	(blue vitriol)	
	Magnesium oxide	
	*Phosphoric acid	
	Glaubers Salt	
	(sulfate of soda)	
	Sodium nitrate (saltpeter)	
	Zinc sulfate	

*Indicates ingredient which contains a mineral element needed under North Dakota conditions.

(b) Source of Vitamins A and D.

Mineral A is a simple mixture while Minerals B and C. are complex mixtures which sell at a high price.

(a) Resigned September 1, 1943.

COMPOSITION OF COMMERCIAL MINERALS

Table 1 shows the percentages of important elements and salt in each of the three foregoing mineral mixtures.

TABLE 1—Composition of Mineral Mixtures (1)

Mineral Mixture	Percentage				
	Calcium	Phosphorus	Iodine	Fluorine	Salt
A	25.00	6.31	0.058	0.042	6.70
B	10.20	0.39	0.053	0.018	59.00
C	15.80	3.59	0.011	0.446	0.00

Mineral A is a good source of calcium and phosphorus, while B is low and C is only fair in both elements.

So far as is known, calcium and phosphorus are the only mineral elements generally required by farm animals under North Dakota conditions. Pregnant females, especially sows, should have iodine added to their feed to prevent the development of goiter and hairless young. Fluorine, in excessive amount, has a toxic effect on animals. Mineral mixtures for hogs should not contain more than 0.10 percent fluorine². Mixture C contains an excess of fluorine. Salt should be supplied to all animals. It is usually more satisfactory and cheaper to provide a supply of salt alone, although small amounts in the mineral mixture may induce greater consumption of the mineral. Inclusion of large quantities of salt, such as that found in Mixture B, is a very expensive way to provide this ingredient.

Feeding Trial With Minerals For Pigs

Because large quantities of the complex, high priced mineral mixtures were being sold in North Dakota, three of the more commonly

sold hog minerals were compared with a simple mixture at the North Dakota Agricultural Experiment Station in the summer of 1943. Sixty purebred pigs, representing the Chester White, Duroc Jersey and Hampshire breeds, were used. These pigs were identified individually with ear notches, weighed and divided into five uniform lots of 12 pigs each. Three-day individual weights were taken at the start and end of the trial, the average of the three weights being used as the initial and final weights respectively. The pigs were also weighed every 14 days during the trial. Equal numbers of the three breeds were included in each lot. The pigs were housed in the hog barn, which has a concrete floor and had access to outside runways, also floored with concrete.

All pigs were fed the same feed mixture. This feed was low in calcium and only fair in phosphorus, containing about 0.25 percent calcium and 0.40 percent phosphorus. The feed mixtures were made up as follows:

Feeding Trial With Mineral For Pigs

	June 2-28	June 29-August 25
Yellow Corn	40	62
Oats	20	—
Barley	20	20
Soybean meal	10	13
Dried Buttermilk	10	5

Delsterol was added at the rate of 5.7 grams per 100 pounds of feed, to provide Vitamin D.

The grains were ground in a hammer mill and all the ingredients were thoroughly mixed. The pigs were lot fed, twice daily. All lots were self fed salt. Lot 1 received no mineral supplement; Lot 2 received mineral mixture E, composed of 40 percent steamed bonemeal, 40 percent ground limestone and 20 percent salt; Lot 3 received mineral mixture B; Lot 4 received mineral mixture C, and Lot 5 received mineral mixture D, which is also a complex mixture, containing 14 ingredients. All minerals were self fed. Minerals B and C are the same as those discussed before. Mineral A

was not fed, and minerals D and E are additional mixtures.

One pig in Lot 3 became crippled and was removed July 14. One pig in Lot 4 and in Lot 5 each developed a rupture and both were removed from their lots. Feed consumption for the pigs which were removed was calculated in proportion to their weights and deducted from the total for the lot. The condition of these three pigs probably was not attributable to their feed or mineral.

The weight and feed records are included in Table 2.

Table 2.—Summary of Weights and Feed Consumption

	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5
	Number Mineral	Mineral E	Mineral B	Mineral C	Mineral D
Pigs per lot.....	12	12	11	11	11
Total final weight.....	1786	1833	1600	1668	1591
Total initial weight.....	524	530	498	500	486
Total gain.....	1262	1303	1102	1168	1105
Average final weight.....	148.8	152.7	145.4	151.6	144.6
Average initial weight.....	43.7	44.2	45.3	45.4	44.4
Average gain.....	105.1	108.5	100.1	106.2	100.2
Average daily gain.....	1.25	1.29	1.18	1.26	1.20
Total feed eaten.....	3964	3964	3672	3741	3691
Feed per 100 pounds gain....	314	304	333	320	334
Total salt eaten.....	21.5	19.5	18.1	17.0	16.7
Salt per 100 pounds gain.....	1.80	1.49	1.63	1.45	1.06
Total mineral eaten.....	..	22.5	19.1	37.0	27.0
Mineral per 100 pounds gain..	..	1.72	1.73	3.09	2.44
Cost of total feed per 100 gain (*).....	7.08	6.91	7.68	7.52	7.77

(*) Prices of feeds were: Corn \$1.12 a bushel; oats \$0.64 a bushel; barley \$0.96 a bushel; soybean meal \$55.00 a ton; dried buttermilk \$100.00 a ton; salt \$1.00 a hundred pounds; mineral E, \$3.50 a hundred pounds; mineral B, C and D \$10.00 a hundred pounds.

Discussion of Results

As indicated by the average daily gains, there was little difference between any of the lots. The pigs in Lot 1 were beginning to be stiff and lame the last few days of the trial and all of them were weak in the pasterns. This condition was probably due to the low mineral content of the feed. The pigs in the other four lots were all normal and showed no indications of mineral

deficiency. The fact should be noted that the pigs in each of the three lots which received the complex minerals gained slightly less than the pigs in Lot 2 on the simple mineral. Lot 4, which received mineral C was the only lot on a complex mineral which equaled Lot 1, without mineral. This difference is not large enough to be important, but the fact is that none of the complex mixtures showed any advantage

over the simple mineral. They did provide sufficient mineral to prevent the pigs from becoming lame.

The amount of feed required to produce 100 pounds of gain was slightly greater in each of the three lots receiving the complex minerals than in either lots 1 or 2. This difference is not great, but the fact should be noted that the complex mixtures did not reduce the feed required to produce 100 pounds of gain. The slight differences between the three complex mixtures is of no significance.

Minerals C and D appeared to be quite palatable and were eaten in

larger amounts than either B or E. The amounts of minerals C and D eaten per 100 pounds gain were correspondingly greater. Occasional scouring occurred in the pigs of Lots 3, 4 and 5, and these pigs generally were much looser than those in Lot 1 and 2.

The total cost of feed per 100 pounds gain was higher in each of the three lots, 3, 4 and 5, than in either Lot 1 or 2, due both to the greater amount of feed required and the cost of the mineral. It is evident that none of the three minerals reduced the cost of gains.

SUMMARY

Three commercial hog minerals which are widely sold in North Dakota were fed to growing pigs in dry lot. The pigs received a feed mixture which was well balanced except that it was low in calcium and phosphorous. A check lot which received no mineral supplement, and a lot which received a simple mineral were also included.

None of the pigs in the lots receiving the commercial mixtures showed any advantage over those in the lot which received the simple mixture, either in rate of gain or in amount of feed required per 100 pounds gain. The pigs in the check lot gained as rapidly and cheaply as those in the other lots, but the check pigs were becoming stiff and lame at the time the trial was closed. None of the pigs in the four lots which received a mineral supplement became lame.

A simple mineral, which supplied calcium and phosphorus, protected the pigs against lameness and resulted in slightly greater gains, with lower feed costs, than either of the three complex minerals.

BIBLIOGRAPHY

1. Minnesota Department of Agriculture, Dairy and Food, 24th Annual Feed Bulletin, 1942.
2. Mitchell, H. H., The Fluorine Problem in Livestock Feeding. National Research Council, Reprint and Circular Series, No. 113, June 1942.

Cocklebur plants are poisonous to pigs when the plants are in the seedling stage as they will be the last half of May. Pigs should be kept away from places where the burs are sprouting. The plants grow most commonly along rivers and creeks or in other low ground. Burs are carried by flood water and by animals. (O A. Stevens)