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A Simple Mineral Mixture

for

Fattening Pigs

By

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AGRICULTURAL EXPERIMENT STATION

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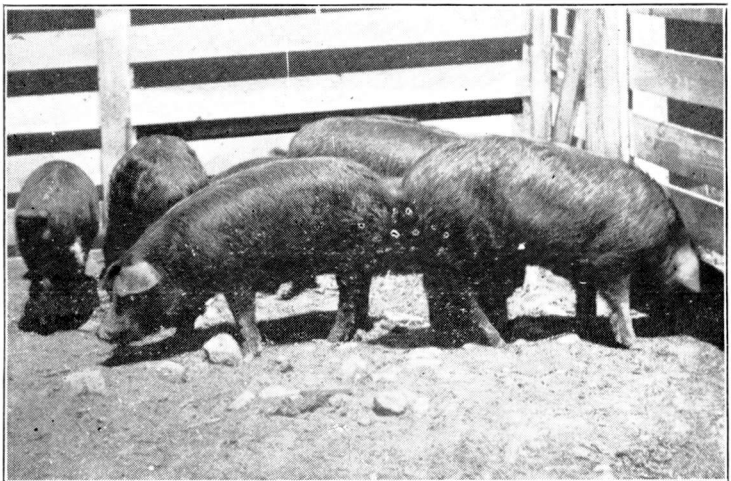
ALABAMA POLYTECHNIC INSTITUTE

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AUBURN



Lot 1 which received mineral



Lot 2 which received no mineral

A SIMPLE MINERAL MIXTURE FOR FATTENING PIGS

By

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If a ration is very deficient in ash or mineral matter, it will not produce satisfactory gains on growing pigs. Despite this fact rations that do not furnish sufficient mineral matter are often fed. Hogs are usually fed largely on concentrated feeds, many of which are low in ash. In this state peanuts, corn, peanut meal, and sweet potatoes form the basis of the fattening rations. All of these feeds are low in ash and particularly low in calcium. Even cowpeas and soybeans are deficient in this respect. Feeds like skimmilk, tankage, alfalfa, and clover which tend to correct the mineral deficiencies of a ration are used only to a very limited extent.

The feeding of such materials as wood ashes, charcoal, lime, and copperas to hogs is a rather old practice on some farms. The use of these has usually been irregular. They have been considered as tonics, or "worm medicines" rather than substances which contained elements essential to normal nutrition of the hog.

The need for mineral supplements in practical feeding has been shown by tests at various experiment stations. As a result of these tests feeders are becoming interested in the "How," "What," and "When" of feeding mineral mixtures. In order that some definite figures might be obtained in regard to the value of a simple, home mixed, mineral supplement the experiments reported in the following pages were made.

GENERAL PLAN OF EXPERIMENTS.

Object.—The object of these experiments was to determine the value of adding a simple mineral mixture to a ration of corn and peanut meal.

Animals Used.—All the pigs used in these experiments were purebred Poland Chinas, Duroc Jerseys, or crosses from purebreds of these two breeds. Two lots were fed in each experiment. In both cases special care was taken to have the two lots as nearly alike as possible in breed, thrift, weight, sex, conformation, and condition.

Quarters.—The quarters used were pens with concrete floors in the experimental hog barn at Auburn. These pens are well lighted and ventilated. In each experiment the two lots were fed in adjoining pens.

Weighing.—Individual weights were taken on three consecutive days at the beginning, and again at the end of the experiment. Averages of the three weighings were used as the initial and the final weights. Individual weights were taken every 14 days throughout the experiment.

Rations.—The following rations were fed:

LOT 1

- Ground corn, 2 parts
- Peanut meal (hulls included, 38.6 percent protein), 1 part
- Mineral mixture:
 - Charcoal, 1 pound
 - Marble dust, 1 pound
 - Salt, 1 pound

LOT 2

- Ground corn, 2 parts
- Peanut meal (Hulls included, 38.6 percent protein), 1 part

Water.—Water was kept before the hogs at all times.

Feeding.—The corn was ground and mixed with the peanut meal in the proportion of 2 pounds of corn to 1 pound of peanut meal. The mixture was fed in self-feeders. A close watch was kept on the feeders to insure a supply of feed being kept before the hogs at all times.

Equal parts by weight of pulverized charcoal, marble dust (CaCO_3), and common salt were mixed together and placed in a shallow box, in Lot 1, in 5 to 10 pound quantities as it was consumed.

Quality of Feeds.—No. 2 white corn was used in the first experiment. No. 2 mixed, containing a large percentage of yellow corn, was used in the second experiment.

The peanut meal used in both experiments was made from the whole peanut (hulls included) and was guaranteed to contain 36 percent of protein.

Analyses of the peanut meal and of the corn used in the first experiment were reported by the Department of Research Chemistry of this station as follows:

Analyses of Feeds

| Feed | Moisture | Ash | Crude Protein | Ether Extract | Crude Fiber | Nitrogen-free Extract |
|-----------------|----------|------|---------------|---------------|-------------|-----------------------|
| Peanut Meal --- | 8.92 | 3.52 | 38.63 | 10.89 | 15.61 | 22.43 |
| Corn ----- | 11.43 | 1.35 | 9.40 | 4.09 | 2.10 | 71.265 |

EXPERIMENTAL RESULTS.

The results of the first experiment are shown in Table 1. When the test began there was no noticeable difference in the two lots but marked differences began to appear within a few weeks.

TABLE I.—*Summary of Experiment 1*
January 5 to April 21, 1923—106 days

| | Lot 1 Corn 2 lbs. P. N. Meal 1 lb. Minerals Self fed | Lot 2 Corn 2 lbs. P. N. Meal 1 lb. Self fed |
|---------------------------------|--|--|
| Number of hogs to lot ----- | 10 | 10* |
| Av. initial weight ----- | 72.9 lbs. | 73.0 lbs. |
| Av. final weight ----- | 171.0 lbs. | 118.0 lbs. |
| Av. total gain per hog ----- | 98.1 lbs. | 45.0 lbs. |
| Av. daily gain per hog ----- | .93 lbs. | .46 lbs. |
| Av. daily feed per hog: | | |
| Ground corn ----- | 2.51 lbs. | 1.75 lbs. |
| Peanut meal ----- | 1.25 lbs. | 0.88 lbs. |
| Mineral mixture ----- | .07 lbs. | ----- |
| Total ----- | 3.83 lbs. | 2.63 lbs. |
| Feed for 100 lbs. gain: | | |
| Ground corn ----- | 271.5 lbs. | 381.0 lbs. |
| Peanut meal ----- | 135.7 lbs. | 191.0 lbs. |
| Mineral matter ----- | 7.7 lbs. | ----- |
| Total ----- | 414.9 lbs. | 572.0 lbs. |
| Feed cost of 100 lbs. gain ---- | \$7.97 | \$11.10 |

* 2 hogs died in non-mineral lot

Prices of feeds:

Ground corn—\$1 a bushel

Peanut meal—\$45 a ton

Mineral mixture—1 cent a pound

The hogs that had access to the mineral mixture had better appetites and consumed more feed than those that did not receive a mineral supplement. The latter were restless and had a marked tendency to root the feed out of the feeders. They would gnaw on the feeders and on the boards at the sides of the pen. It was evident that they craved something which the ration did not contain.

The average daily gain was twice as great in the lot that received the minerals as in the lot that did not receive them. The pigs in both lots were rather unthrifty when placed on test and the gains even in Lot 1 were not as large as are usually made on a similar ration.

Lot 1 required 414.9 pounds of feed for 100 pounds of gain, while Lot 2 required 572 pounds. In other words, the lot that did not receive a mineral supplement required 38 percent more feed for a unit of gain than the lot that had access to the mineral mixture. The feed cost of 100 pounds gain was \$7.97 in Lot 1 and \$11.10 in Lot 2, a difference of \$3.13 per hundred pounds gain in favor of the mineral lot.

During the experiment two hogs died in Lot 2. Post mortem examinations indicated that death was due in one case to auto-intoxication and in the other to ulcer of the bladder and uremic poisoning.

When the remaining hogs were slaughtered at the end of the test, it was noted that the liver from every hog in the non-mineral lot, and from four in the mineral lot, was condemned on account of parasites. It cannot be said that the rations had any relation to the difference in the parasitic infestation of the livers, or to the death of the two hogs mentioned. However, the results may indicate that there was a lowered resistance of the hogs that were fed the ration deficient in its mineral content.

SECOND EXPERIMENT.

The death of the two hogs and the extremely poor gains made by Lot 2 in the first experiment made the results appear somewhat uncertain. It seemed probable that other factors besides an inadequate supply of minerals might have been partially responsible for the results obtained. Consequently a second test was made.

TABLE II.—*Summary of Experiment 2*
March 10 to May 23, 1923—74 days

| | Lot 1 Corn 2 lbs. P. N. Meal 1 lb. Minerals Self fed | Lot 2 Corn 2 lbs. P. N. Meal 1 lb. Self fed |
|-----------------------------------|--|--|
| Number of hogs to lot ----- | 9 | 9* |
| Av. initial weight ----- | 56.6 lbs. | 57.6 lbs. |
| Av. final weight ----- | 157.1 lbs. | 122.2 lbs. |
| Av. total gain per hog ----- | 100.5 lbs. | 64.6 lbs. |
| Av. daily gain per hog ----- | 1.36 lbs. | .97 lbs. |
| Av. daily feed per hog: | | |
| Ground corn ----- | 3.36 lbs. | 2.81 lbs. |
| P. N. meal (38.63% protein) ----- | 1.68 lbs. | 1.41 lbs. |
| Mineral mixture ----- | 0.13 lbs. | ----- |
| Total ----- | 5.17 lbs. | 4.22 lbs. |
| Feed for 100 lbs. gain: | | |
| Ground corn ----- | 247.2 lbs. | 291.5 lbs. |
| Peanut meal ----- | 123.6 lbs. | 145.7 lbs. |
| Mineral mixture ----- | 0.093 lbs. | ----- |
| Total ----- | 380.4 lbs. | 437.2 lbs. |
| Feed cost of 100 lbs. gain ----- | \$7.28 | \$8.47 |

* 2 hogs were removed from non-mineral lot on account of broken legs

Prices of feeds:

Ground corn—\$1 a bushel

Peanut meal—\$45 a ton

Mineral mixture—1 cent a pound

The pigs used in the second test were from the station herd and had been raised under uniform conditions. They were very thrifty when placed on test. Number 2 mixed corn was used in the second experiment. This contained a rather large percentage of yellow corn. In other respects this experiment was a duplication of the first.

The results of this experiment were similar to those of the first. The differences between the two lots were not so striking but the mineral mixture was decidedly beneficial. The hogs that had access to the minerals consumed more feed and made larger and more economical gains than the hogs that received only corn and peanut meal. Lot 1 made 40 percent larger gains than Lot 2. Lot 2 required 15 percent more feed (at a cost of \$1.19 more) for 100 pounds of gain than Lot 1.

In this experiment the hogs that did not receive a mineral supplement were very easily injured. Two of them received broken legs and had to be removed

while the experiment was in progress, and only three were able to stand when they reached the market at the close of the experiment. None of the hogs that received the mineral supplement was crippled during the test or in shipping to market, although both lots were shipped in the same car. This suggests that the large number of crippled hogs reaching the markets from this section might be reduced by feeding mineral supplements.

AVERAGE OF THE TWO EXPERIMENTS

Table III shows the average results of the two experiments. The hogs that had access to a simple mineral mixture consumed more feed, made larger gains and used the feed more efficiently than the hogs that received the same ration without a mineral supplement.

TABLE III.—*Summary of the Two Experiments*

| | Lot 1 Corn 2 lbs. P. N. Meal 1 lb. Minerals Self fed | Lot 2 Corn 2 lbs. P. N. Meal 1 lb. Self fed |
|-----------------------------------|--|--|
| Number of experiments ----- | 2 | 2 |
| Number of hogs used ----- | 19 | 19 |
| Av. number of days fed ----- | 90.8 | 82.0* |
| Av. initial weight ----- | 65.2 lbs. | 65.7 lbs. |
| Av. final weight ----- | 164.4 lbs. | 120.0 lbs. |
| Av. total gain per hog ----- | 99.2 lbs. | 54.3 lbs. |
| Av. daily gain per hog ----- | 1.09 lbs. | 0.66 lbs. |
| Av. daily feed per hog: | | |
| Ground corn ----- | 2.83 lbs. | 2.18 lbs. |
| P. N. Meal ----- | 1.415 lbs. | 1.09 lbs. |
| Mineral mixture ----- | 0.093 lbs. | ----- |
| Total ----- | 4.338 lbs. | 3.27 lbs. |
| Feed for 100 lbs. gain: | | |
| Ground corn ----- | 259.8 lbs. | 330.7 lbs. |
| P. N. meal ----- | 129.9 lbs. | 165.4 lbs. |
| Mineral mixture ----- | 8.6 lbs. | ----- |
| Total ----- | 398.3 lbs. | 496.1 lbs. |
| Av. feed cost of 100 lbs. gain -- | \$7.65 | \$9.63 |

* Difference due to removal of sick and injured hogs from non-mineral lots.

Prices of feeds:

Ground corn—\$1 a bushel

Peanut meal—\$45 a ton

Mineral mixture—1 cent a pound

The average daily gain per hog in both tests was 1.09 pounds for Lot 1 and 0.66 pounds for Lot 2. This was an average of 65.1 percent larger gains where the minerals were supplied. The lots that did not receive the mineral supplement required 97.8 pounds or 24.5 percent more feed for 100 pounds gain than the lots that received the supplement. Stated in different terms, 8.6 pounds of mineral mixture, costing 1 cent a pound saved 70.9 pounds of corn and 35.4 pounds of peanut meal.

Some losses due to injury or death occurred in the lots that did not receive the mineral supplement. It cannot be said that all of these were due to a deficiency of minerals. However, it seems significant that no losses occurred in the lots that had access to the mineral mixture.

The question has been asked whether as striking results would have been obtained if the hogs had been on forage crops instead of in dry lots. It is true that forage crops in general contain considerable ash or mineral matter and tend to remedy this deficiency of seeds or their by-products. However, when forage crops are grown on soils of low lime content the forage is often not an adequate supplement to rations that are extremely low in mineral matter. In the spring of 1923 two lots of 8 pigs each were fed on oat and vetch pasture. A ration consisting of 80 percent of corn and 20 percent of peanut meal was fed in daily amounts equal to $2\frac{1}{2}$ percent of the live weight of the hogs. In addition to this, one lot had access to a mixture of equal parts of charcoal, air-slaked lime, and salt. This lot made 20 percent larger gains and required 10 percent less feed for a unit of gain than the lot that did not have a mineral supplement.

The safest practice is to keep a mineral mixture before all hogs at all times.

POINTS OF INTEREST.

1. In the two experiments the average rate of gain was 65.1 percent greater when a ration of corn and peanut meal was supplemented with a mineral mixture composed of equal parts by weight of charcoal, marble dust (CaCO_3), and salt than when such a supplement was not used.

2. The lots that did not receive the mineral supplement required 97.8 pounds or 24.5 percent more feed for 100 pounds gain than similar lots that received the supplement.

3. In other words, 8.6 pounds of mineral mixture costing 1 cent a pound saved 70.9 pounds of corn and 35.4 pounds of peanut meal.

4. The general thrift and appearance of the hogs were better where a mineral supplement was used than where such a supplement was not used.

5. A ration deficient in its mineral content apparently had some relation to a lowered resistance to disease and to the occurrence of a large number of fractured bones.