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MINNESOTA FEED SERVICE

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Nitrogen Boosts Yield of Oats and Corn

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The supply of readily available nitrogen in Minnesota soils is being rapidly depleted. Some of our soils have now been farmed for over a hundred years with relatively little being returned to the soil except by farm manure.

The legumes grown in our rotations have not been able to return the large amounts of nitrogen removed from our soil by nonlegume crops. Since every bushel of corn removes more than a pound of nitrogen, it is evident that we are making heavy withdrawals from our soil fertility checking account. The application of commercial fertilizer is now a necessity if we are to maintain our present soil fertility.

Since only limited amounts of nitrogen can be mixed with phosphate and potash, most of our commercially mixed fertilizers are relatively low in nitrogen. New sources and new methods of applying nitrogen to the soil promise to change this situation rapidly.

In the spring of 1953, the Department of Soils, Minnesota Agricultural Experiment Station, in cooperation with the Minnesota Liquid Fertilizer Company and Paul Kunkel, agricultural agent of Brown County, carried on 12 field experiments (four oat fields and eight corn fields) using anhydrous ammonia and ammonium nitrate as nitrogen fertilizers.

Experiments were not conducted with a third form of nitrogen, liquid nitrogen solutions, but it can be assumed that the results would be about the same as for anhydrous ammonia and ammonium nitrate.

The conclusions are as follows:

Nitrogen Increases Yield

1. Nitrogen from anhydrous ammonia has the same effect as nitrogen from ammonium nitrate in substantially increasing the yield of both corn and oats.

Where the oat fields were not fertilized, the yields ranged from 4 to 67 bushels per acre, with a 39-bushel average. Two hundred pounds of 0-20-10 per acre (0-40-20) had no effect on average yield. Nitrogen alone (40 or 80 pounds per acre) increased yields about five bushels, but when used with the 0-40-20 produced from 5 to 14 more bushels of oats per acre than the unfertilized oats.

Where starter fertilizer alone was used on three corn fields the yields were 72, 92, and 104 bushels of ear corn per acre. The hill-dropping of 400 pounds of 0-20-20 per acre (0-80-80) produced three more bushels of corn. Fifty pounds of nitrogen applied to the soil before planting increased corn yields by 13 bushels, while the 100- and 150-pound rates of nitrogen increased corn yields 15 bushels. This emphasized the fact that three stalks of corn per hill are not sufficient to make efficient use of the heavier nitrogen applications.

The mineral treatment (0-80-80) with nitrogen produced about three more bushels of corn above the nitrogen treatment alone. The nitrogen deficiency was most limiting to plant growth.

On the three harvested fields of sidedressed corn, one phosphate deficient field yielded 81 bushels of corn per acre, with no increase for applying nitrogen. The second field yielded 107 bushels of corn where starter fertilized by the farmer, with 12 bushels more for sidedressing with 40 pounds of nitrogen, and 23 bushels increase in yield when 80 pounds of nitrogen per acre was used. The third field yielded 115 bushels, with starter fertilizer only, 8 bushels more for 40 pounds of nitrogen, and 12 bushels increase when 80 pounds of nitrogen was applied.

Protein Content Also Increases

2. The protein content of oats was increased where fertilizer nitrogen was used, except where large increases in yield occurred. The average protein content of the unfertilized oats on the four fields was 13.2 per cent, with 200 pounds of 0-20-10 per acre having no effect. Forty and 80 pounds of nitrogen per acre increased the oat protein as much as 1.3 per cent.

The average corn protein on the three fields receiving starter fertilizer alone was 9.2 per cent, with the 0-80-80 treatment lowering this to 8.8 per cent. Fifty pounds of nitrogen produced corn with 9.8 per cent protein, and the heavier nitrogen treatment gave a further increase to 10.0 per cent. The 0-80-80 with nitrogen produced a small additional increase. Nitrogen sidedressing of the corn gave essentially the same increase in corn protein.

More Yield of Protein

3. The yield of protein per acre from both oats and corn was substantially increased with nitrogen applications. The unfertilized oats averaged 157 pounds of protein per acre with no increase where 0-40-20 was applied. Nitrogen alone produced 35 pounds more protein per acre, and where minerals were used with the nitrogen, this increase was doubled.

Where starter fertilizer alone was used on the corn, the average protein yield was 500 pounds per acre with 0-80-80 showing no effect. Nitrogen alone increased protein by 110 to 170 pounds per acre, and when minerals were included with the nitrogen, the increase varied from 130 to 190 pounds more protein than where the corn received the starter fertilizer only.

4. It has been generally assumed that commercial fertilizers are more effective on land where the fertility is at a low level. The results with nitrogen in 1953 indicated that well managed soils also respond very well.

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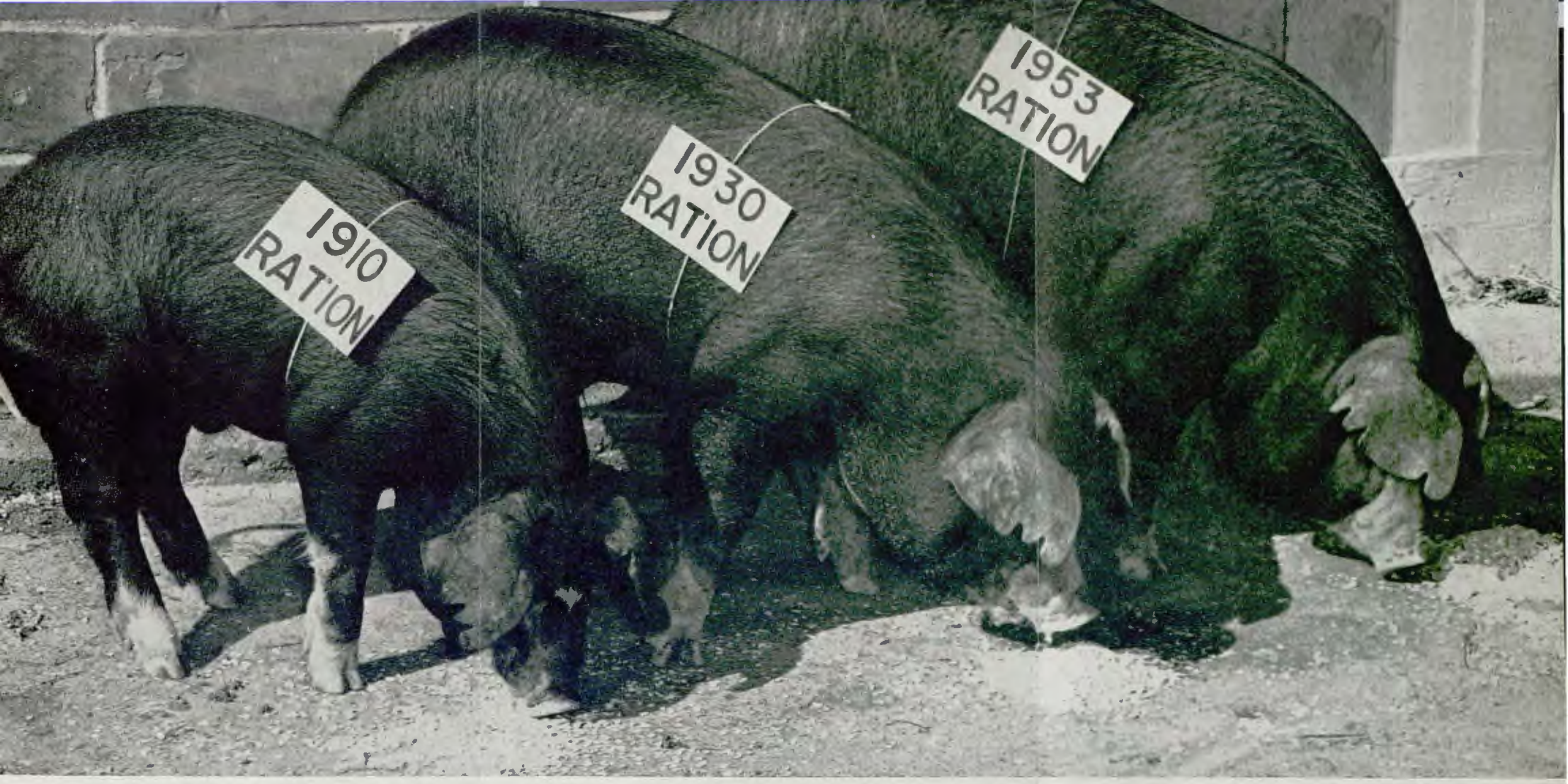

MODERN HOG RATIONS PAY

Save $14.00 in Feed per Pig over Old Rations

The Demonstration . . .

A simple but spectacular demonstration last summer showed the value of feeding modern swine rations and emphasized how important research has been to the hog industry.

This demonstration was carried on by L. E. Hanson, professor of animal husbandry at the University of Minnesota.

It was started May 28 when Hanson placed one pig from each of six litters on a 1910 ration; another on a typical 1930 ration; and a third group on a 1953 ration.

The pigs had just been weaned and averaged 51 pounds each. Except for the rations, they all received the same care. After 2½ months the results were amazing (see picture above). After 3½ months (see chart at right), the modern ration's advantages were even more marked.

On September 9, the 1953-fed pigs weighed 242 pounds; the 1930-fed pigs, 161 pounds; and the 1910-fed pigs a scrawny 118 pounds. And the modern ration took much less feed per 100 pounds gain, too.

Here's what the rations included:

1910 RATION—97 per cent corn and 3 per cent complex minerals plus vitamins A and D, self-fed.

1930 RATION—1910 ration plus tankage.

1953 RATION—Corn plus a modern complete supplement including soybean oil meal, tankage, linseed meal, alfalfa meal, steamed bone meal, trace mineralized salt, B-complex, and traces of B-12 and antibiotics. This ration was self-fed.

The Results . . .

RATION FED	AVERAGE DAILY GAINS (in pounds)	FEED PER 100 POUNDS GAIN		
		CORN (in bushels)	TANKAGE AND MINERAL (in pounds)	SUPPLEMENT (in pounds)
FROM WEANING (51 POUNDS) TO 125 POUNDS AVERAGE WEIGHT				
1910	0.64	9.1	(mineral only) 16	
1930	0.96	5.7	44	
1953	1.70	4.3		59
FROM 125 POUNDS TO 135 POUNDS (1910 RATION) AND 200 POUNDS (1930 AND 1953 RATIONS)				
1910	0.34	15.1	(mineral only) 26	
1930	1.63	6.8	27	
1953	1.92	6.1		45
FROM WEANING (51 POUNDS) TO 200 POUNDS AVERAGE WEIGHT				
1910	0.45*	12.1*	(mineral only) 21	
1930	1.20	6.3	35	
1953	1.81	5.2		52

* Estimate based on record to October 20.

Record of Pigs Fed 1910 Ration up to October 20 and then Fed the 1953 Ration to 200 Pounds

	Results on 1910 ration (September 19 to October 20)	Results on 1953 ration (October 20 to November 24)
Average daily gain (pounds)	0.34	1.96
Average daily feed (pounds)	3.00	6.60
Feed per 100 pounds gain	870	335

Swine Feeding Research Made This Progress Possible

UNIVERSITY OF MINNESOTA INSTITUTE OF AGRICULTURE

Rhree New Varieties Tecommended

EDITOR'S NOTE—In the December 30 issue of Minnesota Feed Service we listed crop varieties recommended by the University of Minnesota. Here are the changes since then:

Three new varieties of small grains—one each of rye, oats, and wheat—have been added to the recommended list of the University of Minnesota, according to W. M. Myers, head of the Department of Agronomy.

Rye—The new rye variety is Caribou, developed in Canada. Recommended ryes now include Emerald, Imperial, and Caribou.

Oats—The new oat, Missouri 0-205, is resistant to Race 7 of stem rust as are the recommended varieties Andrew, Branch, and Ajax. The other varieties recommended are Clinton, Bonda, Mindo, Shelby, James (a hull-less variety), and Clintafe, and they are resistant to Race 8 of stem rust.

Branch and Ajax have moderate resistance to Race 45 of crown rust, prevalent in recent years. Clintafe is resistant to all known races of crown rust.

Spring wheat—On the spring wheat recommended list are Willet, Lee, Rushmore, and Mida. Rival was removed from the list because of inferior performance. Willet is a new variety developed by the University and will be available on limited basis in 1955.

The new Canadian variety, Selkirk, is not on the recommended list because of lack of complete information. It is on the list accepted for certification by the Minnesota Crop Improvement Association.

Flax—Three flax varieties—Redwing, Minerva, and Koto—were removed from the list. Now recommended are Redwood, B-5128, and Marine. These varieties are immune from rust. Both Redwood and Marine are resistant to wilt while B-5128 is moderately susceptible. Marine shows the greatest pasmo resistance.

Corn—Three corn hybrids were added to the list—Minhybrids 609, 707, and 711. Minhybrid 609 has about a 95-day maturity and 707 and 711 about a 90-day maturity. Minhybrid 602 was removed from the list.

Arrowhead sunflowers are now recommended for growing for feed in central and northern Minnesota.

The rest of the present list of approved varieties follows:

Durum wheat—Carleton, Mindum, and Stewart.

Winter wheat—Minturki and Minter.

Barley—Kindred and Montcalm. Vantage and Peatland are recommended for feed but are not acceptable for malting.

Soybeans—Blackhawk, Renville, Capital, Ottawa Mandarin, and Flambeau. Renville is a new high-oil-content variety developed at the University. It is now recommended for increase, and seed will not be available until 1955.

Bromegrass—Lincoln, Achenbach, and Fisher, all southern bromegrasses.

Red clover—Midland and Wegner.

Sweetclover—Evergreen and Madrid.

Alfalfa—Ranger, Ladak, and Narragansett. Certified Ranger is plentiful and reasonably priced.

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5. Application of nitrogen, especially where used with the phosphate and potash, resulted in the oats ripening from two to seven days earlier than the unfertilized grain.

Applications of nitrogen to the soil produced corn with slightly less moisture at harvest time, whether applied alone or with phosphate and potash.

6. In general, nitrogen should not be applied alone unless considerable amounts of phosphate and potash have been applied to the soil. If the minerals are not available to the plant in ample amounts, nitrogen application should not be expected to increase yields. A starter fertilizer high in phosphate should always be used where nitrogen is applied. One phosphate deficient field of sidedressed corn in 1953 was low in fertility and received no starter fertilizer and nitrogen was of little value.

7. The most profitable rate of nitrogen application will vary with the fertility levels of the different fields. The 1953 experiments showed this to be somewhere between 50 and 100 pounds of nitrogen per acre. Probably about 60 pounds of nitrogen per acre will be near the optimum on most of our fields unless very high yields are desired.

8. The residual fertility or carryover effect of the nitrogen to crops in the following years is not well established, and the 1953 fields will be studied as long as possible to find the answer. Until this effect is better known, it would be unwise to fertilize the same field with direct nitrogen applications in two consecutive years.

9. Direct application of nitrogen to soil for small grains should be made before seeding or burning of the vegetation may result. Nitrogen may be applied for corn from before planting time until early July when the crop becomes too tall for the passage of the applicator.

10. Two years of experiments with applying fertilizer in the fall and in the spring have shown that fertilizer applied in the fall is just as effective as when applied in the spring, except on very sandy soils.

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