

MANGANESE CONTENT OF SOME SOUTH DAKOTA FEEDS

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Until recently interest in the manganese content of feeding-stuffs was more or less academic. With the discovery of the important role of this element in poultry nutrition the manganese content of feeds has become of considerable importance.

Peterson and Lindow¹ in 1928 determined the manganese content of a number of vegetables and concluded that no definite relation seemed to exist between the manganese content and the variety, size or date of harvest of the vegetables. In 1931 Carlyle² studied the manganese in Texas soils and its relation to crops. He concluded that plants grown on one kind of soil may contain from two to five times as much manganese as the same kind of plants grown on another soil and that even though some Texas soils contain only small percentages of manganese, the requirements of the plant are so small that the soil is much better supplied with manganese than with nitrogen, phosphorus or potassium. Several other workers have investigated the manganese content of various plants and soils. Most of the results would indicate that there are a number of factors which influence the absorption of manganese from the soil. The manganese content of feeds from various sections of the country show considerable variation.

Within the last two years manganese has taken a prominent role in poultry nutrition. Diets high in bone meal or calcium and phosphorus very often produce a condition known as slipped tendon, perosis or hock disease. This condition or disease is characterized by a bowing of the leg at the tibio-metatarsal or hock joint and enlargement with a tendency toward flattening of the joint and finally the slipping of the Achilles tendon from its normal position. Wilgus and coworkers³ in 1936 reported that perosis or slipped tendon could be prevented by the addition of a small amount of manganese to the diet.

Wilgus and coworkers made this discovery while feeding a low grade of calcium phosphate in an effort to produce slipped tendon. Upon analysis they found that the salt contained manganese. Subsequent trials with manganese proved that it was effective.

Lyons, Insko and Martin⁴ in 1937 injected manganese into eggs before incubation and found that 15.45 mgm. of manganese per egg was very effective in preventing perosis.

Recent work indicates that a ration containing from 30 to 50 p.p.m. of manganese will prevent perosis. Gallup and Norris⁵ have reported that 30 p.p.m. of manganese completely prevented perosis in White Leghorn chicks while 50 p.p.m. did not give full protection to New Hampshire chicks. With these figures on the manganese requirements on hand the analysis of poultry feeds for manganese is of practical value. As feeds come into the laboratory for the regular approximate analysis the unused portions of the samples are kept on file. Manganese has been determined in a number of these samples.

Method of Analysis

Ten gram samples of feeds are ashed at 1300°F. The ash is dissolved in nitric acid with an excess of about 1½ cc. About 30 cc. of water is added to the crucible which is then placed on a hot plate and the contents are brought to boiling. At this point 0.3 of a gram of potassium periodate is added and the material is stirred with a small glass rod and evaporated to about 10 cc. volume. The solution is made up to volume in a 25 cc. volumetric flask and then transferred to test tubes and centrifuged. The supernatant solution is compared in a colorimeter with standards prepared from potassium permanganate. By adding a small amount of potassium periodate as a preservative the standards can be kept for several weeks.

Results

The manganese content of twenty-six samples

Sample	Parts Per Million Manganese
#570 Corn	7.0
#594 Corn	9.0
#664 Corn	2.0
#665 Corn	7.0
#770 Corn	2.0
#771 Corn	6.0
#1898 Corn Silage (dry)	32.0
#459 Wheat	34.0
#582 Wheat	40.5
#607 Wheat	60.0
#712 Wheat flour	2.8
#715 Wheat bran	118.0
#697 Wheat protein (acetic acid purified)	5.0
Wheat protein (contains some bran)	22.0
#531 Barley	19.0
#585 Barley	14.0
#586 Barley	14.0
#471 Rye	38.0
White Millet	9.0
Yellow Millet	11.0
Rolled Oats	35.0
#1896 Pepper grass seed	35.0
Creeping Jenny Seed	55.0
Sunflower (whole plant)	33.0
Alfalfa hay	37.0
Aster multiflorus (whole plant)	43.0

The manganese content of a number of South Dakota soils has been determined and the range is from 274 to 837 p.p.m.

Bibliography

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