Gene Mutations in Corn Improve Feeding Value

Plant scientists at The Pennsylvania State University have found that corn containing mutant genes can improve the nutritional quality of animal feeds. Such corn enables animals to use plant protein more efficiently than corn with normal genes, according to Dr. Douglas L. Garwood and Dr. John S. Shenk, assistant professors of plant breeding. They add that corn from certain mutant genes may also be more digestible than normal corn.

The findings are part of long range studies by plant scientists to improve the nutritional value of food crops. Plant breeders have recently produced varieties with high percentages of polyunsaturated fats, high sugar sweet corn hybrids, and crops with increased amounts of various minerals.

Weight of laboratory rats and meadow voles doubled at Penn State when the animals were fed mutant genes known as opaque-2 and a combination of opaque-2 and sugary-2, compared with weight gains from normal corn or the sugary-2 mutant gene alone. Rats and meadow voles (field mice) were used because they could be fed the limited grain available from plant breeding studies. Also, the rat has a single stomach while the meadow vole has a more complex digestive system with a greater capacity to digest fiber.

The Penn State scientists used 5 naturally-occurring maize mutant genes in their experiments. All mutant genes were examined individually and in various combinations for digestibility. The three genes not mentioned earlier were known as amylose-extender, dull, and waxy.

The experiments showed that digestibility of corn can be improved by using mutant genes. A laboratory procedure was used to simulate the rumen digestive system by using rumen fluid from the stomach of a cow to digest the experimental corn. Waxy and double waxy mutants with full-sized kernels were highest in digestibility. Mutants with amylose-extender were the least digestible.

Drs. Garwood and Shenk explain that a gene is a unit of inheritance. Each hereditary factor or gene controls the formation of a specific component of the plant. In a plant having a mutant gene, an altered or non-normal product results.

The value of mutant genes in corn was described recently by Drs. Garwood and Shenk in a special foods issue of "Science in Agriculture," the quarterly magazine of the Agricultural Experiment Station at Penn State. Copies are available free from the Agricultural Mailing Room 112 Ag. Adm. Bldg., University Park, Pa. 16802.

The quality of a food protein, the researchers point out, depends primarily on the level of a specific amino acid in the protein. Amino acids are the protein building blocks which develop muscle and maintain vital bodily functions.

Unfortunately, proteins found in corn, barley, wheat, rice, and sorghum are low in amino acids such as lysine. The lysine definciency becomes apparent when corn, for example, is fed as the sole source of protein to single-stomached animals like humans and pigs. These animals are unable to build adequate protein from corn alone and growth is retarded.

Corn with the opaque-2 mutant gene has been shown to overcome amino acid deficiency, and has been termed "high-lysine corn." Corn hybrids containing this gene have an amino acid composition that makes the grain suitable for food or feed without adding supplementary protein. A similar gene has been identified in barley and sorghum, say the Penn State scientists. Reports suggest that high-lysine wheat may be developed.

Widespread adoption of the opaque-2 corn hybrids has been slowed by softness of the kernels. Soft and "floury appearing" opaque-2 kernels contribute to increased problems in harvesting and storage compared to normal corn.

Bank Directors OK 4-for-1 Stock Split

The shareholders of the First National Bank of Strasburg approved a stock split and an increase of capital at their annual meeting on January 22, 1974.

The four for one stock split will increase the number of shares of capital stock outstanding from 50,000 shares to 200,000 shares and the par value of each share will be changed from $10.00 per share to $2.50 per share.

Also approved was an increase in capital by the sale of 50,000 shares of Common Stock of $2.50 par value each, at a sale price of not less than $20.50 per share. Shareholders will receive transferable subscription warrents exercisable until 12:00 noon, February 25, 1974.

The shareholders reelected the following Directors: L. H. Brubaker, John E. Burkholder, J. Everett Fisher, Howard E. Groff, J. Lloyd Harnish, J. Robert Hess, Donald H. Hoffecker, William M. Musser, Jr., A. F. Witmer, and C. M. Woerth.

The Board of Directors then held their annual reorganizational meeting. Donald H. Hoffecker, executive vice president of the Bank, announced the election of the following officers of the Board: J. Lloyd Harnish, Chairman of the Board, William M. Musser, Jr., president, John John E. Burkholder, vice president, and L. H. Brubaker, secretary.

Over 160 attended the shareholders meeting which was preceded by a luncheon at Historic Strasburg's Washington House where Miss Tina Louise Thomas, Miss Pennsylvania, entertained the group with a selection of gospel songs.