SPECIAL ARTICLES

A NUTRITIONAL STUDY UPON A FUNGUS ENZYME[1]

POSSIBILITIES in a comparatively uninvestigated field of nutrition have been suggested by the feeding of a vegetable fungus enzymic material called protozyme to growing chicks in a preliminary test at the New Jersey Agricultural Experiment Station. Over a thousand Leghorn chicks of both sexes were used in the investigation for a period of seven weeks, after which the males were eliminated. The test has now continued for a period of twenty weeks. The birds in question are divided into five groups. All receive a normal scratch mixture daily of cracked cereal grains and a ground mash mixture of bran, middlings and corn meal. All have free access to liquid skim milk. The enzymic material is incorporated in the mash mixture as follows: 5 per cent. of the weight of the mash in Group 1, 3 per cent. in Group 2, 2 per cent. in Group 3, 1 per cent. in Group 4 and none in Group 5. Group 5, consuming no accessory enzymic material, acts as a check upon the other four groups.

During the twenty-weeks' feeding in every instance the chicks consuming the enzymic material have manifested a more rapid growth than those not consuming it. The following table indicates the feed consumed and growth attained.

SUMMARY OF GROWTH AND FEED CONSUMPTION UPON LEGHORN FEMALES CONSUMING DIFFERENT AMOUNTS OF FUNGUS ENZYMIC MATERIAL—END OF TWENTIETH WEEK OF AGE

Amount of fungus enzymic material in mash	Number of chicks	Mean weight lbs.	Mean total grain consumption lbs	Mean total mash consumption lbs.
5 per cent.	100	3.24	7.65	8.31
3 per cent.	100	3.03	7.67	8.31
2 per cent.	100	2.89	7.68	8.27
1 per cent.	100	2.80	7.70	8.21
None	95	2.65	7.77	7.73

Duplicate qualitative tests upon material taken from the crop and gizzard at the end of the sixth week of age indicated increased starch and protein digestion in individuals consuming the enzymic material over those not consuming it.

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[1] Paper No. 244 of the journal series New Jersey Agricultural Experiment Stations, Department of Poultry Husbandry.

GASTRIC TRANSPLANTATION

THE study of gastric motility as ordinarily carried out is attended with many technical difficulties. It was conceived that it might be possible materially to reduce these difficulties by transplanting the stomach to a subcutaneous locus so that it could be viewed directly from the outside. Whether the animal could survive such an operation, maintain normal nutrition and gastric movements was the crux of the problem.

The problem was attacked in the following way, using young albino rats. The animals were given no food for twenty-four hours before the operation and none for twenty-four hours after. A median longitudinal incision of 2 cm was made through the abdominal wall along the linea alba. The stomach was lifted through this opening and the abdominal muscles sutured together beneath it, but leaving openings sufficient to transmit the esophagus and the pylorus. These structures were anchored to the abdominal wall by two stay sutures each. Then the integument was dissected back from the muscle laterally on each side to form a pouch for the stomach. The cut edges of the skin were brought together and held by continuous sutures closing the incision. Thus the stomach was covered on the outside by skin and lay between the skin and the abdominal muscles. In two weeks the incision was healed and the animal ready to be observed. Of ten animals first subjected to the operation five lived. Later five more animals were operated on and all lived for considerable periods. Three are alive and apparently normal at the end of nine months. These have been studied with care. They show a normal weight graph, normal appetite and apparently normal peristalsis. They have at no time shown signs of esophageal or pyloric stasis.

The contour of the stomach and its contraction waves can readily be seen through the skin. To permit study of these contractions the rat is placed in a small glass-bottomed cage. This cage is suspended above a bench upon which the observer reclines.

At present the writer is working on the question of the relation between gastric contractions and muscular activity. The observation cage is suspended from one end of a Fitz pneumograph (Porter type) which is connected through rubber tubing with a tambour (Durrant method).[1] This is a highly sensitive method of detecting movements of the animal. For example, the rat's nibbling a grain of corn sets the system into marked oscillations. The tambour is adjusted to write on a revolving extension kymograph drum. Below the tambour lever is adjusted a signal magnet with simple key in circuit and a chronograph.

[1] Durrant, *Am. J. Physiol.* (Balt.), 1924, *70*, 344.

A point is marked on the skin about half way between the cardiac and pyloric ends of the stomach. Whenever a wave is seen passing this point the simple key is closed, thus recording it on the drum. A single stroke represents a shallow wave, two strokes a medium and three strokes a deep wave. When the animal shifts its position so as to obscure the view the signal key is depressed until a readjustment of the posture is secured.

A fairly high correlation between muscular movements and gastric peristalsis as postulated by Richter[2] is evident. Frequently in the quiescent animal gastric contractions become shallow or apparently entirely cease. These suddenly become deeper, whereupon the animal at once arouses to activity and carries out sundry movements, such as washing or scratching. More frequently, however, it has been observed that muscular activity immediately precedes rather than follows augmented gastric motility.

A detailed account of the observation will be published later.

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THE IOWA ACADEMY OF SCIENCE

THE thirty-ninth annual meeting of the Iowa Academy of Science was held at the Iowa State Teachers College, Cedar Falls, Iowa, on May 1 and 2, 1925.

Officers were elected as follows: *President,* R. I. Cratty, State College; *vice-president,* C. E. Seashore, State University; *secretary,* P. S. Helmick, Drake University; *treasurer,* A. O. Thomas, State University; *editor,* Willis DeRyke, State University; *representative to American Association for the Advancement of Science,* D. W. Morehouse, Drake University.

The following papers were presented:

BACTERIOLOGY

(Iowa State College Branch, Society of American Bacteriologists.)

Section Chairman, Max Levine, State College, Ames.

Some notes on trickling filters in the purification of creamery wastes: MAX LEVINE.

Bacterial decomposition of sugars and acids: JOHN H. WATKINS.

Yeasts in bottled carbonated beverages: W. R. TURNER.

Effect of reaction on the growth of yeasts: J. C. WELDIN.

The development of metallic flavor in buttermilk: M. P. BAKER and B. W. HAMMER.

The influence of carbon dioxide on the quality and keeping qualities of butter and ice cream: F. F. SHERWOOD.

The production of hydrogen sulphide by bacteria: F. W. MULSOW and FRED S. PAINE.

Unsolved problems related to the inoculation of legumes: LEWIS W. ERDMAN.

Some bacteriological activities in manures: A. J. ENGLEHORN.

Bacteriological activities in an orchard soil: R. H. WALKER.

Do we have "niter spots" forming in Iowa? PAUL EMERSON and DON S. GRAY.

Teaching the elementary course in bacteriology: R. E. BUCHANAN.

BOTANY

Section Chairman, G. W. Martin, State University, Iowa City.

Genetic correlation between fruit size and color in the tomato: E. W. LINSTROM.

Some Aminitas from eastern Iowa: G. W. MARTIN.

Notes on Iowa fungi—1924: G. W. MARTIN.

Some soil and moisture relationships of sweet gum and river birch in southern Maryland: FRED B. TRENK.

The occurrence of hickories in Iowa in relation to soil types: FRED B. TRENK.

The formation of root hairs in water: CLIFFORD H. FARR.

Ceratophyllum demersum in West Okoboji lake: EDWARD N. JONES.

Microsporogenesis in Cucurbita maxima: EDWARD F. CASTETTER.

Chromosome studies of Zea Mays L.: R. G. REEVES.

An abortive lily anther: CHARLES A. HOFFMAN.

Some wound responses of citrus leaves: ROBERT B. WYLIE.

Culture studies on Psilocybe coprophila: KATHRYN GILMORE.

A partial list of the parasitic Ascomycetes of Iowa: JOSEPH C. GILMAN.

A trip in the Iron Range Country: L. H. PAMMEL.

Some notes on the flora of Forest and Florence counties, Wisconsin, and Iron county, Michigan: L. H. PAMMEL.

Germination of some pines and other trees: L. H. PAMMEL and C. M. KING.

Our native plants (an article appearing in the Iowa Farmer and Horticulturist, Vol. 1, No. 7, Nov., 1853): L. H. PAMMEL.

A provisional list of the species of Septoria in Iowa: B. N. UPPAL.

A tree census of Mount Pleasant, Iowa: H. E. JAQUES.

The physiographic ecology of a Wisconsin drift lake: LOIS A. CATLIN and ADA HAYDEN.

Iowa in the botanical manuals: B. SHIMEK.

Deforestation and stream pollution: B. SHIMEK.

Some noteworthy Iowa fungi of 1925: GUY WEST WILSON.

CHEMISTRY

(Iowa and Ames Sections, American Chemical Society.)

[2] Richter, Comp. Psychol. Monogr., 1922, *1,* Serial No. 2, September.