NUTRITION

Chemical Team Spurs Growth

Antibiotic wonder drugs plus vitamin B-12 give more meat on the nation's poultry and hogs. Discovery of growth kick from this team was accidental.

By ANN EWING

➤ A NEW chemical team is putting more meat on the nation's poultry and hogs. The team is made up of vitamin B-12 and such wonder remedies—antibiotics, they are called—as terramycin, aureomycin, penicillin, streptomycin and bacitracin.

Discovery of the growth spurt of animals when these two factors are added to diets is so new that exact growth effects are still being tested.

Both partners in the team are potent tools for man's good when used alone. The antibiotics are effective against a host of disease-spreading organisms. Vitamin B-12 is one of the most active biological chemicals known, effective in the treatment of pernicious anemia.

The kick to growth these chemicals give when teamed together was discovered accidentally: aureomycin just happened to be in one of the commercial B-12 supplements fed to poultry.

Even without the extra spurt given by the antibiotics, however, vitamin B-12 deals a plenty potent punch:

Extremely tiny amounts of it, so minute you need a microscope to see the dose, will give a miraculous effect to pernicious anemia victims.

Equally small amounts will put weight on hogs, make chickens grow faster and hatch more eggs, give us plump turkeys sooner than by ordinary diet.

Some scientists say young children who are under par and have no appetite, ask for second helpings and improve in alertness and general behavior when fed very small amounts of vitamin B-12.

25 Years of Research

Purified B-12 forms slender, needle-like red crystals. But it took about 25 years of research in two totally different fields to get the pure crystals and to pin on the vitamin its duplicate role as a growth promoter and an anti-pernicious anemia factor.

For many years, farmers and poultry specialists have known that poultry and swine must have certain proteins, particularly during their growth period. And they have known that these necessary proteins are not available from proteins of vegetable growth. On the other hand, ruminants, cud-chewers such as cows or goats, are evidently equipped to make their own required growth factors.

Vitamin B-12 has always been present in poultry and swine feeds. Before the vitamin was identified, it was supplied in natural form by such feed supplements as fish and meat meals and dried skim milk. It was known as the animal protein factor. But there are not enough of the extra feeds to go around, the supply meeting only about half the demand required for the best production of pork and poultry.

With the discovery of the growth spurt given by the antibiotic-vitamin B-12 combination, some poultry specialists are predicting that as much as 90% of the total poultry feed can be made up of this chemical team added to grain, grain by-products and soybean oil meal. Built-up floor litter as part of the diet will help to give the same growth results as the added chemical combination.

The chemical structure of vitamin B-12 is gradually being unfolded. The most surprising discovery, announced almost simultaneously in England and the United States in 1949, is that B-12 contains cobalt. This is the first time that this diet-vital metal has been found in a pure substance of biological origin.

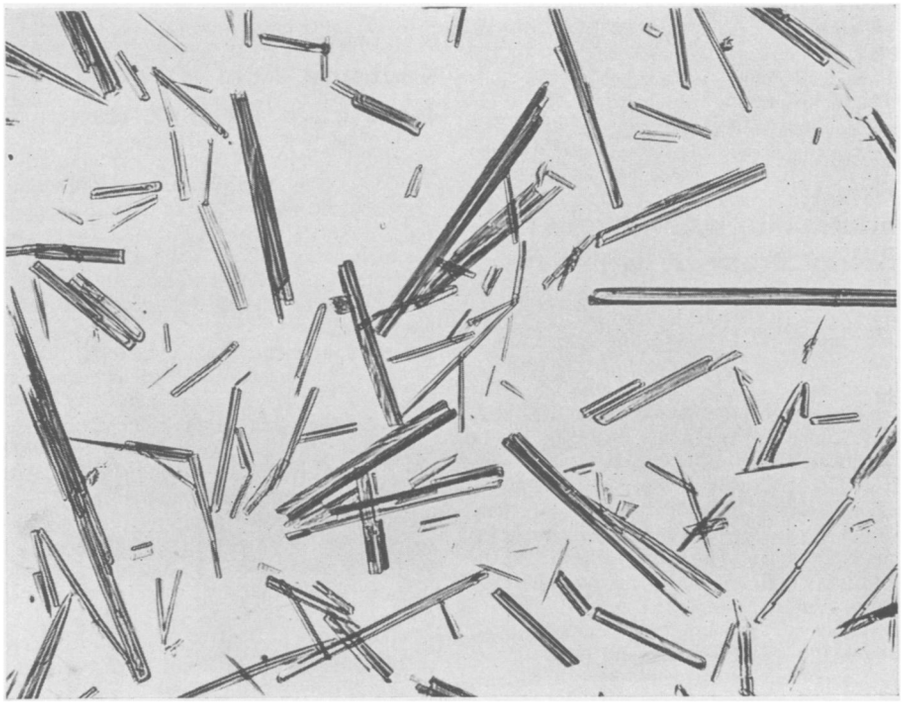
Since cobalt is known to be needed by cows and other cud-chewing animals for the production of milk, scientists are now trying to find what connection there is between that fact and the presence of cobalt in vitamin B-12. Cobalt is needed in very small amounts for good human nutrition.

The story of the discovery of vitamin B-12 begins more than 20 years ago when Dr. G. H. Whipple of the University of Rochester Medical School, Dr. W. P. Murphy, Boston, and the late Dr. G. R. Minot found that eating liver was a workable dietary cure for pernicious anemia. For this achievement they were awarded the Nobel prize in medicine in 1943.

Pernicious anemia is a disease of the bone marrow, site of the body's blood-building equipment. It once claimed more than 50,000 victims per year. Those afflicted with this stubborn, once-fatal disease are not able to produce the required red blood cells in their own bodies.

The liver diet cure, wonderful though it was, was also a difficult one for the patient—for it took about a pound of liver a day to be effective. Liver once a week or so in a moderate helping is a highly-to-be-recommended practice, but eating a pound of liver a day, even spread over three meals a day, is a rather formidable task.

Chemists, therefore, put every effort into concentrating that portion of the liver that saved the anemia-afflicted patients. By 1943, they had succeeded in reducing the amount



VITAMIN B-12—Crystals of the new vitamin B-12, which when teamed with the antibiotics give a kick to poultry and hog growth, shown under a high-powered microscope.

to be taken to the point where patients could survive on only one milligram per day of concentrated liver extract. This is about the equivalent in weight of one piece of a postage stamp cut into 50 parts.

Of this one milligram, only a very small fraction is the part responsible for the extract's healing properties. Yet it takes about a ton of liver to get around 20 milligrams of the potent extract. So the search for the powerful portion continued.

Isolate B-12

In April, 1948, Dr. E. L. Rickes and associates of Merck and Co., announced they had isolated, from highly concentrated liver extract, a few small crystals, the new vitamin B-12. The following week, Dr. E. Lester Smith, of the Glaxo Laboratories in England, announced that he had also isolated the anti-pernicious anemia factor.

Now pernicious anemia victims need take only very tiny doses of vitamin B-12 to hold the disease in check. Recent studies have indicated that each new red blood cell gets one molecule for its very own.

Vitamin B-12 is now being made from the same mold that produces streptomycin, but it is possible that an even cheaper method of production may be found when the riddle of its chemical formula is solved.

Nutrition Research

If it had not been for research in an entirely different field, discovery of the B-12 producing qualities of streptomycin mold might have been long delayed. Scientists in this field wanted to learn more about the diet needs of animals and so improve their growth, thus give humans better food. Intensive work on this problem has also been going on since the late 1920's, although most of the studies were made recently.

In 1946, Drs. C. A. Cary, A. M. Hartman and their co-workers at the Department of Agriculture reported a new factor—they called it "X"—that seemed to be essential for normal growth in young rats. Milk and commercial liver extract were among the substances that would correct a deficiency of this factor.

"Guinea Pig" Micro-Organism

Looking for a guinea pig on which to test this rat-growth factor, Dr. Mary Shorb, working at the University of Maryland, studied the micro-organism, *Lactobacillus lactis Dorner*. She found that this micro-organism required not one, but two factors for growth. One is called the TJ factor for the tomato juice in which it is found. The other is the LLD factor. LLD is the short name for *Lactobacillus lactis Dorner*. This LLD was found in the highest concentrations in liver extracts, and the more potent the liver extract in helping pernicious anemia patients, the more powerful the LLD factor.

Because of this, Dr. Shorb thought the LLD factor required by the micro-organism for growth and the chemical that gave such relief to anemia victims were identical. After crystalline B-12 had been isolated, it was tested with the micro-organism and showed LLD activity. Dr. Shorb's suggestion had been right.

Dr. Rickes then looked for the new vitamin B-12 in other biological materials besides liver, using Dr. Shorb's micro-organism as a guinea pig. He found several. One, a red crystalline compound, was isolated from the mold that gives us streptomycin. Tests showed that this crystalline compound had the same chemical and physical properties as the just-isolated vitamin B-12.

The accidentally discovered growth spurt given by the vitamin-antibiotic combination can be shown by example. Here is how the combination puts extra weight on animals:

Use Less Feed

A typical chicken grower, using the so-called high-energy diet, containing some animal proteins, is doing well if his chickens weigh three pounds at the end of 12 weeks. And that weight is reached only by feeding the flock three pounds of animal-protein enriched feed per pound of gain.

If however, he adds vitamin B-12 to the same amount of feed, his broilers will be up to three pounds in 11 weeks. But with a combination of B-12 and an antibiotic, he can get a three-pound broiler at the end of ten weeks, using only two and a half pounds of feed per pound of gain to reach this added weight in a shorter time.

Exactly which antibiotic combined with vitamin B-12 will give the best growth for chickens, for turkeys and for hogs is now being tested. There is some evidence that results are more promising with one antibiotic for chickens, another for swine.

Thus the search for the anti-pernicious anemia factor in liver and the hunt for better animal feed came together in one vitamin, the twelfth in the series of B vitamins. And this vitamin, combined with one of the antibiotics, is adding greatly to our poultry and hog production.

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GENERAL SCIENCE

Draft Deferred Students Should Have Way Paid

➤ BOYS WHO would be deferred to go to college under new Selective Service regulations but who cannot afford it should have their way paid by the federal government. This is the opinion of Dr. M. H. Trytten, general chairman of the six advisory committees to Selective Service Director Lewis B. Hershey. The six committees were responsible for the new college deferment regulations.

"I believe the time is here when the federal government must give consideration to the support of qualified young men who desire to go to college and cannot afford it," Dr. Trytten reported.

"It has been necessary to provide through Selective Service for the deferment of large numbers of college students in training for the many fields of specialization the nation needs," he went on.

"Congress recognized this need when it wrote the 1948 Selective Service law."

Dr. Trytten pointed out that the six advisory committees strongly advised that something be done about the youngster who did not have the money for college but who did have the ability.

"However," he said, "their responsibility was only to provide a way of carrying out the mandate of Congress. That mandate was that an adequate flow of trained personnel should be provided to meet national needs in the national health, safety and interest through a Selective Service procedure.

"The Committees," Dr. Trytten said, "felt very strongly that this clearly pointed up the question of how to provide equal opportunity for equally qualified youngsters and recommended strongly that early consideration be given by Congress and the government to a program of assistance to such qualified persons."

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