

Antibiotics in Feed Have Little Effect on Pork Quality

CHICAGO.—So far there has been no evidence that antibiotic feeding of hogs to increase their growth rate has any effect on the quality of pork. This was the substance of a report by R. W. Bray, University of Wisconsin, at the meeting of the council of research of the American Meat Institute here March 26 and 27.

The ultimate measure of the quality of meat is the tenderness, juiciness, and flavor as judged by the American housewife. An exact quantitative definition is difficult. Most studies thus far have been on a comparison of the ratio of lean to fat. The results from various institutions conflict to a certain extent, but any differences which have been observed are rather slight. It is difficult to segregate the effects of antibiotic feeding from the effects of other variables, such as protein level of the ration, type, and breed of hog and the length of time the antibiotic was administered.

In Iowa work was done with several different antibiotics in varying quantities. It was found that antibiotics improved growth rate, but had no detectable effect on meat quality. In Minnesota a comparison was made between feeding anti-

biotics at only the early stages vs. feeding antibiotics until the animal was ready for market. The withdrawal of the antibiotic had little, if any, effect on the quality of the meat. There seemed to be some trend towards thicker fat back in the antibiotic fed hogs, but these data have not yet been completely analyzed.

A group of Canadian researchers set up a scoring system to compare meat quality. They found a decrease in the score when B₁₂ and the antibiotics were used in combination.

Work remains to be done on the effect of residual antibiotics on the microflora of the meat. More knowledge of the lability of antibiotics is needed.

By-Products. For many years the profit of the meat packers has come, not from the beef, but from the by-products produced. Recently the value of the by-product in relation to the cost of the live animal has been decreasing sharply, according to H. R. Kraybill of the American Meat Institute Foundation. In 1947 by-products represented more than 11% of the total value of all products produced by the meat packers. This amounted to over \$1 billion. The price

of by-products has been declining steadily. Increased competition from synthetic detergents, nonleather shoe soles, and hydrogenated vegetable oils has cut into the market for these products. More research is needed to develop new uses for the products and to convert them into more valuable materials, according to Dr. Kraybill.

Canning. C. A. Greenleaf, National Canners Association, presented a review of new canning methods. Present canning methods have the undesirable feature of excessively cooking the products. Use of antibiotics and ionizing radiation have been proposed as means of eliminating heat entirely. Subtilin was investigated at Western Regional Research Laboratory. Results were questionable, and, moreover, the Food and Drug Administration has recently outlawed the addition of antibiotics to food.

More effective use of heat is the goal of several new canning methods. Radio frequency dielectric heating offers a means of heating the entire mass simultaneously. At present this procedure is not commercially practicable.

Agitation during sterilization has been used to obtain a more uniform heating of canned goods. This ordinarily is practical only for liquids or liquid-containing products. However, new equipment makes it possible to apply agitation to such a preparation as cream style corn.

Increasing Knowledge of Carbohydrates Changing Food Preparation from Art to Science

THE LAST DECADE's research on carbohydrates has given chemists more and more control over the properties of these most plentiful of the food materials. This theme dominated the symposium on use of sugar and carbohydrates in the food industry, sponsored jointly by the Division of Carbohydrate Chemistry and the Division of Agricultural and Food Chemistry at the ACS meeting in Los Angeles. Ability to manipulate the chemical and physical properties of the carbohydrates plus the extreme versatility of the materials themselves is helping to make food preparation a science.

The choice of a carbohydrate and the physical form of it to be used in particular food products is becoming more and more conditioned on what is known about its chemical and physical properties. For example, sugar's wide range of uses and its flexibility depend on its capability of being completely or partially hydrolyzed to dextrose and levulose. The properties of most native starches are dependent on the linear or branched-chain structure of the poly-

saccharides. Modified starches, which have permitted many new and varied uses of starch in food can be traced in large part to alterations of molecular size and shape. Modern starch hydrolyzates can be virtually custom-tailored to fit exact requirements of the end use.

Candymaking is perhaps an outstanding example of the control of sugar's properties and its versatility, a characteristic required by the candy industry to turn out its more than 2000 varieties of candy. To the confectioner, the most important chemical and physical properties, in order of their importance are: relative sweetness, solubility and crystallization characteristics, density of liquid sweeteners and moisture content of solid sweeteners, hygroscopicity, flavor, fermentation and preservative properties, molecular weight, and osmotic pressure and freezing point depression.

The relative sweetness of maltose, dextrose, and corn sirups, using sucrose as a standard, varies directly with concentration and combinations of these sugars give sweetness values that are

additive if calculated in dextrose terms.

Sucrose has the highest rate of solution and forms super-saturated solutions with the desirable physical property, for candymakers, of withstanding super-cooling—important in the manufacture of hard candy. Invert sugar sirups, high-inversion corn sirups, enzyme sirups, and invert sugar can be used interchangeably on a solids basis to control sucrose crystallization in such grained candies as fondants and fudge. Corn sirups affect cane sugar crystallization to a greater degree than invert and without the attendant handicap of introducing excessive hygroscopic qualities. Dextrose is used to change solubility characteristics and modify the relative sweetness of confections. It also tends to crystallize more slowly than sucrose and, at the same concentration, is less viscous. Sorbitol seems to have plasticizing effects on confections and, besides its low humectant range, keeps candies soft for extended periods of time. New methods of improving the shelf-life and quality of candies, adding to the complexity and

scientific technique of candymaking, are possible with low-methoxyl pectin and polyoxyethylene stearates. The pectins are used to produce jellies containing high percentages of invert sugars or glucose. The polyoxyethylene stearates are providing better dispersion of starch in sugar sirups for making gum drops.

Carbonated beverages, another large user of sugar (13% of last year's sucrose and a considerable dextrose tonnage), employ sugar and other carbohydrates chiefly for their sweetening powers, but also to supply body or mouth feel. About 27% of carbonated beverage manufacturers use dextrose in a 5 to 45% mix with sucrose. In acidulated beverages the sucrose undergoes inversion, but this probably does not alter the resultant sweetness by the time it reaches the consumer. Until recently, bottlers used canners' sugar, but the industry is now promulgating its own standards for sugar to be used in making carbonated beverages, proposing tolerances for color, ash, insolubles, bacteria, yeasts, molds, and test for foreign odor and taste.

The ability of sugar to reduce the brashness of salt is perhaps its most important property to the meat packer. Although not a large user of sugar—an

estimated 50 to 60 million pounds annually—it does perform several important functions in meat preparation and storage, not all of them completely understood. In addition to its softening of the salt taste, sugar, especially reducing sugars, help to retain meat color, possibly through their utilization by microorganisms or the enzymatic systems of the meat tissues. The meat industry uses an estimated 35 million pounds of starches and flours annually for their power to retain moisture during processing and storage of sausages and other prepared meats. They may also serve to stabilize the emulsion of moisture, fat, and protein.

The meat industry is also watching closely recent experimental results which indicate that feeding of sugar shortly before slaughter increases the quality of beef and pork. Higher dressing percentage, better color, and even better flavor have been reported by several investigators.

Flavor and protection are the biggest reasons for the large consumption of sugar by the frozen food and canning industry, which together with the jams, jellies, and preserves, used over 14 billion pounds of sugar in 1950. The frozen

food industry is using less sugar than previously, especially in bulk packing, because more rapid freezing and lower temperatures have reduced the hazard of microbiological storage. In retail packs, sugar is used also for its flavor and consequently the ratio of sugar to fruit is about the same—4 parts of fruit to one of solid sugar or three parts fruit to one part liquid sugar.

In canning, recent developments have been toward increasing acceptance of the starch hydrolyzates in combination with sugar. This was necessary during wartime sugar shortages and the industry has continued to make use of them.

The sweetening agents used in preserves, in addition to flavor properties, increase osmotic pressure to prevent spoilage, contribute to high viscosity for desirable spreading properties, and help to preserve color.

Browning, a sugar reaction that is not yet completely understood, is important to the baking industry in formation of crusts. Since sucrose does not enter into Maillard reaction while invert sugar does, the food technologist can avoid or minimize inversion of sucrose where color is not wanted and promote it where color is desired.

Industry

Supreme Court Refuses to Review Bread Standards

THE SUPREME COURT'S refusal on April 6 to review the Bread Standards case gave Atlas Powder Co. another setback in its attempts to get its bread emulsifier listed as an optional ingredient in bread making. In effect, the Supreme Court's denial of the Atlas appeal upholds the standards of identity for bread as announced by the Federal Security Administrator.

Isaac Fogg, president of Atlas, says that his company will continue to sell its emulsifier MYRJ 50 pending a legal decision on a similar polyoxyethylene monostearate emulsifier which is manufactured by Research Products Co.

Mr. Fogg's statement follows.

"We at Atlas regret that the Supreme Court has declined to review the decision of the Third Circuit Court, which supported the Federal Security Administrator in our legal action regarding certain sections of the FSA Bread Standard Order.

"In this litigation the company had sought to require FSA to reopen the bread standard proceedings—which closed three and one-half years ago—to consider new evidence concerning MYRJ 45, an emulsifier manufactured by Atlas and proposed as an optional bread ingredient.

"Essentially, the company views this matter as a scientific—and not a legal—decision of the Third Circuit Court, which supported the Federal Security Administrator in our legal action regarding certain sections of the FSA Bread Standard Order.

"Essentially, the company views this matter as a scientific—and not a legal—issue. We introduced MYRJ 45 to the baking industry in 1947, after scientific experts, on the basis of testing methods then accepted, had assured us that it was safe for such use. Since that time, test criteria have been expanded and Atlas has continued its research program in accordance with these newly defined procedures.

"Fully cognizant of our responsibilities to the consuming public, we at Atlas have spent hundreds of thousands of dollars for research at leading universities and other independent laboratories to assure the safety of our products used in foods. We are confident of the integrity of these products.

"During more than six years of usage, when billions of bread loaves containing MYRJ 45 have been consumed, there has never been the slightest evidence of injury to any individual—a point which the Food and Drug Administration con-

cedes. Bakers throughout the country have hailed the technological usefulness of MYRJ 45.

"An abundance of fresh evidence on safety has been developed since the bread hearings ended in September 1949. As these data became available, we have sought repeatedly to bring them officially into the bread record. Rebuffed in this effort by the former Federal Security Administrator, Mr. Oscar R. Ewing, Atlas, out of obligation to its customers as well as its stockholders and employees, reluctantly resorted to legal action.

"The FSA Bread Order, issued on May 15, 1952, was scheduled to take effect last August. The U. S. Court of Appeals for the third circuit, however, granted Atlas a stay of the order insofar as it applied to MYRJ 45, pending conclusion of the legal proceedings. On Dec. 22, 1952, the Third Circuit Court ruled, in effect, that Mr. Ewing had acted within his legal authority in refusing to reopen the record. The Supreme Court today declined to review that decision. As a result, the stay granted Atlas by the Third Circuit Court, permitting the company to sell MYRJ 45 to its customers for use in bread, has been terminated.

"In this connection, Research Prod-