sufficient molybdenum may be present to cause toxic levels in herbage eaten by cattle. When this toxicity occurs it may be overcome by use of copper sulfate in the fertilizer or in drenches for the cattle. On very acid, sandy soils in limited areas, molybdenum deficiency has been found in citrus and cauliflower. Applications of molybdenum to the soil, use of molybdenum sprays, and raising soil pH have successfully overcome molybdenum deficiency. Wherever possible, raising soil pH is preferred to molybdenum applications, said Gammon, because molybdenum does not readily leach from acid soils, and there could be a potential danger to cattle if the fields were converted to pasture following repeated applications.

R. M. Sandstedt (right) receives the Thomas Burr Osborne Medal from R. A. Barackman of Victor Chemical, president of AACC. Medal is awarded for outstanding contributions to the field of cereal chemistry.

CarbonDioxide Aids Wheat Storage

Gas in interseed atmosphere has beneficial effect on stored wheat . . . Underground storage of grain found to give effective insect control

DENVER.—Carbon dioxide tensions above 12 to 18% lower respiratory rate, mold count, and fat acidity formation in stored wheat. The widely held conception that to avoid "sick wheat" it is necessary to turn stored grain to keep interseed atmosphere composition the same as that of outside air is false, W. F. Geddes, University of Minnesota, told the American Association of Cereal Chemists at the 39th annual meeting here May 23 to 27.

In laboratory experiments lasting from 14 to 21 days, various gas mixtures of known composition were passed through samples of hard red spring wheat. Air containing small quantities of carbon dioxide was found to increase the time lag in the respiratory rate curve, but later stimulated respiratory activity. However, concentrations above 12% lowered the respiratory rate. Small amounts of carbon dioxide also increased mold count, but above the 13% level there was a sharp reduction in count. Increased carbon dioxide reduced fat acidity values.

Effects of changing oxygen content were found to be opposite to those of varying carbon dioxide. Respiratory rates were decreased by lowered oxygen concentrations. Germ damage, which decreased with increasing carbon dioxide, increased with greater oxygen tensions. Viability rose with larger amounts of carbon dioxide and dropped with increasing oxygen. Molds were rather tolerant of varying oxygen concentrations; unless the percentage of oxygen was reduced quite drastically, there was no effect on stored grain, said Geddes.

Underground Storage. Underground bulk storage of grain was first developed in Argentina, but it has now been found practical for use in tropical climates, according to T. A. Oxley, Pest Infestation Laboratory, Slough, England. In experimental pits in East Africa, complete control of insect infestation without any need of turning the grain was obtained.

The pits were several yards wide, of a similar depth, and have a considerably greater length. They were lined with concrete, waterproofed, and filled with grain until flush with the top of the pit. A flexible waterproof covering was then sealed over the top so that the compartment was as air tight as possible.

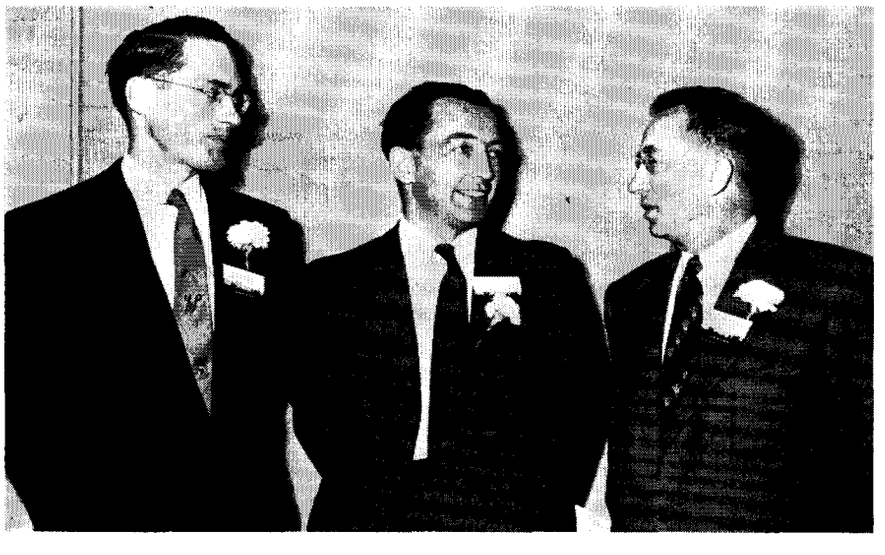
Mechanism of insect control is not clear, but gaseous changes are probably responsible. Carbon dioxide content of the enclosed gas rose but this increase alone did not appear to be sufficient to kill insects. In East African pits which have been studied carbon dioxide content rose gradually to about 8 to 10%. In one pit the level reached 5% and then dropped slowly. Subsequent investigation showed that insect infestation was quite high in this pit.

Heat loss to soil has been suggested as an explanation of the success of the method since the resulting cooling might help. Available data do not indicate that this is responsible. Lowest temperatures measured in East African pits were about 80° F., while those reported in Argentina ran about 73° F.

Corn Steeping. Control of the lactic acid fermentation which takes place during steeping of corn prior to wet milling is critical in controlling the operation of a steeping battery. Heretofore, only standard bacteriological methods have been used to follow the fermentation. A more effective method was described by S. A. Watson of Corn Products.

The technique measures the actual lactic acid producing ability of a sample of steepwater by adding a known amount of dextrose, incubating for a definite time, and titrating the acid formed. Highest relative acid-forming activities were found in the first two of the 12 steep

S. A. Watson, Corn Products; T. A. Oxley, Pest Infestation Laboratory, Slough, England; and W. F. Geddes, University of Minnesota, discuss the work they described before the Cereal Chemists



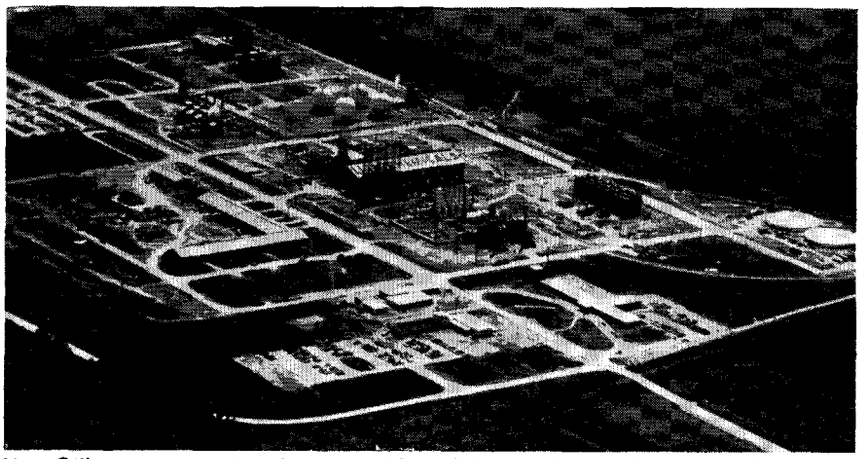
tanks in which the counter-current steeping operation is carried out. Activity dropped to zero in the center tank and subsequent tanks in the sulfur dioxide end of the battery.

Inoculum of lactic acid bacteria comes chiefly from process water which is drawn from other milling operations for use in steeping, although some comes from the raw grain. Poorest grades of corn give best inocula, but since it is desired to mill the better grades, the wet miller must rely on process water for the major source of lactic acid bacteria in steeping.

Correction

The report of the meeting of the Nutrition Foundation (AG AND FOOD, May 26, page 540) contained an error in the discussion of the effects of trace elements in bone and muscle development. George Davis of the Florida Agricultural Experiment Station reported that rats on a low copper high molybdenum diet suffered almost complete noncalcification in ribs. Higher manganese supplements alleviated, but did not completely eliminate, the trouble in rabbits. The previous report was incorrect in the statement that the rats suffered almost complete calcification of ribs.

Industry



Lion Oil's new ammonia plant near New Orleans. In the foreground is the anhydrous NH_3 area and, behind it, the nitric acid plant. Pelleting area for ammonium nitrate is in the background

Lion Oil Starts New Ammonia Operations

Barton plant's 90,000-ton annual nitrogen capacity raises Lion's production to more than 250,000 tons

LULING.—Production of Lion Oil's new plant in St. Charles Parish is now up to design capacity, 300 tons per day of anhydrous ammonia. Located on the West bank of the Mississippi River 14 miles upstream from New Orleans, the Barton plant, added to the El Dorado operations, provides Lion with the largest chemical division of any oil company of proportionate size.

The new plant (designed by Chemical Construction) will have a year-round average daily production of 300 tons of anhydrous ammonia; approximately 250 tons will be converted into 550 tons of pelleted ammonium nitrage, the remaining 50 tons will be sold for industrial and agricultural uses. As part of the basic production Lion's nitric acid plant will manufacture 430 tons of acid per day to be used in the

A view of one of the 210-foot pebbling towers at Lion Oil's new ammonia plant near New Orleans