

**Calorie Levels per Capita and Percentage of Calories From Food Groups by Subregion in Ascending Order of Percent of Calories from High Carbohydrate Foods, Average 1959-61**

Subregion	Calorie level	High carbohydrate foods	Wheat	Rice	Other grains	Other starchy crops	Pulses and nuts	Sugar	Vegetables and fruits	Fats and oils	Meat fish and eggs	Milk products
United States .....	3,190	40	17.4	0.9	2.5	3.1	3.3	15.7	6.2	20.5	16.9	13.5
Canada .....	3,100	42	18.8	0.6	1.9	4.5	1.9	16.3	4.8	15.1	22.0	14.1
Oceania .....	3,260	43	25.2	0.6	1.3	2.7	1.3	13.4	4.7	14.3	24.8	11.7
Northern Europe .....	3,060	48	23.4	0.6	4.0	6.9	1.7	13.4	4.5	17.8	16.4	11.3
River Plate .....	3,200	56	33.2	1.7	2.3	6.0	1.0	12.4	3.3	12.5	21.0	6.6
Southern Europe .....	2,720	60	40.1	2.4	3.8	6.0	4.4	7.6	7.4	15.6	6.9	5.8
Eastern Europe .....	3,000	66	32.1	1.0	16.5	7.8	1.3	8.5	2.9	11.4	11.9	6.6
Central America and Caribbean ..	2,240	69	8.8	9.4	23.0	12.7	5.9	15.0	4.2	8.6	7.4	5.0
Mexico .....	2,580	70	11.1	1.6	42.2	1.8	8.0	13.0	2.8	8.1	6.1	5.3
Other South America .....	2,260	70	16.9	5.9	16.0	15.5	3.9	15.9	3.9	7.5	9.0	5.5
Brazil .....	2,710	71	8.6	14.5	11.2	20.9	8.9	15.4	2.3	5.9	8.4	3.9
Southern Africa .....	2,670	72	14.0	1.1	41.6	1.1	1.7	14.0	2.4	5.3	12.4	6.4
West Asia .....	2,350	72	48.0	4.2	8.8	1.6	4.1	9.8	7.6	8.1	4.0	4.2
USSR .....	3,040	73	35.7	0.8	16.9	9.9	1.4	9.8	1.9	8.9	8.1	6.6
North Africa .....	2,210	73	26.4	3.1	36.2	1.3	5.7	6.1	6.1	6.0	4.3	4.8
India .....	2,060	74	11.3	33.1	19.0	2.6	13.2	8.2	2.0	4.2	0.9	5.5
Japan .....	2,360	78	11.7	46.9	4.6	7.7	5.9	6.7	4.2	5.0	5.9	1.4
Other East Asia .....	2,150	78	1.8	50.1	7.7	12.7	6.6	5.2	5.4	5.7	4.1	0.7
Other South Asia .....	2,120	79	19.4	47.1	4.9	1.0	5.9	6.7	3.6	4.0	3.0	4.4
West Central Africa .....	2,460	81	1.2	5.7	27.2	45.3	6.5	1.5	1.0	9.0	2.0	0.6
East Africa .....	2,390	83	2.3	8.4	55.9	12.4	6.5	4.3	0.8	3.4	3.6	2.4
Communist Asia .....	1,790	87	12.2	44.3	18.1	11.1	5.9	1.2	1.7	3.1	2.3	0.1

## The Perilous Problems of

# World Agriculture

By George Campbell and John Burnham

**EDITOR'S NOTE:** This is second and concluding portion of an article which began in the November-December 1965 issue of *Progressive Agriculture* in Arizona.

Actually, the size of the world population is less of a food problem than its uneven distribution. Communist Asia, for example, accounts for a fourth of the world population — more than all of Europe, including the USSR, and exceeding the combined population of the Western Hemisphere, Africa and West Asia. India's population represents 14 percent of the world total while, at the other extreme, Oceania, Canada, Central America and Caribbean, River Plate and Southern Africa each has less than one percent.

The authors are extension economist and experiment station editor, respectively.

Despite the pressure generated by limited food supplies and burgeoning populations, efforts to control population have been few and ineffective. By contrast, mortality rates have been reduced sharply, adding to the world problem.

### Japan Controls Births

Among countries with a pressing population problem, Japan alone has faced the grim necessity of rebuilding its economy. Since World War II, Japan has faced the hard fact of limited land resources and a large prospective population growth. Thus, the government took the lead in educating the nation in family planning. By the late 1950's the population increase had dropped below one percent per year.

Efforts have been started in other population-burdened nations, but none has so far been materially effective. India has launched an ambitious program, but in India a large family means economic security for the parents in their old age, an historic fact which has almost closed the door to effective family planning.

Thus we view a world where two-thirds of the people face shortages of food, where diet-deficiencies reflect the low level of living in general. While generous nations can alleviate this condition as a short time emergency effort, the desirable solution is a rapid increase in productivity of the peoples affected.

**The rapid growth of population in the poorer countries, the wide gap between the rich and poor countries,**

**creates a world environment in which war, revolution, and acceptance of dangerous political ideologies is endemic. Thus special efforts must be made in economic and social development in general.**

Since the underdeveloped countries have 60 to 80 percent of their labor force engaged in agriculture, strenuous efforts toward agricultural development are called for. Handicaps of an illiterate labor force, lack of capital, and lack of technical and managerial skills, must be faced. Insufficient food of itself causes impaired health, inertia, low stamina.

Some of these countries have unexploited land resources, where it is possible to increase productivity faster than the growth of population. These areas can meet their problems with development of more tillable land. But most people in diet-deficient lands are in countries where expansion of the cultivated area has not kept pace with the accelerating population in the past quarter century. In those countries there must be, simultaneously, successful development of new arable lands and increase in labor and land productivity of lands already being cultivated. Here the lack of capital and managerial skill shows up.

Uncle Sam, a beneficent neighbor with a surplus of food, has given vast amounts of foods to needy peoples throughout the globe. Such food aid has made important contributions to the direct improvement of diets as well as to economic development. But

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## Reports UA People in Brazil Doing Excellent Job



*The 10-man team of agricultural scientists from this College of Agriculture now working in Brazil is doing an excellent job, and their relations with the host country and its people are excellent.*

*So reported Dr. Antonio Martins Filho, rector of the University of Ceará, visiting college and University of Arizona administrators recently. The UA team of agriculturists is attached to the University of Ceará, in the city of Fortaleza, in northern Brazil. The team has been on the job for nearly two years.*

*Shown above, left to right, Dr. Harold E. Myers of the UA College of Agriculture; Dr. Martins; Dr. Darrel S. Metcalfe, director of resident instruction in the college here, and at extreme right, Dr. Porto, professor of English at the University of Ceará.*

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the potentialities of such aid in directly improving diets are sharply limited.

### **An Impossible Sum**

The cost of filling the world deficit in 1970 would total \$6.8 billion (\$2.5 billion excluding Communist Asia) while the level of exports projected for 1970 under the U. S. Food for Peace Program is less than \$1.8 billion. This program currently accounts for over 90 percent of the total food aid extended by all nations and international agencies. Uncle Sam has carried the lion's share of the burden — but that cannot meet the need.

Expansion of commercial food imports into diet-deficient countries is difficult, simply because those nations do not have the buying power for such purchases. Such imports, projected to 1970, would amount to \$4.6 billion for all the diet-deficit subregions. Export earnings of most developing countries depend heavily on only a few commodities frequently subject to problems of oversupply, or low and sharply fluctuating prices, resulting in unstable export earnings from year to year. Coffee, rubber, cocoa, oil, bananas are typical of such exports.

Thus, many of these countries face persistent unfavorable balance-of-payment problems. With limited foreign exchange reserves and many

high priority demands for imports, food is generally not given a high priority, except in emergencies. Thus, caught between the upper and nether millstones — a nutritional gap and chronic balance-of-payment problems — the food lack in most of the undeveloped countries must be met largely by increased production within those countries themselves. This is a terrific problem.

### **Vast Changes in the U. S.**

To look for a moment at the U. S., which has met its own food needs and — as said above — has been the provider for vast tonnages of foods for needy nations, imaginative techniques and new knowledge have brought vast changes. *In fact, the techniques of agriculture in America have changed more in the past three decades than in the three preceding centuries!*

To list a few:

Hybrid corn has not only vastly increased production of that crop but placed the ears in position ideal for machine harvesting. The hybrid plant also has a sturdier root system, to hold the plant upright.

Artificial insemination of dairy cattle has removed the hazardous herd bull from most Midwest dairy farms, at the same time giving each dairyman opportunity to select sperm from sires carrying genes for tremendous dairy production.

The slow-flying, highly maneuver-

able crop dusting plane, which applies insecticide on fields in all areas of the United States, now has broadened its chores to include rapid, even broadcast sowing of such small-seed crops as alfalfa, rice and wheat.

In the Southwest new Rube Goldberg machines march down a lettuce row, mechanical "hands" feel each head for firmness, signalling knives to cut marketable heads, which go into a conveyor belt on the machine, thence to a platform where workers pack and seal cartons right on the machine, as it travels down the field.

Irrigated areas of America routinely use devices which measure moisture penetration, moisture depth and need, as a guide to irrigation needs.

### **New Era of Hybrids**

Hybrid sorghum has followed hybrid corn into prominence, and work on hybrid barley, wheat and cotton is under way in the research laboratories, greenhouses and fields of the nation's agricultural colleges.

A multi-million dollar chemical industry disciplines plants and insects, selectively attacking harmful insects, increasing leaf growth of crops when that is desired, or defoliating before the crop is to be harvested. Separate chemicals are designed for distinct types of weeds.

A vast new knowledge of chemical fertilizers and their placement has made such plant nutrients vastly more efficient. The potato grower, for example, knows exactly what kind of fertilizer to use, at what depth, how close to the plant's root system, what time is best, and in what amounts.

Crops which a few years ago could not be contemplated as machine-harvested — grapes, tomatoes, nuts, fruit — are now being gathered by new kinds of machines. New types of packing and shipping, too, bring them to market in tip-top condition.

The citrus grower, in an office in his orchard, can look at a panel and see exactly what the temperature is next to each tree on the ground and at fruit height, so that frost hazards can be met with operation of wind machines, smudge pots and other devices.

### **Larger Animal Units**

Feedlot operators with 10,000 animals in their pens, poultrymen with a 50,000 bird flock, dairymen milking 500 cows daily, all now have an interest in computer card systems which measure feed use and efficiency, animal output, economical level of meat

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# Can We Guide Honey Bees?

*Attract them for pollination?  
Repel them from insecticides?*

Developing methods to protect beneficial insects and help them help man is an important part of the research entomologist's job. A search for materials that attract or repel honey bees is a case in point.

As part of continuing studies of insect repellents and attractants, ARS and Arizona scientists have tested 195 formulations for the effect their vapors have on honey bees. They found four formulations that rate weak to moderate as attractants and 18 that rate moderate to strong as repellents.

Although the screening program is providing fundamental information about honey bee behavior, the researchers are looking toward the day when formulas might be used to at-

tract honey bees for pollination purposes. They also say that a repellent added to an insecticide might someday keep bees away from areas in which toxic materials have been used. Repellent materials might even be used to keep bees away from the family picnic.

The experiments were conducted by ARS entomologist A. W. Woodrow and chemist Nathan Green, both of ARS, statistician Henry Tucker of The University of Arizona, and agronomists M. H. Schonhorst and K. C. Hamilton of the Arizona Agricultural Experiment Station.

The researchers noted the reactions of bees when vapors of various natural and synthetic compounds were wafted over them. The tests were conducted in a specially constructed modified olfactometer, an instrument used to determine whether insects are affected by an odor.

If bees moved toward the vapors, the material was rated as an attractant; if they moved away from the vapors, it was rated as a repellent.

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gain, egg laying or milk production. Computer arithmetic is helping to make many of the decisions of the "big operators" in American agriculture.

Even the farm watering pond now has a chemical spread onto its surface to inhibit evaporation. On Southwestern cattle ranches, where water is scarce and evaporation can total as much as 12 feet of water depth annually, that is important.

More and more, too, are products devised, selected and produced for specific market needs. The cantaloup's planting date in the Yuma Valley of Arizona is carefully calculated to get fresh fruit on the eastern market early, when prices are best. The same with bell peppers, lettuce, tomatoes, cucumbers and other produce. New cottons are grown to meet specific fabric needs.

The beef cow's figure is being remoulded, not with an eye for beauty or sturdiness, but to get the carcass size most desired by the supermarket butcher and his customer. Hens are selected to lay eggs of a size and color the customer prefers. The market support for whole milk products, and away from butter, has made the Holstein the nation's dominant breed of dairy cattle.

A marvellous new world of ingenious machines and chemicals, vast new

knowledge about electronics, chemistry, cytogenetics, physiology and pathology of both plants and animals, and about packaging, shipping and marketing, have changed the face of U. S. agriculture.

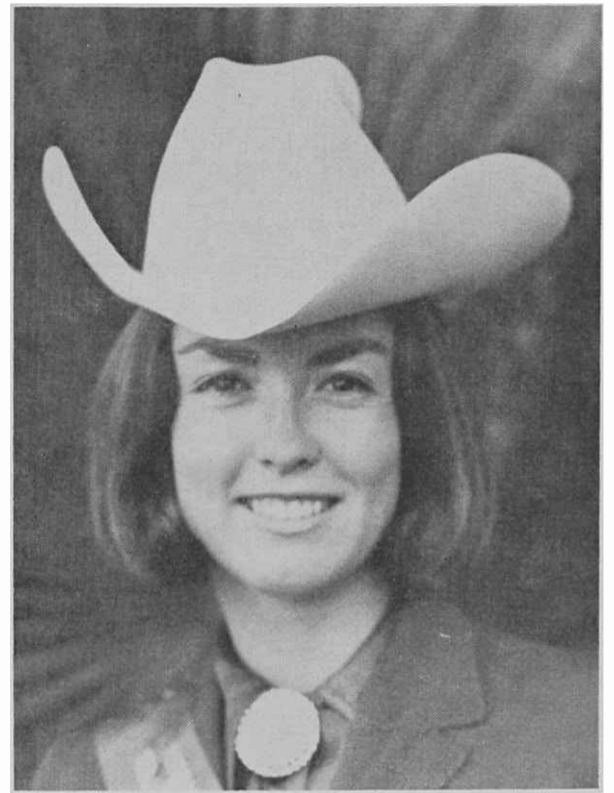
## Grandpa Wouldn't Know It

The farmer of the 1920's would scarcely recognize the machinery on a farm today. The horse-drawn implements and hand tools are mostly gone. The planting, tilling and harvesting of crops, and the feeding and care of livestock, are machine operations, some of them automatic. In fact, the American farmer today uses more petroleum products than does any other industry, and his use of electric power has made private utilities and the Rural Electric Cooperatives scramble to meet his needs.

**America's commercial farm today is no longer a small operation, a family operation with small investment, heavy on sentiment and weak on income. Today it is a business, though often a family business, but a business with a six-figure investment and thousands of dollars expended each year for seeds, fertilizers, fuel and machinery upkeep.**

Whether America can convey this new learning and efficiency to other nations — through the Peace Corps, through the Agency for International Development (AID), through the teams of agricultural extension workers and research scientists from American colleges now working in scores of lands on four or five continents — this may be more important to the future peace, welfare and political

## U of A RODEO QUEEN



sanity of the world than any military or diplomatic effort.

The 1965 University of Arizona rodeo queen is Kathleen Patricia Keogh, as pretty and authentic a rodeo queen as ever was. Kathy's grandfather homesteaded in western North Dakota at the turn of the century, and was a neighbor and associate of Teddy Roosevelt when the former president had the Elkhorn and Maltese Cross ranches out near Medora, in western North Dakota.

Kathy's father, Brooks J. Keogh, is president of the American National Cattlemen's Association, and past president of the North Dakota Stockmen's Association, oldest incorporated association in North Dakota — Roosevelt was one of the 10 incorporators, as was his ranch foreman, John Goodall, sheriff in that area. Also one of the 10 was Frank Keogh, Kathy's grandfather.

The Keogh ranch includes 20,000 deeded acres at Keene, on the edge of the Badlands. The ranch runs a thousand Herefords and also raises quarter horses. Like most ranch-raised girls, Kathy brought her saddle horse to college with her.

Kathy has been North Dakota Quarter Horse Queen, North Dakota Rodeo Princess, and was all-around cowgirl at the North Dakota High School rodeo in 1963. She attended North Dakota University at Fargo as a freshman, transferred to College of St. Catherine at St. Paul for her sophomore year, then came to the University of Arizona last fall.

The photo above was taken by Mike Prime, agricultural journalism student.