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THE UNIVERSITY OF OKLAHOMA
GRADUATE COLLEGE

DECISIONAL INFLUENCES IN PEASANT ANIMAL PRODUCTION:
A CENTRAL AMERICAN COMPARATIVE CASE STUDY

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1972

DECISIONAL INFLUENCES IN PEASANT ANIMAL PRODUCTION:
A CENTRAL AMERICAN COMPARATIVE CASE STUDY

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Dedicated to Lilitana, Georgie, Tony, and Michelle Marie.

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DECISIONAL INFLUENCES IN PEASANT ANIMAL PRODUCTION:

A Central American Comparative Case Study

CHAPTER I

INTRODUCTION

In a world of rapidly expanding scientific frontiers where men are regularly traveling to the moon, it is indeed tragic that food production in many nations is not keeping pace with population growth. Largely because of this, malnutrition, particularly that resulting from protein deficiencies, is a problem for two-thirds of the Earth's peoples, most of whom are living in the developing nations.¹

As a developing region Central America exemplifies the two inter-related problems of malnutrition and rapid population growth. This area's population growth rate of 3.4 percent is the world's highest and if allowed to continue unabated will result in a doubling of the population within the span of twenty years.² Costa Rica, in many ways the most advanced of the Central American republics, is burdened with a population

¹ Robert White-Stevens, "Producing Protein for Seven Thousand Million Humans in the Twenty First Century," Problems of World Nutrition, Vol. IV, Proceedings of the Seventh International Congress on Nutrition, ed. S. Kuhnau, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 929.

² "World Population May Double by 2000," Los Angeles Times, July 10, 1972, Sec. 1, p. 4.

growth rate of 3.8 percent, Latin America's highest.³

Nutritionists recognize protein malnutrition as this region's principal health problem. The majority of the population generally has available to it sufficient quantities of food to satisfy daily calorie needs. However, for the most, this region's food difficulties, as in much of the developing world, result from a shortage of high quality protein foods such as eggs, milk, meat, and fish. The consequences are as would be expected -- a high infant mortality rate, low expectation of life, and a generally poor capability to work because of poor health.

The emphasis of the research reported in this study was largely directed toward examining the significance of cultural factors influencing the production of animal protein foods by peasant farmers at the subsistence level. For an appreciation of the role of such factors, it is important that the extent and severity of protein deficiency diseases within Central America be understood. To assist in providing this understanding, the following discussion of malnutrition and the limitations of current solutions is presented as an introduction to the study.

Protein Deficiency Disease in Central America

The two most prevalent diseases caused by protein malnutrition are kwashiorkor and marasmus.⁴ Kwashiorkor results from a diet mainly composed of starches and low in protein. Its principal ill effects are a

³Willard W. Cochrane, The World Food Problem: A Guardedly Optimistic View (New York: Thomas Crowell Company, Inc., 1969), p. 17.

⁴Nevin S. Scrimshaw, "Nutrition and Infection," Nutrition and Health, Vol. 1, Proceedings of the Seventh International Congress on Nutrition, ed. J. Kuhnau, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 7.

3

retardation of muscular growth, reduced physical growth, possible permanent impairment of mental development, and a greater susceptibility to infectious diseases. Additional symptoms may be edema, loss of hair, change in condition of hair, mental apathy, enlarged liver, and diarrhea.

Although an inadequacy of quality protein is the principal factor in kwashiorkor's causation, a deficiency of caloric intake is usually a contributing condition. This disease occurs most frequently after children aged one to three years have been weaned. It can commonly be precipitated by gastro-intestinal infections.

The other common manifestation of protein malnutrition, nutritional marasmus, is principally caused by a low intake of calories for a considerable period of time together with a shortage in the diet of protein and other nutrients. As in the case of kwashiorkor, a child suffering from marasmus is much more disposed to contracting infectious diseases than is a healthy child receiving a proper diet.⁵

Because of protein deficiencies in their diets, many children of Central America are victims of a vicious cycle resulting from a synergistic relationship between kwashiorkor and infectious disease. Each disease by itself weakens the child's resistance against the other. Any infection, no matter how mild, has a detrimental effect on the way the body utilizes food consumed in the diet. For example, a child whose normal diet is already deficient has even less food made available for metabolism when his body loses it without complete digestion through diarrhea resulting from an infectious disease such as infantile gastroenteritis. On the other

⁵United Nations. World Health Organization. Conquest of Deficiency Diseases: Freedom from Hunger Campaign, Basic Study No. 24, 1970, p. 51.

hand, a child chronically malnourished, principally because of a low protein intake, is less able to produce the necessary antibodies to ward off infectious diseases to which he may be exposed.

The severity of protein malnutrition in its various forms within the populations of Central America, particularly among rural infants and children, is not fully realized. An abundance of statistics exists indicating that the problem is widespread but these usually present a case of much less gravity than is the situation in actuality. Dr. Nevin S. Scrimshaw, a noted nutritionist, states that in the average Guatemalan rural community it is not uncommon for half the children to experience two or more attacks of diarrhea, or perhaps as many as six or seven, in a single year. In addition, respiratory, staphylococcal, and streptococcal infections, as well as common communicable diseases, occur frequently.⁶ These sicknesses combined with a generally low protein diet retard the growth of the children and cause many to succumb to kwashiorkor.

A study conducted by the Institute of Nutrition of Central America and Panama (INCAP) gives evidence of the gravity of kwashiorkor and how its prevalence is not reflected in official statistics of morbidity.⁷ In this study it was found that of 109 infant deaths examined among children ages one to four, one-third died with signs or symptoms of kwashiorkor. However, as shown in Table I, only one of these deaths was officially recorded as being the result of kwashiorkor. Those found to have died from causes other than kwashiorkor commonly exhibited milder

⁶Scrimshaw, Nutrition, p. 8.

⁷United Nations. World Health Organization. Malnutrition and Disease: Freedom from Hunger Campaign, Basic Study No. 12, 1963, p. 19.

degrees of malnutrition which in an indirect way led to their becoming victims of measles, respiratory, or diarrheal diseases, the final agents of their death.

TABLE 1. DEATHS OF CHILDREN ONE TO FOUR YEARS OF AGE
IN FOUR GUATEMALAN VILLAGES

Causes	Source of Information	
	Civil Register	INCAP Study
Respiratory infections	15	15
Infectious diseases	11	14
Parasitic diseases	45	0
Diarrhea	15	25
Severe malnutrition (mostly kwashiorkor)	1	40
Other	22	15
TOTAL:	109	109

Source: United Nations. World Health Organization. Malnutrition and Disease: Freedom from Hunger Campaign, Basic Study No. 12, 1963, p. 19.

Protein and the Central American Diet

Proteins are complex chemical substances composed of simpler chemical compounds called amino acids. Eight of these amino acids are required in the human diet for the maintenance of good health. The amounts of these acids needed to grow new body tissue, produce disease resisting antibodies, and to perform other important metabolic functions have been determined.⁸

⁸White-Stevens, Problems of World Nutrition, p. 925.

The quality of any food as a source of protein is dependent on its content of essential amino acids and the presence of these acids in proper proportions. A deficiency in the proportion of any one acid will restrict the body's utilization of the others. Because animal protein foods such as eggs and milk are better balanced with reference to their amino acid composition, these are given a premium value over proteins obtained from plants.

Cereals, which provide 70 percent of the world's protein, are deficient in certain amino acids and are of themselves incomplete sources of protein for humans.⁹ Diets composed mainly of cereals therefore are greatly improved when supplemented with animal protein foods. This is particularly true in the case of the Central American diet with its heavy dependence on maize (Zea mays). The inclusion in meals of eggs and meat not only increases the total amount of protein but also corrects the imbalance of the amino acids contained in the protein of the maize.

The World Health Organization (WHO) and Food and Agricultural Organization (FAO) in recognition of the important value of animal protein foods, have consistently recommended the consumption of some animal products by all peoples in their daily meals.¹⁰ The ideal minimum consumption of animal protein has recently been established as being between ten to fifteen grams per person per day depending on the physical condition of the individual and the quality of vegetable protein consumed

⁹Addeke H. Boerma, "A World Agricultural Plan," Scientific America, Vol. CCIII, No. 2 (August 1970), p. 59.

¹⁰Ibid., p. 58.

in the diet.¹¹ In the developed world the average intake of animal protein is in excess of forty-five grams while in the underdeveloped world it is only nine grams, less than what is nutritionally desirable.¹²

With reference to large segments of the Central American population the supply of quality protein is particularly acute, even though certain data would suggest otherwise. A country-by-country review of production statistics relating to beef, eggs, poultry, and fish could mistakenly lead to the belief that current domestic production of these foods provides more than the desired daily requirement. However, when factors such as the amount of these foods exported and inequities of purchasing power are considered, it can easily be seen that the minimum protein requirement is not available to much of the Central American population, especially the rural poor. Dietary surveys and nutritional studies conducted since World War II have factually established the distributional severity of the problem not readily evidenced in food or agricultural production statistics alone. With reference to the minimum daily requirement of 10 to 15 grams of animal protein, a study conducted in Guatemala presented evidence indicating 17 percent of the rural population consumed from 0 to 2.5 grams of animal protein and the remaining majority only 5 to 15 grams.¹³

¹¹ Interview with Dr. Arthur Brownlea, George Hooper Medical Foundation, School of Medicine, University of California, San Francisco, November 15, 1972.

¹² United Nations. Food and Agricultural Organization. Possibilities of Increasing World Food Production: Freedom from Hunger Campaign, Basic Study No. 10, 1963, p. 23.

¹³ Institute for Nutrition of Central America and Panama. Evaluacion Nutricional de La Poblacion de Centro America y Panama: Guatemala (Guatemala City: Instituto de Nutricion de Centro America y Panama, 1969), p. 12.

It went on to state that the problem was especially grave for children because of their greater need for protein, a need which is twice that of adults on a proportional basis of weight. The situation in relatively advanced Costa Rica as reported by that nation's Ministry of Public Health is hardly better. In July, 1971, according to a report issued by that ministry, 57.4 percent of Costa Rican children under 6 years of age suffered from malnutrition.¹⁴

In recognition of the extent of malnutrition, Central American governments with the aid of international agencies have been attempting to resolve their food problem. This problem is more qualitative than quantitative in that it is principally caused by shortages of proteins rather than calories. The factors involved in trying to improve the diets of any group are numerous, too numerous to consider in any single program or study. However, any attempt to resolve such difficulties must proceed from an understanding of the composition of the diet to be improved. In the case of Central America, the diet for the majority of the population is composed almost entirely of maize, and to a lesser degree beans. It would in fact not be an over-statement to say that for most of this population, maize is life. There is perhaps no crop in the world whose production is of greater essentiality to a people than maize is to the peasants of mainland Middle America. It is not unusual in Guatemala for 80 percent of the individual's daily food intake to be comprised of maize.¹⁵ The average rural family of six may consume ten to twelve pounds of dry

¹⁴"Ciento Ochenta Mil Ninos Sufren de Desnutricion en Costa Rica," Republica (San Jose, Costa Rica), July 10, 1971, p. 1.

¹⁵E. Higbee, "The Agricultural Regions of Guatemala," Geographical Review, Vol. XXXVII, No. 2 (April 1947), p. 181.

maize kernels each day in the form of tortillas (flat cakes), tamales (patties or balls of corn meal stuffed with vegetables or meats), and atoles (gruels).¹⁶ As the dominant staple, maize monopolizes the amount of labor and land devoted to the cultivation of food crops. Its preparation as a family food demands more of the women's time than does any other chore. The importance of maize is also strongly reflected in the psychology, religion, and folk traditions of Central America. Many of these relationships are pre-Columbian in origin and have only been slightly affected by European culture introduced through the Spanish. As a staple, maize is of greatest significance in the Indian highlands of Guatemala. Within Central America it generally continues to be of basic value in the diet southward as far as Panama, where rice begins to assume a greater importance.

The Central American diet, so dependent upon maize, is nutritionally enhanced through the associated consumption of beans and the method in which maize is commonly prepared as a food. The types and quantities of beans consumed may differ, but on the average most persons consume beans in some quantity at least once a day. While maize contains excess amounts of the amino acid leucine, it is relatively low in lysine and tryptophan, both of which are essential to human health. All pulses, including beans, peas, and lentils, generally have a balanced amino acid composition, and can improve the biological value of maize when eaten in the same

¹⁶Ricardo Bressani, Ramiro Paz y Paz, and Nevin S. Scrimshaw, "Chemical Changes in Corn During Preparation of Tortillas," Journal of Agricultural and Food Chemistry, Vol. VI, No. 10 (October, 1958), p. 771.

meal.¹⁷ Though the pulses are recognized as better sources of protein than cereals, it is worth noting that protein derived from many pulses is of lesser quality than that obtained from animal sources. Consequently, a meal of beans and maize while being higher in nutritional value than one without beans is not as nutritious as a meal also containing quantities of animal protein.

Scientists have recently proven the traditional Central American method for making dough (masa) from whole kernel maize to be uniquely important as relates to health.^{18 & 19} Part of this preparation includes the cooking and soaking of raw maize in a lime solution, prior to the grinding of the kernels. One study found this treatment, while reducing the quantity of protein contained in the maize, improved the protein quality by changing the grain's chemical composition. Another benefit gained from the lime soaking is the release of niacin from chemical bonds. Because of this procedure, pellagra, a deficiency disease resulting from a low intake of niacin, is rare in Central America but common in other maize diet areas where this practice is not followed.^{20 & 21} The lime treatment,

¹⁷V. A. Oyenuga, "Improvement of Nutritional Status in Developing Countries by Improved Food Production: Legumes," Nutrition under Various Geographic and Climatic Conditions, Vol. III, Proceedings of the Seventh International Congress on Nutrition, ed. H. D. Cremer, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 44.

¹⁸Bressani, Paz y Paz, and Scrimshaw, Agricultural and Food Chemistry, pp. 770-773.

¹⁹Ricardo Bressani and Nevin S. Scrimshaw, "Effect of Lime Treatment on in Vitro Availability of Essential Amino Acids and Solubility of Protein Fractions in Corn," Journal of Agricultural and Food Chemistry, Vol. VI, No. 10 (October 1958), pp. 774-778.

²⁰V. N. Patwardhan, "Geographic Distributions of Malnutrition," Nutrition Under Various Geographic and Climatic Conditions, Vol. III, Proceedings of the Seventh International Congress on Nutrition, ed. H. D. Cremer, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 32.

by making available calcium from the lime, is also credited for a generally low distribution of calcium deficiency disorders within rural Central America.²²

Inadequacy of Current Solutions

Satisfying the world's protein needs has been the object of considerable scholarly research. In advancing towards the goal of an abundance of protein, certain achievements have been made. However, these for the most part offer only limited application for a resolution of malnutrition as a current problem in Central America.

The Seas

Following World War II, when the scope of the world's food problems was first beginning to be widely recognized, the seas were assessed as having the potential to provide a boundless supply of rich protein. It was commonly believed that the only limits on tapping this resource were those imposed by the availability of mechanized fishing fleets.

Today, few reputable oceanographers or marine biologists hold such optimistic views. The effects of marine pollution and overfishing are now being experienced; and no longer do increases in capital inputs of fishing fleet improvements guarantee increases in catches of fish. The

²¹Ricardo Bressani, "Improvement of Nutrition by Improved Production of Cereals," Nutrition Under Various Geographic and Climatic Conditions, Vol. III, Proceedings of the Seventh International Congress on Nutrition, ed. H. D. Cremer, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 59.

²²Moises Behar and Guillermo Arroyave, "Geographic Peculiarities of Nutrition: Central America and Panama," Nutrition Under Various Geographic and Climatic Conditions, Vol. III, Proceedings of the Seventh International Congress on Nutrition, ed. H. D. Cremer, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 299.

point of diminishing returns has been reached with many species of fish, crustaceans, sea mammals, and even entire seas. In 1969, for the first time since 1950, there was a decline in the productivity of the oceans; and a drop of 3 percent occurred despite a greater intensification and modernization of fishing. Of related importance was a 2 percent increase in world population during the same year.²³ In 1970 a slight recovery was made through increased catches; but since most of the increase was in fish not used for direct human consumption, the impact on the nutritional problem was somewhat limited.²⁴

Partially because of a decreased supply the rising cost of seafoods has had the effect of placing this source of protein beyond the purchasing grasp of the world's malnourished millions. All attempts to increase the catches of fish will be of little or no value unless the effectiveness of demand in the developing nations is sufficiently improved. It is disheartening to learn that while protein starved Africa and Latin America are realizing increases in the taking of fish, most of this valuable food resource is diverted through exports to the richer and more attractive markets of Europe and North America.²⁵

Much of the hope initially given to fish meal preparations as a cheap, easily available, and readily acceptable source of protein has

²³Paul R. Ehrlich, The Population Bomb (Rev. ed.; New York: Ballantine Books, Inc., 1971), p. 96.

²⁴United Nations. Food and Agricultural Organization. The State of Food and Agriculture: 1971, p. 1.

²⁵Arno Meschkat, "Improvement of Fish Consumption in Developing Countries Through Influence in Food Habits with Special Reference to Africa," Nutrition Under Various Geographic and Climatic Conditions, Vol. III, Proceedings of the Seventh International Congress on Nutrition, ed. H. D. Cremer, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 53.

diminished. Problems related to taste and food taboos continue to be serious obstacles in areas where their distribution has been attempted. Because most of the protein deprived world population subsists in what can be best described as marginal cash economies, the distribution of any food, particularly a food strange to local tradition, will be difficult however cheap the cost. This is certainly true of a poor and illiterate Central America.

The possibilities of achieving reductions in the cost of fish meal for use as a human food are also dim because of two factors -- the rapid decline in world catches of fish used for fish meal and a growing demand for fish meal as a supplementary animal feed in the advanced nations. The Food and Agricultural Organization estimates that in 1971 serious reductions in fish meal production occurred in the six most important producing countries (Peru, Angola, Chile, Iceland, Norway, and South Africa). These reductions were of the overall magnitude of 25 percent.²⁶ The sad necessity for the world's poor having to compete unsuccessfully with the poultry and cattle of America and Europe for the sea's protein is eloquently expressed by the French authors of The Hungry Future in their book's dedication:

To the children of backward countries who never attain their full promise, or who have died of kwashiorkor, because the fish meal which might have saved them has fed the chickens gorged by the rich.²⁷

A potentially great source of protein is plankton in the world's seas.

²⁶United Nations. Food and Agricultural Organization. State of Food, p. 8.

²⁷Rene Dumont and Bernard Rosier, The Hungry Future (New York: Frederick A. Praeger, Publishers, 1969), dedication page.

Unfortunately, existing technological limitations greatly restrict its utilization. Reports of preliminary studies carried out by Swedish researchers indicate that the production of ten grams of plankton would necessitate the processing of 400 tons of sea water. The expenses involved therefore preclude any consideration of plankton as a source of dietary protein for current world needs.²⁸

Algae, another possible marine protein supply, has been investigated for its nutritional value. While it has been found to have use as a food, its overall nutritional aspect is disappointing. The most promising algae, Chlorella, is difficult to digest and frequently causes diarrhea. Its acceptance as a food is further hindered by problems of color and a "strong unpleasant flavor."²⁹

Vegetable Protein-rich Mixtures

Scientists have succeeded in developing vegetable mixtures which while rich in protein are composed entirely of relatively inexpensive plant products. Most of these foods contain concentrates of different types of protein rich oilseeds. All have been extensively studied and the obtained results prove them to be complete sources of protein. The best known of these is Incaparina, a vitamin enriched mixture developed by the Institute for Nutrition of Central America and Panama (INCAP).

²⁸E. J. Bigwood, "Problems of World Nutrition in the Future: Outlook to the Year 2000," Problems of World Nutrition, Vol. IV, Proceedings of the Seventh International Congress on Nutrition, ed. J. Kuhnau, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), pp. 829-30.

²⁹Hisateru Mitsuda, Kyoden Yasumoto, and Hisao Nakamurs, "Needs for Protein Isolate Techniques to Utilize Chlorella and Other Unused Resources," Physiology and Biochemistry of Food Components, Vol. V, Proceedings of the Seventh International Congress of Nutrition, ed. J. Kuhnau, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 327.

Separating the brilliant laboratory achievements of scientists in producing these new foods and their consumption by the needy is a wide and disappointing gap caused by problems of acceptance and distribution. These difficulties have been of sufficient magnitude to lead many nutritionalists to question the wisdom of having originally proposed and developed food mixtures as possible solutions. With reference to this, Dr. D. S. McLauren, an important figure in the development of Laubina, a mixture widely used in the Middle East, very critically states, "The millions of dollars and many years of effort which have already gone into developing these mixtures would have been better spent on efforts to preserve the practice of breast feeding."³⁰ Equally strong feelings have been expressed by M. C. Latham, as evidenced in the following colorful, but valid, critique of attempts to promote these "sometimes weird" mixtures:

I do not decry these efforts, some of which have been very valuable, but I do not believe that these efforts should be at the expense, or to the detriment, of increasing the consumption of dairy products and eggs. If you can persuade a mother to obtain a bowlful of milk for her toddler from the nanny goat who sleeps under her bed, this is far better than persuading her to go to the village shop to spend a few hard-earned pesos on an attractive packet of Incaperina or to walk 5 miles to the community center to get a cupful of multi-purpose food. 31

³⁰ Donald S. McLauren, "A Criticism of the Rationale for the Development of Vegetable Food Mixtures for the Prevention of Protein-Calorie Malnutrition in Young Children," Nutrition Under Various Geographic and Climatic Conditions, Vol. III, Proceedings of the Seventh International Congress on Nutrition, ed. H. D. Cremer, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 149.

³¹ Michael C. Latham, "Increasing Production and Consumption of Dairy Products and Eggs in Developing Countries," Nutrition Under Various Geographic and Climatic Conditions, Vol. III, Proceedings of the Seventh International Congress on Nutrition, ed. H. D. Cremer, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 62.

To understand why the success of these complete foods has been less than anticipated, it is worthwhile to consider the following comments of Dr.

Moises Behar, the distinguished director of INCAP:

As may be appreciated, it is not easy to develop, produce and distribute a product of this kind and to attain the desired use. Scientific and technical difficulties and problems at the laboratory level, although considerable, are not the greatest. Many other problems, especially economic, socio-cultural, and sometimes even political must be overcome. 32

Restrictions imposed by socio-economic factors must be considered as critical in determining the success of any program related to vegetable protein mixtures. The cost for a package of one of these new foods, no matter how small, is a most formidable barrier to a malnourished and poor peasant family ignorant of the need for a balanced diet. Removal of the economic barrier of cost by reducing the price or providing free distribution results in the imposition of even more formidable social obstacles. Experience has shown such action labels the mixtures as "foods for the poor" which for reasons of prestige are then avoided as a food. This is much more likely to occur when distribution is through governmental rather than commercial channels. These and other restrictive factors listed in Table II illustrate the difficulties to be resolved before foods like Incaparina and Laubina can be successful. Until these conditions and attitudes are changed, the miracle foods will remain as "future hopes" and not "present panaceas."³³

³²Moises Behar, "New Dietary Sources of Protein," Nutrition Under Various Geographic and Climatic Conditions, Vol. III, Proceedings of the Seventh International Congress on Nutrition, ed. H. D. Cremer, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 198.

³³William and Paul Paddock, Famine-1975 (Boston: Little, Brown and Company, 1967), p. 97.

TABLE II. OBSTACLES TO PRODUCTION AND ACCEPTANCE OF PROTEIN-RICH VEGETABLE MIXTURES

Public	Government	Private Industry
Resistance to changes in food habits	Neglect of food situation	Preference for maximum profits
Lack of education for appreciation as a food	Preference for industrialization	Distrust of humanitarian projects
Unwillingness to pay for "proteins"	Suspicion of private industry's motives	Adverse reaction of stockholders
Preference for prestige foods and disdain for "poor people" foods	Lack of funds and complicated bureaucracy	Uncertainty of ability to compete with low cost traditional foods

Source: J. Mauron, "From Pilot Plant Tests to Protein-Rich Vegetable Mixtures," Nutrition Under Various Geographic and Climatic Conditions, Vol. III, Proceedings of the Seventh International Congress on Nutrition, ed. H. D. Cremer, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 192.

The Green Revolution

The Green Revolution's new and improved varieties of wheat and rice have significantly increased the supply of calories in areas of the world where starvation was formerly an accepted condition of life.³⁴ However, in many cases the increased supply of cereals rich in carbohydrates but low in protein has actually worsened rather than improved the nutritional status of millions. According to FAO, general agreement exists in recognizing that increases in caloric intake should not always be gained

³⁴The newly coined phrase, Green Revolution, refers to the large increases in food production which have recently been achieved in traditionally food short nations as a result of the introduction of improved and high yielding varieties of wheat and rice.

from an increase in the consumption of cereals or starchy roots, which would further unbalance the diet; but should come from foods that would provide a better balance, namely, fruits, vegetables, pulses, and nuts on the plant side, and still more important, foods of animal origin -- milk, meat, fish, and eggs.³⁵

Most of the new varieties of rice and wheat have a higher requirement for fertilizer and pesticides than do the older lower yielding varieties. Unfortunately, the application of these has of itself been detrimental to the production of protein. In recent Philippine experiments, for example, farmers were extremely happy to harvest record rice crops. But the same chemicals used to produce high yields killed the fish in the rice fields and nearby waterways. The result was more rice, but less protein in the local diet, an overall loss in food values.³⁶ It is indeed sad for the alleviation of undernourishment (hunger resulting from a deficiency of calories) to be at the expense of a worsening of protein malnutrition.

The Green Revolution has not influenced food production in Central America as it has in areas like Mexico, India, Pakistan and Southeast Asia. This is because in Central America rice and wheat, the principal crops benefited by the research of the Green Revolution, are not of great importance as food crops.

Opaque-2 Maize and Beans

Until recently improvements in maize have focused upon the development of high-yielding hybrids which doubled and even tripled yields in the

³⁵Pawley, Possibilities of Increasing Food, p. 14.

³⁶"Who's for DDT?" Time, November 22, 1971, p. 84.

United States and some areas of Latin America and Europe. In producing these high yielding genetic strains little attention was given to protein quality. Consequently, the hybrids contained protein of lesser quality than did the lower yielding non-hybrid types.³⁷

In 1964 efforts of scientists directed towards improving the protein value of maize were rewarded with the discovery of the mutant gene, opaque-2.³⁸ Maize hybrids bred to contain this gene have nearly twice as much of the essential amino acids lysine and tryptophan, as do normal hybrids. For regions like Central America, where the population is largely dependent on maize for much of its food needs, this may very well be the most significant nutritional development of modern times. Tests comparing the new strains with older varieties clearly demonstrate the advance they represent for human nutrition. Adwin T. Mertz, leader of the Purdue University team which discovered the opaque-2 gene, reports that adult men who consumed 300 grams of the new maize, an amount equal to only one-half of the normal ration consumed in areas where maize is a staple, were provided 93 percent of the established daily protein requirement and 40 percent of the caloric needs. In contrast, the consumption of 500 to 600 grams of the normal varieties satisfied only 70 percent of the protein and 80 percent of the caloric requirements.³⁹

³⁷Paul B. Pearson, "International Cooperation by Various Disciplines to Improve Nutrition in Developing Countries," Nutrition Under Various Geographic and Climatic Conditions, Vol. III, Proceedings of the Seventh International Congress on Nutrition, ed. H. D. Cremer, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 282.

³⁸Edwin T. Mertz, Lynn S. Bates, and Oliver E. Nelson, "Mutant Gene That Changes Protein Composition and Increases Lysine Content of Maize Endosperm," Science, Vol. 145, No. 3629 (July 17, 1964), pp. 279-280.

In studies conducted by Kies and Fox, the superiority of opaque-2 maize as a supplier of rich protein was further confirmed. But because lysine was still insufficient in the grain's amino acid composition, it was not evaluated as a complete human protein food.⁴⁰ An investigation conducted by Young, Ozalys, and Scrimshaw on opaque-2 maize grown in tropical Columbia found its protein quality to be equal to approximately 80 percent of the value of whole hen's egg protein.⁴¹

The nutritional superiority of the opaque-2 strains is even greater in the area of animal nutrition. Weanling pigs fed rations with opaque-2 maize gained weight at a rate 3.6 times faster than those fed regular hybrid maize.⁴² Similar studies with poultry produced equally satisfying results; but, in the case of fowl, small additions of nutritional supplements were required.⁴³

As yet, little of the potential to be obtained from opaque-2 maize

³⁹Helen E. Clark, Edwin T. Mertz, Oliver E. Nelson, "Nitrogen Retention of Adult Human Subjects Who Consumed Opaque-2 Maize," Physiology and Biochemistry of Food Components, Vol. V, Proceedings of the Seventh International Congress on Nutrition, ed. J. Kuhnau, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), pp. 241-246.

⁴⁰Constance Kies and Hazel Metz Fox, "Protein Nutritional Value of Opaque-2 Corn Grain for Human Adults," Journal of Nutrition, Vol. CII, No. 6 (June, 1972), pp. 757-766.

⁴¹V. R. Young, I. Ozalp, B. V. Cholakos, and N. S. Scrimshaw, "Protein Value of Columbian Opaque-2 Corn for Young Adult Men," Journal of Nutrition, Vol. 101, No. 11 (November, 1971), pp. 1475-1481.

⁴²E. P. Singsen, "Poultry Production Potentials and Limitation to the Year 2000," Problems of World Nutrition, Vol. IV, Proceedings of the Seventh International Congress on Nutrition, ed. J. Kuhnau, 5 vols. (Braunschweig: Vieweg & Sohn, 1967), p. 904.

⁴³E. P. Singsen, Jobst Nagel, S. G. Patrick, and L. D. Matterson, "The Effect of a Lysine Deficiency on Growth Characteristics, Age at Sexual Maturity, and Reproductive Performance of Meat Typr Pullets," Poultry Science, Vol. XLXL, No. 6 (November, 1965), pp. 1467-1473.

has been realized in Central America or other areas where this cereal is a human staple. This is accounted for by the still to be achieved development of high yielding varieties suited to tropical conditions of soil, climate, and pests.⁴⁴ A different class of factors, socio-cultural in nature, represent a possibly greater barrier to the acceptance of opaque-2 maize than do natural conditions. Ignorance of the value and need for a maize of high quality protein affects the willingness of mal-nourished peasants to substitute it for older varieties, particularly when the value awarded any maize may be entirely dependent on how tasty and crunchy are the tortillas made from it.

In Central America the diets of most people could be improved through increases in the consumption of beans, which while inferior to animal sources of protein are of higher quality than those derived from cereals. The major limitation on an increase in bean production is that the varieties available to Central American farmers are low yielding as related to inputs of both capital and labor. It should also be remembered that the protein value of any plant food, including beans, is generally increased when consumed with animal proteins. Addeke H. Boerma, the director-general of the Food and Agricultural Organization, has warned against a shift from using land to produce vegetable rather than animal protein in countries with serious protein deficits. To do so, he stated, would ignore the qualitative nature of the protein problem and "human psychological and dietary preferences."⁴⁵

⁴⁴E. E. Howe, G. R. Jansen, and M. L. Anson, "An Approach Toward the Solution of the World Food Problem with Special Emphasis on Protein Supply," American Journal of Clinical Nutrition, Vol. XX, No. 10 (October, 1967), p. 1144.

⁴⁵Boerma, World Agricultural Plan, p. 58.

Synthetic Proteins

Many hold hope for the solution of the protein problem being found in the production of "synthetic" proteins, such as those produced by French scientists from microorganisms grown on petroleum carbohydrates. These and other synthetics are presently faced with restrictions of cost and still unknown certainties of the influences they may have on human digestion and metabolism.⁴⁶ Until these problems are resolved, manufactured proteins, like protein-rich vegetable mixtures, will also remain future hopes rather than current cures.

Increasing Peasant Animal Production

Because of the above mentioned factors, much of the immediate future demand for protein will have to be satisfied with supplies from animals. Cattle, which provide the bulk of the world's animal protein, are not completely satisfactory as a solution for the Central American situation. Their relatively long cycle of reproduction and their requirement for extensive grazing lands preclude cattle production in many areas of Central America. In addition, the subsistence peasantry is largely without the cash income needed for the purchase of cattle protein foods from domestic producers; and the national economies are unable to support increases in the importation of foreign foods.

It is unfortunate that Central America is exporting increasing amounts of quality protein foods (beef and shrimp) to the already

⁴⁶J. Masek, "Perspectives of Human Nutrition," Problems of World Nutrition, Vol. IV, ed. by J. Kuhnau (Braunschweig: Vieweg & Sohn, 1967), p. 783.

well-nourished industrialized world, while its own need for these foods continues unsatisfied. This, too, is the result of a rapidly growing population without the necessary purchasing power to buy these domestically produced foods.

In the preceding discussion of new alternatives for solving the world's protein needs, particularly those of Central America, certain major limitations in their applicability were noted. Aware of the magnitude and complexity of the problem, many concerned scientists are calling for an attack which would utilize all sources of protein. Until recently little attention in the way of research monies and labors has been devoted to expanding the production of quality protein from traditional sources available to the poor of underdeveloped lands. In no area have these stimulants been more lacking than in the expenditure of efforts directed at understanding how to increase the supply of eggs, milk, and meat by peasant farmers at subsistence or marginal cash economic levels.

For Central America and much of the remaining underdeveloped world, an expansion of pig and poultry production on the subsistence level could greatly contribute to an improvement in dietary composition. Pigs and poultry, along with other animals such as rabbits and goats, are not very demanding in terms of land, are more efficient producers of meat, and can be economically raised by families on small holdings of land. Most Central American peasants do in fact keep animals; but the number of animals raised by them is below the level which could be maintained and is not sufficient to provide the individual family's requirement for quality protein.

Too many of the offered solutions are products of the rich and highly industrialized lands and are not suited to the different physical and

cultural environments of the Third World. Too often the well-meaning foreign advisors charged with the responsibility of instituting changes to bring about improvements are themselves too "ignorantly sophisticated." As long as organizations such as the United States Agency for International Development employ advisors from Illinois who believe a Guatemalan farm of 150 acres to be a "small farm," there can be little hope for an alleviation of the problem through such agents or agencies.

No approach will realize any significant achievement unless it first obtains an understanding of all the realities related to malnutrition. The attainment of this understanding is beyond the scope of any single discipline. The agronomist searching for a maize of richer protein would be well advised by the social scientist to consider that the color of the grain's kernels may determine the success of its acceptance. On the other hand, the social scientist who promotes the adoption of dairy foods high in lactose for protein starved children might consider the findings of medical scientists which prove that such foods can aggravate the illness of some children by causing diarrhea.⁴⁷

Malnutrition and the Role of Geography

A traditional concern of geography has been the attainment of an understanding of the man-land relationships. Malnutrition, like other diseases, has been commonly and simply defined as a maladjustment of man to his environment. Therefore, from this definitional basis alone, geography has a disciplinary responsibility of contributing to the

⁴⁷Frederick J. Simoons, "Primary Adult Lactose Intolerance and the Milking Habit: A Problem in Biological and Cultural Interrelations," The American Journal of Digestive Diseases, Vol. XIV, No. 12 (December 1969), p. 821.

resolution of world malnutrition.

As a discipline bridging the social and physical sciences, geography is well equipped to study man-land relationships. The individual farm, the basic unit of agricultural systems, is of itself a sociological system, an ecological system, and an economic system. Agriculture's elemental composition of soil, climate, locational situation, social organization, technological skills and tools, values, and economic structure is an intimate expression of the man-land relationships, and for this reason is central within the scope of geography. The geographer, trained to weigh both cultural and physical factors, and equipped with geographic field techniques, is well qualified to assist in the scientific understanding of peasant agriculture, particularly by assisting in the identification of conditions limiting food production.

By examining the role of cultural factors influencing peasant animal production, it is anticipated that the findings of this study will contribute to the resolution of Central America's widespread problem of protein malnutrition.

CHAPTER II

RESEARCH PLAN

Objective

The principal research objectives of this study were the identification and assessment of cultural factors restricting the full utilization of land resources available to subsistence farmers for the production of eggs, milk, meat and other foods of animal origin. An emphasis was directed towards defining those factors not known or fully recognized as important in influencing the types and amounts of animals and fowl raised. Universally appreciated and obviously important factors such as forms of land tenure and size of holding were examined but not in detail. It is well understood that a farmer-owner of 150 acres will be better able, and more likely, to produce more than the peasant who has only 3 acres to sharecrop. Less understood is how peasant production of protein foods may be affected by a mother's perception of the food value of eggs for an ill child or a farmer's ignorance of the superiority of cracked maize as a poultry feed over maize fed in whole kernels.

Traditional geographic techniques were employed in conducting the research. These included library research conducted in the United States and Central America and field study in Costa Rica, Honduras, and Guatemala. Financial support was provided through a research grant (No. GS-27734) from the National Science Foundation, Washington, D. C.

Field studies were conducted during the months of June, July and August, 1971, with approximately one month being spent in each of the three countries studied. The basic field research technique employed in this study of factors influencing the decision making of Central American peasants in raising animals for food was the qualitative microgeographic sample survey as proposed by Blaut.¹ This approach was employed to gather the necessary threshold criteria of accuracy and breadth required for the understanding of influences relating to a single cultural trait in an area as large and complex as the Central American highlands.

Usage of Terms

The term peasant, as used in this study, will follow the comprehensive definition given it in The Random House Dictionary of the English Language, which is as follows: "one of a class of persons, ...of inferior social rank, usually engaged in agricultural labor."² Within the limits of this definition, any individual or family of the recognized lower economic level, living in a predominantly rural and agricultural setting, and directly dependent upon farming for sustenance, was considered a peasant. Aware of the absence of agreement on a more precise meaning of this term in professional references (i.e., Encyclopedia of the Social Sciences) and by eminent Middle American sociologists and anthropologists such as Sol Tax, Robert Redfield, Eric Wolf, and Oscar Lewis, the dictionary definition was considered to be adequate. A broad meaning has also been

¹J. M. Blaut, "Microgeographic Sampling," Economic Geography, Vol. XXXV (January, 1959), pp. 79-88.

²The Random House Dictionary of the English Language (New York: Random House, Inc., 1966), p. 1061.

given the term subsistence farming, as that expression is used within the study. In this case too, the Random House dictionary was referred to for definitional direction. It offers the following definitions: "subsistence farming, 1. farming whose products are intended to provide for the basic needs of the farmer, with little surplus for marketing. 2. farming that brings little or no profit to the farmer allowing only for a marginal livelihood."³ While these definitions are not of great sophistication, they do apply to the study's objective and are not contrary to other meanings as commonly used by social scientists. The word animal will be used comprehensively to include poultry and fish as well as the more familiar forms of livestock.

Study Types and Sites

To obtain a scope of coverage representative of the region's cultural diversity, field work involving sample surveys was conducted at the micro level of the individual farm in areas inhabited by the three major cultural groups in the study region: Indians, Ladinos, and "Europeanized" peasants. These ethnic classes comprise the bulk of Central America's peasant population and no other sizable groups practicing subsistence farming are found within the region's highlands.

The two cultural extremes of peasant types in Central America are well typified by the highly European Costa Rican peasant (Tico) and the Guatemalan Indian. The former is European in race and culture, enjoys a relatively high standard of living among American peasants, and is an active participant in the political life of his country. Contrarily, the Guatemalan

³Ibid., p. 1417.

Indian lives a way of life little changed in most fundamentals from that of his pre-Columbian Mayan ancestors and is in many ways isolated from Hispanic or Latin Guatemala.

Between the Indian of Guatemala and the Tico of Costa Rica, is a third ethnic type referred to as the Ladino. Though he is a speaker of Spanish, the Ladino, differing from the Tico, is usually pure Indian or of a mostly Indian racial mix. Because of this the term is recognized as having primarily a cultural rather than a racial meaning. According to West, the Indian maize-beans-squash crop combination is the basis of Ladino farming.⁴ However, unlike the Indian, the Ladino has adopted many European agricultural tools, techniques, animals, and buildings.

An important task involved in the research plan was the selection of study sites representative of the Guatemalan Indian, the Ladino, and the Costa Rican Tico. Originally, the writer had tentatively planned to conduct studies of the Indian in the vicinity of Ostun-calco, Guatemala. However, upon arrival in Guatemala this choice was changed to the village of Panamaquib, near the town of San Lucas de Toliman, in the area of Lake Atitlan. Elaboration on the reason for making this change follows in Chapter V. The southwestern Honduran town of Yamaranguila was chosen to conduct a study of the Ladino peasant. The site selected in Costa Rica to study the highly "Europeanized" Tico was San Vito, in an area of active colonization bordering upon Panama. In addition to providing the necessary cultural breadth, these settlements were also extensive in their spatial distribution within the Central American highlands. Collectively, all three

⁴Robert C. West and John P. Augelli; Middle America: Its Land and Its Peoples (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1966), p. 394.

can be classified as in a humid and temperate highland environment, commonly referred to as tierra templada.⁵

Sample Survey and Interview Method

Because reliable secondary data on the number and types of animals kept by peasants is largely unavailable and no comprehensive study has ever been published on this subject, heavy reliance was placed on detailed interviews with individual farm families as a part of the sample survey conducted in each field location. Simple random sampling was originally planned for the selection of farms to be used for interviewing. It had been intended to use large scale topographic maps, aerial photographs, and official lists of properties or parish rolls as could be obtained from local officials to select farms for sampling lists. In all three locations circumstances existed which forced the abandonment of this aspect of the research plan. In his article on microgeographic surveys, Blaut gives wise and strong warning of the difficulty to be expected in attempting such approaches in underdeveloped lands, and states:

Even a simple random sample will be unobtainable if circumstances are such that a list of farms cannot be provided beforehand and field selection of farms is impracticable. This problem will arise frequently in underdeveloped areas: official, church, or other agencies which are usually the sources of farm lists may not have them, or the information may be out-dated; and field selection of a simple random sample may be impossible where air photos are either not available or not usable for this purpose. ⁶

The necessary adjustments made in response to obstacles restricting random

⁵A climatic classification, literally meaning temperate earth or region. In the tropics of Latin America it relates to those areas at altitudes of 3000-5500 feet, and with moderate temperatures in the range of 55-85 degrees Fahrenheit.

⁶Blaut, Economic Geography, p. 195.

sampling will be discussed in the detailed presentation of each study area.

Based upon earlier field experience in Central America, and for reasons well explained by Rodgers, no prepared printed questionnaires or tightly structural interview formulas were used.⁷ Following this type of formal approach would have resulted in a serious degree of suspicion and fear by the respondents towards the interviewer and his motives. Consequently, interviews were conducted in a casual and informal manner so as to obtain, as far as possible, an open and free response from each informant. Spanish was used in all interviews in Costa Rica and Honduras. An interpreter was employed in Guatemala because of the researcher's lack of competence in the Mayan language spoken by the Indians in the local study area. Among most of these Indians, Spanish is looked upon as a foreign tongue. The average interview lasted approximately two hours.

In each interview the weight of the effort was directed towards obtaining an understanding of the factors and influences related to the production and utilization of animals for food as perceived or understood by the farmer himself. Of principal importance were responses which reflected attitudes towards land use priorities, value of animal foods in human nutrition, awareness of disease and predator problems, and economic realities. An integral part of every interview was an inventory of all animals and fowl owned by the responding family. Notes were recorded in all interviews. It should be mentioned that all interviews, while not of a precise design, did follow a somewhat structured but individually flexible

⁷Everett M. Rodgers, Modernization Among Peasants: The Impact of Communications (New York: Holt, Rhinehart and Winston, Inc., 1969).

format. In many cases, women proved to be better sources of information than men. This was probably because the keeping of small animals is usually the responsibility of the woman in a household rather than the man.

The first area to be surveyed was San Vito, Costa Rica. This decision was predicated on the assumption that the availability of reliable secondary data and field aids would be greatest in Costa Rica. It was also expected that experience gained in Costa Rica would facilitate later studies in other parts of Central America where field conditions were anticipated to be more demanding. The Honduran Ladino village of Yamaranguila was the second to be surveyed and this was followed by Panamaquib, the Guatemalan Indian settlement.

CHAPTER III

SAN VITO: THE COSTA RICAN CASE STUDY AREA

Population Growth and Malnutrition in Costa Rica

Costa Rica exhibits all the common characteristics of Central America's physical geography, from volcanoes to savannas to rainforests. However, its cultural geography differs greatly from that of other Hispanic nations in the tropical New World. One significant distinction is that approximately 80 percent of the Costa Ricans claim to be unmixed Caucasian descendants of Spanish colonists.¹ Most of this population is densely clustered in the Meseta Central, an upland basin of fertile volcanic soils located in the geographic center of the nation. No other Central American nation can rival Costa Rica's record of political stability or its claim to having the region's highest rate of literacy.

Unlike many of its sister republics, Costa Rica has developed without any strong Indian cultural influences. At the time of the Spanish conquest, only the northwestern lowland region of Guanacaste was inhabited by Indians of the high Meso-American civilization. The remainder of the nation was sparsely populated by Indians of a lesser sophisticated culture, who mostly were killed by or fled from the Spanish. Consequently,

¹ Robert C. West and John P. Augelli, Middle America: Its Lands and Its Peoples (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1966), p. 436.

settlement in the fertile highlands of the Meseta Central occurred in the absence of any significant aboriginal population. Without the usual Indian labor force, the large estate (latifundia) system so characteristic of other parts of colonial Spanish America did not develop. The most common form of land tenure came to be the small subsistence farm owned and worked by peasants of almost pure Spanish extraction. This prevalence of small owner worked holdings (minifundia) rather than latifundia has been recognized as contributing to Costa Rica's higher development in democratic traditions.

Until the late nineteenth century the Meseta Central was the only part of the country effectively settled. However, at that time increasing population pressure in the central highlands, accompanied by the demand for more land to produce coffee, stimulated a colonization movement which is still rapidly expanding into unoccupied areas of the country. Historically, the movement of expansion has been out from the Meseta Central along developing arteries of transportation. The first wave of migrants followed the road constructed from the highlands to Puntarenas, Costa Rica's principal Pacific port and major outlet for coffee. Later, the construction of a railroad from San José to the Caribbean provided an exit for migration to the eastern piedmont of the central mountain range. During the 1930s, the extension of the Pan-American highway southward from the Meseta Central together with the shift of banana plantations from the Caribbean lowlands to the Pacific lowlands contributed to the opening and consequent rapid settlement of the southern part of Costa Rica. This migrational movement continues to gain momentum and is certainly the most significant in Costa Rica's recent history of frontier settlement.²

²Ibid., p. 440.

Costa Rica's rapid population growth provides the pressure responsible for the internal migration of settlers. The present inhabitants, estimated to number 1,710,000 in 1970, comprise one of the world's more rapidly growing populations.³ Between 1958 and 1962 the population grew at an annual rate of 4.3 percent.⁴ Since then it has decreased slightly, but continues to be the highest in Central America, the region believed to have the world's highest rate of population increase.

Principally because of strains imposed by the rapidly growing population, Costa Rica, despite its high levels of democratic government and literacy, suffers serious economic difficulties. One of these has been the failure to produce sufficient quantities of food for its people at prices supportable by the nation's poor, the majority class in Costa Rica as elsewhere in Central America. The inadequacy of nutritious foods is the basis for Costa Rica's poor status in public health.

The national food problem is primarily qualitative rather than quantitative. Maize and rice, the major staples in the Costa Rican diet, are generally consumed in quantities sufficient to provide most of the per capita caloric needs. But the low level and poor quality of the protein contained in these cereals make them insufficient for the daily needs of the average person, particularly children whose nutritional needs are greater than those of adults. In agriculturally and industrially wealthier nations, the quality protein requirement is satisfied with foods of animal origin, principally eggs, milk, and meat. However, in Costa Rica these

³Dirección General de Estadística y Censos, Población Total, de la República de Costa Rica por Provincias, Cantones y Distritos (San José, Costa Rica: April, 1971), p. 1.

⁴West and Augelli, Middle America, p. 439.

foods, if available in quantity, are almost always beyond the economic grasp of most of the people. Consequently, the diets of many are qualitatively inadequate with reference to protein needs, and malnutrition as a problem is widespread within the population.

The social and economic realities of the situation can easily be demonstrated through statistical data available in recent health and nutritional surveys. In its nutritional analysis of the Costa Rican population in 1969, INCAP noted that of all the animal protein foods produced in Costa Rica, only milk was economically available in amounts capable of meeting the nation's minimum established needs. Eggs, meat, and beans, the last of these the principal vegetable source of quality protein, were in short supply. The current and projected availability of these important foods is shown in Table III. Except for milk, these projections predict a situation of continued deficits with only slight improvements in availability.

TABLE III: CURRENT AND PROJECTED PER CAPITA AVAILABILITY OF SELECTED PROTEIN FOODS IN COSTA RICA FOR PERIOD 1965-1980

FOOD	Recommended Daily Intake in Grams	Availability 1965 %	Availability 1970 %	Availability 1975 %	Availability 1980 %
Milk	300	105	113	122	130
Eggs	48	59	59	62	65
Meat	90	63	63	64	66
Beans	75	55	55	55	55

Source: Institution for Nutrition of Central America and Panama, Evaluacion Nutricional de la Poblacion de Centro America y Panama: Costa Rica (Guatemala City, Instituto de Nutricion de Centro America y Panama, 1969), pp. 65-67.

Costa Rica has recently achieved remarkable increases in the production of certain types of protein rich foods of animal origin. From 1966 to 1968

the number of beef cattle rose from 128,685 to 186,305, an increase of almost 50 percent in two years.⁵ Similar increases have been realized in the production of seafoods, particularly shrimp and lobster, as a result of the recent exploitation of fishing grounds on both the Pacific and Caribbean coasts. Why then the gloomy projections for Costa Rica's ability to meet the nation's protein needs? The explanation is simple. The high inputs of capital and technology which have brought about these increases were invested to obtain high profits from the exportation of these products to overseas markets. While bringing in needed amounts of foreign exchange, these developments have done little to directly improve the consumption of protein in Costa Rica. As a result of the emphasis on exports, the amount of beef available in the domestic market actually has decreased while the price has increased -- a simple but sad demonstration of the law of supply and demand. These consequences raise doubts as to the wisdom of expending funds through AID and FAO for such programs when the principal objective, improving the supply of food within developing nations, is worsened rather than improved.

In the concluding statement of his study on Costa Rica's Pacific fishing industry, John Kirchner presents this observation of the difficulty: "One of the ironies of the situation is that as with cattle, the shrimp represent another valuable source of protein being exported from a country seeking ways to increase the production of food."⁶ This unfortunate

⁵ Direccion General de Estadisticas y Censos, Anuario Estadistico de Costa Rica: 1968 (San José, Costa Rica, 1970), p. 162.

⁶ John A. Kirchner, Puntarena: The Center of Costa Rica's Fishing Industry (Mimeographed report, Organization for Tropical Studies, San José, Costa Rica, 1970), p. 4.

misdirection of Costa Rica's food resource has also been noted by INCAP:

Costa Rica has been exporting growing quantities of cattle, canned meats, beef, and also meat extracts, constituting in this an appreciable percentage of exports. Nevertheless, until now the growth in the production of cattle has not been able to satisfy the internal demand. Supply of the national requirements has been attained by virtue of imports of Nicaragua cattle. The cattlemen of Costa Rica are oriented more towards exports than the local market. Equally, the ranchers of the other Central American nations and Panama believe that in the future meat can be a replacement for the exportation of bananas and other current exports. ⁷

Until the poor of Costa Rica can compete successfully with the rich of America and Europe for the Costa Rican supply of quality beef and shrimp, there can be little hope of their obtaining quality protein from these domestic commercial producers.

The expensiveness of meat, eggs, and milk is not fully appreciated when considered only on a basis of cash value. For a more complete understanding of the expenses involved, INCAP has provided a study relating the cost of meat to the cost of maize, the basic staple, on a basis of the labor and cash values the two represent for the average subsistence farm family.⁸ With meat costing 24¢ a pound and maize 4¢ a pound, the amount of money required to buy a pound of meat will buy six pounds of maize. If the local family, as is common, consumes six pounds of maize a day as its basic food, the expense of a pound of meat is equal to an entire day's supply of maize. The average Costa Rican subsistence farm, according to INCAP, produces a 2000 pound maize crop at a labor cost of 100 man days. Each day's labor therefore represents twenty pounds of maize for the family. On this basis,

⁷Institute for Nutrition of Central America and Panama. Evaluacion Nutricional de La Poblacion de Centro America y Panama: Guatemala (Guatemala City: Instituto de Nutricion de Centro America y Panama, 1969), p. 62.

⁸Ibid., p. 75.

a pound of meat, the equivalent of six pounds of maize in price, is equal to more than a quarter of a day's labor, an expensive proposition in any country. It should also be noted that the average peasant, while realizing how expensive a pound of meat is for his family, is generally without full understanding of meat's nutritional value and his family's requirement for a balanced diet.

Even though malnutrition is the most serious disease suffered by the Costa Rican population, only 23 percent are aware of the nutritional origin of kwashiorkor and 24 percent of that of marasmus. The remainder of the population, ignorant of the nutritional relationship of these diseases, attributes them to other causes, and gives them names that have little to do with their nutritional origin, such as anemia, rickets, and worms.⁹

In its recent extensive and intensive survey of Costa Rican health and nutrition, INCAP stated without qualification that protein deficiency was "the most important nutritional problem, especially in small children."¹⁰ Biochemical and anthropometric examinations conducted in 1969 produced evidence indicating that the great majority of the population, and particularly small children, suffered from chronic protein-calorie malnutrition. This derives from a national shortage of quality dietary protein and results in a situation where 23 percent of the population consumes less than 70 percent of the daily minimum protein requirement.¹¹

The Costa Rican Ministry of Public Health recently released for public information, the fact that 57 percent of the nation's children under six

⁹ Ibid., p. 72.

¹⁰ Ibid., p. 106.

¹¹ Ibid., p. 11.

years of age were suffering from malnutrition. This announcement also recognized malnutrition as a problem caused by interrelated social, cultural, economic, and political factors which together adversely affected the production, distribution, and consumption of foods. In conclusion, the Ministry made a plea for a "multi-actional" program which would have as one objective the full utilization of resources for the production of food.¹²

Those responsible for such a program would be wise to consider and study how animal production by peasant farmers could be increased. It is the rural families who suffer most from the consequences of protein malnutrition and who are least able economically to purchase eggs, meat, and milk, the traditional sources of quality protein.

The potential which exists on most small subsistence farms for increasing the numbers of small animals is now beginning to be realized:

The most promising area for improving the diet of small farm families would appear to be in terms of animal and fish protein. The raising in pens of chickens, pigs, and ducks could indeed be put into effect to provide more meat for family consumption....The capability of these small farms to increase other meat productivity is obvious, and a household diet of daily meat protein could easily be obtained by properly raising and managing a small animal population on the farm.¹³

Any program attempting to bring about an increase in the production of eggs, milk, and meat by subsistence farmers should first identify and study those factors accounting for the present low levels of production. The complexity of factors which restrict the full utilization of land resources for animal production by subsistence farmers is indeed great. Although

¹²"Ciento Ochenta Mil Ninos Sufren de Desnutricion en Costa Rica," Republica (San José, Costa Rica), July 10, 1971, p. 13.

¹³Jose Luis Mesa and John A. Kirchner, "Agricultural Potential in the Area of Cimarrones, Turrialba Canton, Costa Rica," (Mimeographed report, Organization for Tropical Studies, San José, Costa Rica, 1970), p. 2.

conditions such as the size of land holdings, the form of land tenure, the high prevalence of animal and poultry diseases, and the low availability of veterinary services are important, these are not by any means the only factors involved. Even the peasant's perception of limiting factors or conditions affecting animal production should be considered.

In spite of the prevailing low levels of formal education, subsistence farmers in Central America, like all farmers, possess a wealth of empirical knowledge which would benefit any program of agricultural improvement. A Costa Rican farmer might not know the pathogen responsible for a disease or the precise conditions which contributed to its incidence, but he would know what time of the year any particular sickness infects his or his neighbor's animals and how these conditions influence local practices of animal husbandry.

Identification of peasant practices responsible for low yields and inefficient production should be included as part of any improvement program. It is only after they are aware of such practices that peasants can be subsequently educated away from them. By understanding present poultry production processes, the researcher/adviser will be provided an insight into the causes of inefficient production. For instance, it would benefit a small farm family keeping a flock of fifteen chickens for eggs to know that maintaining three roosters within the flock restricts rather than promotes maximum egg production. Conversely, it would also be helpful to a university trained agricultural adviser to know the peasant family's rationale for raising three roosters in such a small flock.

The San Vito Setting

The area in Costa Rica selected for study is the locale of San Vito, a

new town on the southern frontier of colonization in the highlands bordering upon Panama.¹⁴ The principal shortcoming in the selection of this area as representative of Costa Rica subsistence farming lies in the recency of its settlement. Most Costa Rican towns in the long settled Meseta Central have origins dating from the colonial period, while San Vito was founded only in the 1950s. However, the vast majority of the colonists living in San Vito are natives of the Meseta Central and differ from other Ticos only by being settlers on an agricultural frontier rather than farmers in an area of historic settlement.

This same newness of settlement which detracts from a consideration of being typically Costa Rican was in itself an important factor recommending selection for study. The study areas selected in Honduras and Guatemala have long histories of occupancy. San Vito as a frontier settlement strengthens the study by broadening its cultural diversity to include a type of peasant who is both a Tico and an active frontier settler. Like the other two study sites, San Vito satisfies the important criterion of being a temperate and humid tropical highland setting.

San Vito is situated at an elevation of approximately 3,000 feet in a rugged mountain region bordered on the northeast by the high Talamanca Range and to the southeast by the lower Pacific Coastal Range. Though only twenty miles from the shores of the Pacific Ocean, road access to San Vito from the coastal plain is difficult because of the elevation and rugged nature of the local topography. Both the climate and natural vegetation can be described in general terms as tropical rainforest. Temperatures in

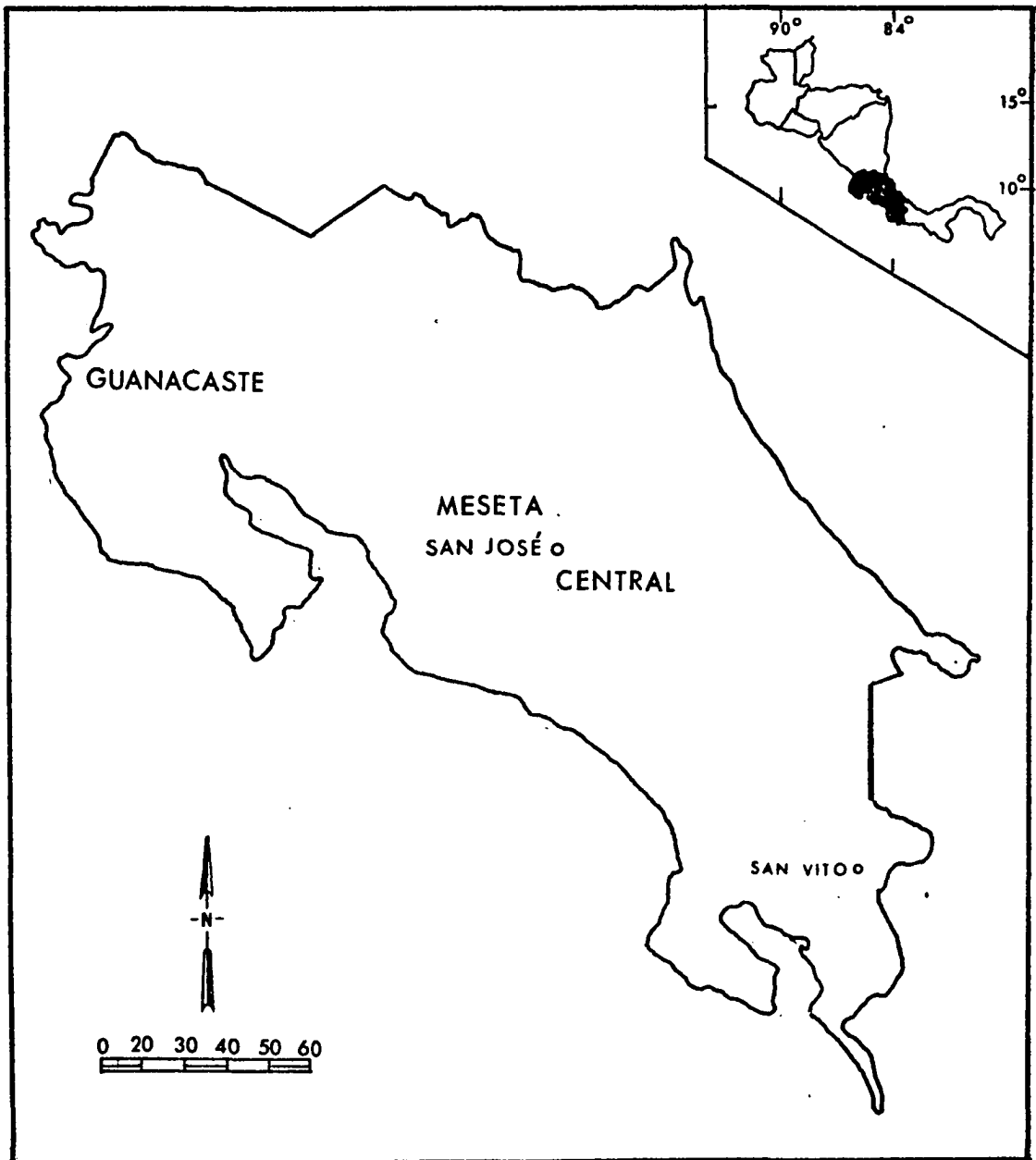
¹⁴The complete name of the settlement is San Vito de Jaba. In that the town is commonly referred to only as San Vito, this is the name which will be used in this report.

San Vito range from a minimum recorded of 61° Fahrenheit to a maximum recorded 81° Fahrenheit. Excluding these extremes, both diurnal and seasonal ranges are slight and the average daily temperature is approximately 72° Fahrenheit. The annual rainfall is heavy and seasonal. All months experience rain, but the period extending from April to November is the wetter part of the year. It is during this wet season that most of the rainfall, which annually averages 150 inches, is received.¹⁵ Most of this precipitation is the result of the orographic lifting and cooling of warm humid air masses moving inland from the Pacific Ocean. The rainy season coincides with the migration of the Intratropical Zone of Convergence into this region. Of the three study areas, San Vito is by far the most humid.

The colonization of this area is unique in that its origin was foreign rather than Costa Rican. In 1951 a private Italian corporation, Societa Italiana di Colonizzazione Agricola, commonly referred to as SICA, signed a contract with the Costa Rican government for the development of an agricultural settlement at what is now San Vito. At that time this unsettled region of virgin rainforest was part of the public domain. In return for a grant of 10,000 hectares of land, SICA agreed "to construct public buildings, such as a hospital, church, and school; and initiate industry and commerce in addition to establishing farms."¹⁶ In return the government agreed to construct a road (which it never did) connecting the colony to settlements on the coastal plain along the Pan-American Highway.

¹⁵J. L. Valenzuela, "La Geografia y la Historia del Canton de Coto Brus" (Unpublished monograph, Agencia de Extension Agricola, San Vito, Costa Rica, 1966).

¹⁶Gerhard Sander, La Colonization Agricola de Costa Rica, Tomo I (San José, Costa Rica: Instituto Geografico, 1962), p. 74.



Location of San Vito, Costa Rica

Some 100 Italian families arrived in late 1952 and joined 19 families already at the site. The latter, also Italian immigrants, had unsuccessfully attempted a colony in the foothills of the Talamanca Range. The majority of the settlers came from southern Italy and had wrongly envisioned a setting which would allow them to produce cereals, grapes, olives, cattle and sheep.¹⁷

Most of the settlers first tried to commercially produce beans, corn, and vegetables. Poor harvests from these crops and a realization of the difficulties imposed on marketing because of the lack of good road transportation led to the cultivation of coffee. The initial coffee yields were on the average two to three times higher than those of the Meseta Central and the relatively high value of dried coffee beans allowed the growers to use air transport for marketing. In addition to their high yields the settlers also benefited from a period of unusually high world coffee prices.¹⁸

In 1959 these boom conditions suddenly disintegrated. World coffee prices began to plummet; the Italians began to realize how rapid tropical soils deteriorate in fertility and the many plant diseases that commonly infect coffee plants had diffused into this area of new production causing lower yields and increased pest control costs.¹⁹ Some Italian settlers began to experience labor difficulties along with the consequences of serious mistakes they made in practices of coffee cultivation. Principal

¹⁷R. C. Jones, "Evolution of Commercial and Service Functions in San Vito de Jaba" (Mimeographed report, Organization for Tropical Studies, San José, Costa Rica, 1968).

¹⁸Sander, La Colonization, p. 76.

¹⁹Jones, "Evolution of Commercial and Service Functions."

among these were failures to properly use shade trees and to thin out groves as trees became older, larger and more crowded.²⁰ In any case, the net result of these problems was the beginning of an exodus of Italian colonists. In May, 1956, there were in San Vito 280 Italians and 248 Costa Ricans. In December, 1958, these two groups had increased to a total of 650 Costa Ricans and 450 Italians.²¹ During 1960-1962, a number of Italian families returned to Italy, or left for Canada or Australia. The year 1963 found only 80-83 families remaining. And in 1968 only 4 percent of the population within "metropolitan" San Vito was Italian.²² Most of the few who did remain were from northern Italy and in addition to owning land usually owned businesses in San Vito or other towns which have grown up in the area.²³

Without qualification, San Vito represents a failure to the average Italian settler; but if San Vito was an Italian failure, their loss was certainly Costa Rica's gain. In granting SICA 10,000 hectares of virgin rainforest in exchange for a road promised but never built, the government hoped the Italian settlement would serve as a catalyst for eventual colonization by Costa Ricans along the unsettled and historically disputed Panamanian border. This hope was fully realized. San Vito, which didn't exist prior to 1952, was in 1970 a booming regional service center with a population of 5,310.²⁴

²⁰Valenzuela, "La Geografia y la Historia del Canton de Coto Brus."

²¹Sander, La Colonization, p. 75.

²²Jones, "Evolution of Commercial and Service Functions."

²³Valenzuela, "La Geografia y la Historia del Canton de Coto Brus."

²⁴Direccion General de Estadistica y Censos, Poblacion Total de la Republica de Costa Rica por Provincios, Cantones, y Distritos.

Four types of land holders are prevalent in the area. These are as follows: (1) the remaining Italian colonists who hold land under the rights and stipulations granted SICA; (2) the national owners (propietarios nacionales), holders of legal titles to lands purchased from rightful former owners or through government land grants; (3) the squatters (precaristas, literally meaning the precarious ones) who have settled on lands private and public without obtaining permission or title; and (4) the frontier farmers (finqueros fronterizos) who have settled in the strip of land 2,000 meters wide and parallel to the Panamanian border, a zone in which settlement is strictly forbidden. The frontier farmers are distinguished from the precaristas on the distinction that the latter has a quasi legal right to land while the former has none whatsoever. Precaristas by farming and residing on land not theirs can in the eyes of Costa Rican jurisprudence establish certain legal claims to that land. On the other hand, the law relating to the frontier zone, specifically precludes any such allowance or recognition being granted the frontier settler.²⁵

The precaristas are by far the most numerous type of settlers in the region; and it was their coming and taking of land which led to the departure of many Italian colonists. Wales gives this description of the problem: "...the Italians notified the government in San Jose that communists were coming into the area and requested help in removing them. These 'communists' were apparently the numerous squatters who were taking up land in the area surrounding the colony and in some cases on colony land itself." This account of the situation goes on to state that the government responded "by sending in troops, 446 soldiers; but before too

²⁵Valenzuela, "La Geografia y la Historia del Canton de Coto Brus."

much evicting had begun, a national holiday arrived and the troops returned to San José for fiesta."²⁶ In response to this, the Italian settlers organized into what might be described as "vigilante" groups to protect against squatters. This action was only partially successful and had the negative consequence of increasing the resentment of the Costa Ricans for the Italians. It should also be noted, as strange as it may seem, that some large land owners welcomed the settling of one or two squatters on small portions of their holdings. The squatters by effectively settling on portions of these properties established certain claims as stated previously; this therefore put into question the legal land rights of the large property holder. The benefit derived from this results from not having to pay taxes on land whose title is not completely clear.

Most of the Costa Rican settlers have migrated to San Vito from the Meseta Central. Many of these, particularly the squatters, had a common experience of having first unsuccessfully settled in the hot savanna lowlands of Guanacaste, another region of active colonization. Different reasons were offered for having consequently settled in San Vito. In general, all mentioned the problem of land shortages and a lack of employment as the principal reasons for having initially left the densely populated Meseta Central. Those who had first moved to Guanacaste presented various explanations for their leaving that area and moving on to San Vito. Some mentioned difficulties in adjusting to the hot and relatively dry environment of the lowlands, so different from their native cool and humid Meseta Central. Others stated they preferred growing coffee rather than

²⁶Robert Wales, "Some Observations of the Farm and Family of Generoso Vargas Seguras" (Mimeographed report, Organization for Tropical Studies, San José, Costa Rica, 1970).

work in raising cotton or cattle, the two principal commodities of Guanacaste. A few specifically mentioned problems of weed control, particularly one invasive grass referred to as piragua, and not being able to adjust to a situation where a "shortage of rain rather than an abundance of rain" was a central problem in farming. The wetness of the Central highlands is underscored by these farmers referring to Guanacaste with its eighty inches of rain a year as being "dry."

Indirectly, the recent and current boom in cattle production in Guanacaste contributed to the departure of many of these settlers who were squatters on land which suddenly became valuable for the raising of export beef. To obtain the large holdings necessary for efficient production, many of these precaristas were bought out, or as was more common, pushed out by force instead of through the courts or banks. Problems of a social nature arising from the different cultural backgrounds of the highland Tico and the Guanacaste mestizo also contributed to the making of an atmosphere not particularly pleasant for the highland migrants. Some of Barber's observations are pertinent to the Guanacaste migrant situation:

Many a small land holder received a bank loan, misused the money, then was forced to sell at distress prices to repay the loan. Neighbors bought the land, and there was one less finquero and one more holding increased in size.... It is interesting that the 10-15 manzana owners were native Guanacastecos, while many of the dispossessed were migrants. 27

With specific reference alluring to the Guanacastecos' advantage of experience and cultural distinctness from the highland migrant, Barber gives this impressionistic statement:

²⁷William M. Barber, "Food Crop Production in the Santa Cruz Area: Changes Through Time," (Mimeographed report, Organization for Tropical Studies, San José, Costa Rica, 1970).

The Guanacasteco may be no better a manager in the broad sense, but he has a feeling, a love for the land that leads him to take the steps necessary to protect it. To be fair, it is necessary to point out that there are many successful immigrants in the region, but they express a different attitude. The nature of the Guanacasteco is a complex and fascinating thing.... It is postulated that 'Guanacasteco-ness' is an important operational factor. 28

The first Costa Ricans to settle in the area of the Italian colony were brought in from the Meseta Central as paid workers to assist in the construction of buildings and the clearing of land. Many of these noted the opportunities the area offered and they too became farmers in the new settlement. Later, when the first coffee crops were being harvested, some of the pickers recruited in the central highlands and Guanacaste also elected to remain rather than return, and they too staked out holdings, mostly as squatters. As mentioned above, many of the highlanders came indirectly to San Vito from unsuccessful attempts as settlers in Guanacaste. Individuals with such a background expressed the greater attraction these southern highlands had for them in comparison to the savannas of lowland Guanacaste. In particular, they made reference to a climate more similar to their native Meseta Central and the opportunity this offered in allowing them to farm their traditional crops, principally coffee.

The recency of settlement and prevalence of squatters in the San Vito area presented difficulties which made random sampling impractical as a method for selecting subsistence farms to be used in the sample survey. Aerial photographs and topographic maps were not current enough to include buildings recently constructed; thereby precluding the use of these tools for the purpose of identifying and numbering farms for random selection.

²⁸ibid.

Because land titles are commodities of a rare nature in this realm of precaristas, plans to use tax rolls as a basis for selection were also abandoned.

In deciding upon an area to use for interviewing, the advice and direction of the agricultural extension agent in San Vito was followed. It was stated that the vast majority of the subsistence farmers in the immediate area were squatters, generally on holdings of less than 20 hectares, although some did range up to as much as 150 hectares. Strong and careful warnings were given in advising not to discuss form of land tenure and size of holding in interviews with farmers. In addition to being a matter of great sensitivity, it was stated that few squatters knew the definite size of land they claimed; and disagreement between adjoining squatter families over common property lines was universal.

The sample survey involved farms located on the crest of a ridge approximately three miles south of San Vito. The general character of this land can generally be described as steep and rugged with approximately one-half the original forest remaining to be cleared (Figure 1). The ridge's elevation of 4,000 feet is approximately 1,000 feet higher than that of San Vito. The road, promised by the Costa Rican government but built by the Italian settlers, leading from San Vito to the coastal lowlands crosses this ridge and is the principal transport artery for local settlers. During the rainy season the road can be travelled only by vehicles with four wheel traction. A network of footpaths and trails radiates from the point where the road crosses the ridge's crest. These trails and footpaths can be travelled only by foot or horseback in both the dry and wet seasons. Farms situated along these trails were used for survey purposes. The only order used for selection was the order in which farm houses were encountered in



Figure 1. Farmstead of San Vito Subsistence Farmer. Family dwelling is in midst of coffee trees. To the right and in background are remnants of uncleared rainforest.

travel along the trails. The researcher was, without exception, received and treated with respect, cordiality, and interest.

Interviews were obtained from thirty-eight families. The male head of household was usually the principal informant. However, in cases where he was absent, interviews were conducted with women. As stated earlier, women were generally found to be as good or better sources of information than men, mainly because the keeping of farm animals is mostly a woman's responsibility. Within her daily routine of work, the woman seldom leaves the immediate area of the house; consequently, it is she who is more knowledgeable of the family's animals which are kept as a rule in the yard adjacent to the family dwelling. Very frequently questions referring to chickens and hogs when addressed to a farmer would be relayed to the wife for an answer. An exception to this is the raising of cattle, which perhaps owing to their larger size and being raised away from the house are usually kept by the men, who answered most of the inquiries concerning these animals.

Following the advice of the local authorities, inquiries relating to ownership rights were avoided; but in all interviews, farmers were asked the size of their holdings. Many hesitated to give this information and would reply, "I don't know for sure" or "I'm unable to calculate." However, through polite persistence an answer was usually given, but frequently with qualification, such as: "I'm not really sure, but maybe thirteen to fifteen hectares." The largest farms in terms of size were two of twenty-five hectares each. The smallest was only a quarter of a hectare. This belonged to a recent arrival who stated he was in the process of trying to find a suitable piece of land "for purchasing." The average size of the thirty-eight farms comprising the survey was nine and a half hectares.

All of the families interviewed lived on the land they owned and farmed. The pattern of settlement is best described as dispersed single family farms. Although the area has only recently been settled and much of the original rainforest remains, the usual placement of dwellings is along trails at intervals of only two or three hundred feet. This relatively close spacing has allowed for a significant degree of neighborhood interaction. The average family was very cognizant of its neighbor's affairs, particularly as relates to the subject of animal keeping. This situation allowed the researcher to verify through neighbors answers and comments which were thought to be doubtful or exaggerated as originally given the interviewer.

The houses were built with wooden walls and floors and roofs of corrugated galvanized iron (Figure 2, page 56). A few had dirt floors -- a very unhealthy condition in an environment having 150 inches of rain annually and nightly temperatures which sometimes drop as low as 60° Fahrenheit. Although some were divided into several rooms, most houses were equally split into a cooking-eating and bedroom division that provides little privacy within the dwelling. None of the houses had running water or electricity. Only two farms were noted to have outdoor privies and the nearby fields and jungle served for the disposal of most human wastes. Problems of sanitation are possibly as great as those of nutrition in the area on the whole and both contribute to the extremely poor state of health endured by these poor people. A very strong description of these local conditions is provided from the following comments of Valenzuela:

If we observe filthy children; if we smell stinking peasants and see uncouth women; if the houses lack water and have no bathing facilities; if the families live in a terrible agglomeration in a common room; if only air flows out of water pipes in the town during

the dry season; if there are open toilet facilities in the rural houses and dirty sanitary facilities in town; and if the people encountered are sloven in general -- how is one able to consider there is good hygiene? 29

In fairness to the people living as described by Valenzuela, a native Costa Rican and citizen of San Vito, it must be stated that these conditions are imposed on them by a vicious circle of poverty and ignorance.

Contrary to Costa Rica's claim for having an extremely high level of literacy, most of the adults in families interviewed personally admitted to being functionally illiterate. In these thirty-eight families only one person claimed to have finished the sixth grade. A common reply to the question, "Can you read or write?" was "No muy bien, pero puedo firmar y calcular." This answer freely translates to mean, "No, not very well, but I can sign my name and do simple mathematics."

Malnutrition is a very serious problem among the families such as those represented in the interview. In the opinion of the doctor in charge of the local medical clinic 80 percent of the population suffered from malnutrition principally because of a low consumption of meat, eggs, and milk.³⁰

While all the farmers interviewed can be described as subsistence farmers, the great majority devoted considerable land and time to the cultivation of coffee as a cash crop. Seasonal labor on nearby commercial farms or as lumberjacks were other important but irregular sources of cash income. However, in all cases food produced by the farmers themselves provided the basic sustenance for their families. The common food crops

²⁹Valenzuela, "La Geografia y la Historia del Canton de Coto Brus."

³⁰Ibid.

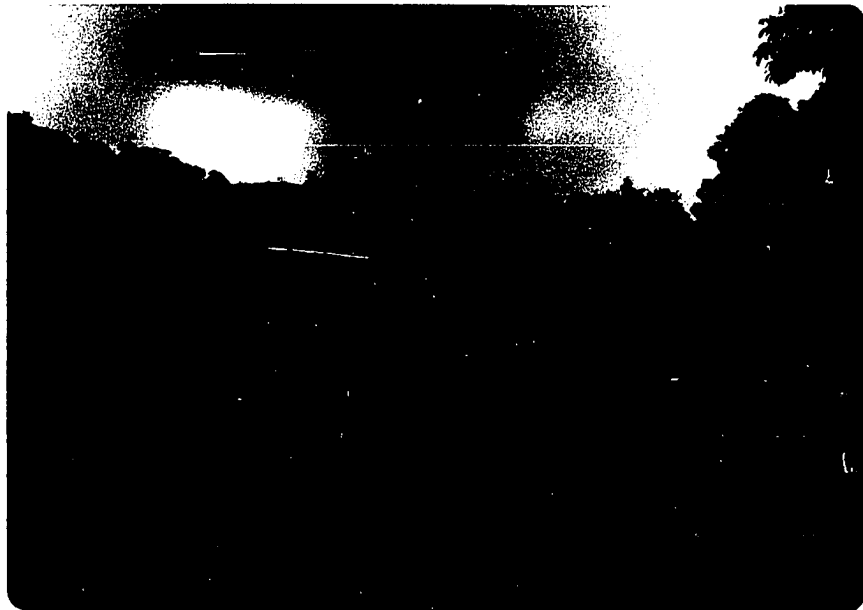


Figure 2. Dwelling of Well-to-do Subsistence Farmer. This home incorporates all the features characteristic of the typical house of rural highland Costa Rica. Few of the farmers surveyed in San Vito had yet acquired the means to construct a home as substantial as this "ideal."

were maize, upland rice, beans, yams, yuca, bananas, and plantains. In this region where cash is always in short supply, it is very common for subsistence farmers to secure money from merchants and coffee buyers through the advance sale of their coffee harvests. Often this money is received in the form of loans subject to high interest rates. It was said to be not unusual for a small farmer to receive no money at all for his crop at harvest because of loans or advances taken on it prior to harvest.

Peasant Animal Production

Chickens

The most common source of high quality protein food maintained by subsistence farmers in the San Vito area was chickens. Sixty-three percent of all farms had chickens in numbers ranging from the smallest flock composed of four birds to the largest totaling forty-seven. It should be noted that more than one-third of the farms were without poultry and some in this category had as much as twenty hectares of land.

Considerable variety was found in the types of chickens and practices used for production. These varied from having chickens run loose to scavenge for their entire ration to those being kept in fenced yards with feed and water provided. The breeds included pure bloods, referred to locally as razas puras, such as Rhode Island Reds; but for the most part flocks were of mixed breeds. A commonly raised type was the so-called criollo. This particular bird has a history predating the relatively recent introduction of improved mid-latitude breeds, and is probably the descendant of fowl brought in by the first Spanish settlers. The principal recommending characteristics of this chicken over other types are: higher resistance to poultry diseases; better capacity to scavenge in competition not only with

other fowl but also hogs and dogs; and a much greater ability to fend for itself in the "semi-wild" environment of the Central American farm yard. Another recommending quality of the criollo described by the farmers who kept them was that the hens were regarded to be better mothers than those of the razas puras. The criollo hen was generally more protective of her brood and also much more efficient in leading them to feed. Consequently, a greater percentage of chicks from a criollo brood could be expected to reach maturity than those of a raza pura. These characteristics were most frequently offered in explaining this breed's preference over others.

The criollo's principal shortcomings are its leanness and poor record as a layer of few and small eggs. But, though it is smaller, thinner and less tender, the criollo's meat is considered superior in taste to that of other chickens.

All farmers were aware of the higher performance of the improved breeds, both pure and mixed, as producers of meat and eggs. However, these chickens were recognized as not being as hardy as the criollo, when raised in a tropical environment with a minimum of feed and housing.

Very few families raised their chickens within fenced yards. The common practice of allowing poultry to roam freely was necessitated by a lack of feed. In general, if the chickens were not allowed to scavenge, they had little or nothing to eat. Several families raising their poultry in fenced yards admitted to not regularly feeding their flock sufficient feed. This improper feeding was recognized by the farmers in accounting for the hens laying few eggs. One farm had twenty-two hens, all kept in a chicken yard, but no eggs were being produced because little feed was available.

Maize, a basic food for both the farm family and its animals, fluctuates

seasonally in price and supply. Its price is usually highest during the wet summer and fall, the growing season for maize and most other staple foods. In the middle of the summer and towards fall, this high price and scarcity of maize make it too expensive to be considered as an animal feed. Any maize the family may have will be retained for the family's direct food needs. The feeding of farm animals usually improves after the annual harvest when maize is more abundant and its market price is low.

When available, yams, bananas, plantains, and various other tropical fruits are fed poultry, but never on a regular basis. No family purchased and fed commercially prepared poultry feeds or concentrates. The price of these rations prohibits their consideration by farmers having limited cash. Scavenging is therefore the key to understanding the keeping of chickens by most peasants. If not permitted to scavenge few chickens would be able to survive on the meager quantity of feed received from the farmers.

However, much of the inefficiency of subsistence poultry production is directly caused by allowing the family flock to scavenge. This practice accounts for the high loss of chickens to predators and from straying to join the chickens on an adjoining farm where feed may be more available. All families mentioned the problem of predators. The two animals responsible for most losses were the coatimundi (Nasua narica) and the yaguarandi (Felis eyra). In local Spanish the two are respectively named tejon and gatillo. Both are very numerous in the San Vito area and were reported to have taken chickens from farm yards immediately adjacent to houses during the middle of the day. It was more common, however, for fowl to be taken while scavenging in the surrounding fields and uncleared portions of rainforest or at night while roosting. Rats were described as the principal predator of baby chicks and it is possible that these small mammals kill as many as

are lost to poultry diseases. If chickens were raised in pens or yards, the problem of predators would be greatly reduced, but the problem of feeding would increase by restricting them from scavenging for food. Not being able to provide all the feed required to maintain their flock, most farmers find it necessary for the chickens to run freely even at the risk of losses from straying or to predators.

Another shortcoming of not keeping chickens enclosed is the loss of eggs. It is not at all uncommon for a family to have as many as ten hens and no nests for the hens to lay eggs. This results in hens, particularly those permitted to scavenge, laying eggs in places difficult to locate. It is a common chore of the family children to playfully search for these eggs and hopefully to find them before a rat, dog, or the neighboring family's children. Most families stated they were aware of many eggs being lost and knew if nests were provided even scavenging hens would regularly use them for laying. Nevertheless, these same families without any reason refuse to make the small effort required to build suitable nests for their hens.

Scavenging chickens frequently damage vegetable and flower gardens. When this is done to a neighbor's garden, it may result in a disruption of good feelings between the involved families. Without having been definitely stated by any respondent, the wish to avoid possible disagreements with neighbors must be considered as important in the decision of some families not to keep chickens. As long as scavenging is required for meeting feed needs, some families will prefer to do without them rather than risk troubles with neighbors because of incidents precipitated by wandering chickens.

Another aspect of scavenging poultry which should be considered is

their habit of feeding upon animal body wastes, including that of humans. As stated earlier, in the absence of closed privies unburied human feces are openly disposed of in areas near the house and where readily available to loose chickens. Poultry in this respect may have an important role in the overall sanitation of the individual farm's ecology. However, knowledge by peasants of this feeding practice may detract from their desirability as a food for family consumption. Perhaps this accounts for the common reference to poultry as "sucio." In Spanish this word carries a meaning of filthy, nasty, dirty, foul, and debased. It is odd that while many think poorly of chickens for this habit few families made serious efforts to keep poultry from regularly wandering into houses. A chicken prowling around the dining-cooking area in search of scraps of food was as common in some homes as was a kitchen table.

It was not at all unusual for a farm to have chickens and no coops for them. In these situations roosting would be in nearby trees or in and under farm structures. This lack of proper housing contributes to the high loss of fowl to both predators and disease. If coops are provided they are generally built with a floor and sides of logs and a thatched or corrugated iron roof. As a protection against wild animals, they are placed on stakes so that the floor will be approximately six or seven feet above the ground. A simple ladder or notched log leads from the ground to the coop door. After the chickens have entered for the night's roosting, this means of entrance is taken down and the door secured. These rudimentary and effective shelters can be built with a few hours of work from materials abundantly available in the surrounding rainforests. Nevertheless, approximately half of the farms with chickens were noted as not having coops of any type. It was usually these farmers who complained the most of problems with predators.

Another benefit to be derived from the penning of chickens, even if only at night, would be the availability of a supply of organic manure for use as fertilizer. In discussing this aspect of coops with the peasants, none thought it worthwhile to collect and use the manure, though they were aware of its merits as a fertilizer. Such a resource would not go unused by the more intensive subsistence farmers of Asia and the Mediterranean Basin. A greater utilization of available organic fertilizers is one neglected aspect of subsistence farming in Central America which can be expanded to give higher crop yields with a minimum of expense. There was no systematic use of poultry fertilizer by any farmers, even those who had relatively large flocks of thirty to forty birds in coops with chicken yards.

The prevalence of poultry diseases and parasites is high. The environmental conditions of high rainfall and humidity along with an absence of frost are conducive to pathogenic problems, as are the poor housing and feeding of poultry. No farmers raised vaccinated chickens, either because of cost or an ignorance of the gains to be derived from having immunized stock.

Disease was stated to be a problem throughout the year; however, the latter part of the rainy season was identified as the period of greatest losses of poultry. This high frequency period of poultry deaths coincides in time with the high price and scarcity of maize. When maize is expensive and in short supply, the always poorly fed chickens are then fed even less. The consequences of this are a drastic drop in egg production and an increase in poultry deaths precipitated by the poor diet of the chickens which weakens their resistance to disease. The interrelated causal factors of poor diet and housing are evident even to observers not trained in animal

husbandry. It is unfortunate that simple corrective measures and practices such as vaccination and balanced feeding are not followed to combat an unnecessarily high rate of poultry loss.

Any improvement in the conditions influencing poultry health will allow for a greater utilization of the more productive mid-latitude strains. However, their greater susceptibility to disease is not the only factor restricting the raising of these breeds by farmers in the San Vito area. Several peasants mentioned difficulties related to the purchasing of quality poultry stock. The primary supply center for verified chicks is San Jose. Travel to this city by truck, the most common means, requires a two-day round trip. This factor of distance and time effectively isolates the small farmer from the principal supply source.

Of equal importance in hindering the use of better poultry is the cost of vaccinated hatchery produced chicks. A few days old chick in San José may cost the equivalent of fifty cents U.S. This price is most prohibitive when considered in relation to the economic situation of the San Vito subsistence farmer. In addition to restrictions imposed by costs, some farmers were reluctant to spend their limited cash on hatchery stock because of a lack of governmental quality controls. Indicative of this was the experience of one farmer who invested the large sum of 180 colones (\$26.00) in the purchase of 60 three day old White Leghorn chicks guaranteed to be 90 percent female. The purpose of this investment was to raise a flock for the production of eggs to be sold as a source of cash income. To protect his flock from predators, wire mesh was also bought. At the time this farmer was interviewed the chickens were three months old and of the 60 chicks guaranteed to be 90 percent female, 59 turned out to be roosters. This swindle was nothing less than a financial disaster for

the farmer and his family, who in the future would think twice before traveling to San José and purchasing with hard earned money "guaranteed" chicks. Such incidents are widely publicized by word of mouth and effectively retard the upgrading of poultry flocks kept by the area's subsistence farmers. Until a local supply of good chicks from respectable dealers is made available, little can be expected in increased production through quality poultry.

Few of the families who kept chickens did so for the sale of eggs or meat. While these products were occasionally sold at times to neighbors or merchants in San Vito, they were more commonly consumed directly by the families as part of their diet. Eggs would be used as available, but a chicken would be killed and eaten only on special or festive occasions and never on a frequent and regular basis. Few Sundays saw "chickens in the pot."

Other Poultry

Poultry other than chickens were seldom encountered. Turkeys, ducks, and pigeons were seen on some farms but never in large numbers. Of the thirty-eight families visited and interviewed, only three had fowl of these types and no family had more than one type of these in addition to chickens.

With reference to turkeys, the Costa Rican dialect of Spanish in San Vito distinguishes between wild turkeys and tame turkeys. The former is referred to as a pavo and the latter as a chompipe. While neither is given value as a farm bird, pavos are hunted in the still unsettled surroundings of San Vito for both sport and food. The only turkey inventoried was a pavo received as a gift from a family friend living in nearby Panama. The owner stated the bird was a pet and had no intention of eating or selling

it. When asked why turkeys were not raised, the explanation most frequently given was "son muy delicado y no producen." This translates to mean that turkeys were considered as more susceptible to poultry diseases than chickens and while requiring more feed produced proportionally less eggs and meat. Some thought turkeys to be more of a problem and risk than chickens because they tended to wander greater distances from the house, making it more likely for them to be lost to predators or stolen by neighbors. It was also stated that turkeys in addition to laying fewer eggs had a habit of intentionally "hiding them under thick underbrush." Other traits of turkeys not liked by farmers who used pens and coops were the ability of turkeys to fly out of a chicken yard and to prefer trees to a coop for roosting at night.

One family was found to have three ducks, one of which was a wild type received as a pet and said to have come from the Caribbean coast near Limon. All three ducks were described as "curiosidades" (curious things) and not kept for purposes of food. The principal reason offered for not raising ducks was a general dislike for them as "dirty" and unproductive birds. Some farmers felt it was necessary to have water for ducks to swim in and for this reason didn't want any.

The single family with pigeons (five) reported keeping them as a source of eggs for themselves. The pigeons, because they were considered as pets, were never killed and eaten. These birds were not kept in cages and were fed on an irregular basis. When other families were questioned on their not keeping pigeons, it was explained that they were a nuisance and not of much value as a source of food.

Dairy Cows

Fifty percent of the families interviewed owned milk cows. This is a high rate for tropical subsistence farmers, but one which is typical of Costa Rican peasants. In this respect the Tico shares an appreciation for cattle not unlike the Antioqueno peasant of Columbia's highlands whose cultural background is very similar.

The eighteen farms with milk cows averaged fifteen hectares in size, substantially larger than the average holding of all the farms surveyed. This indicates, as would be expected, a direct relationship between the size of farms and the keeping of milk cows. However, the smallest farm of three hectares had three milk cows. Because of a relative local abundance of uncropped land, both settled and unsettled, a farmer is not restricted to using only the land he claims for grazing purposes. The lack of grazing land was seldom mentioned as the reason for not having a milk cow. The cost of buying an animal was the explanation given most frequently for not owning a cow. Unlike poultry or hogs, the keeping of cows was never said to have drawbacks. Families without cows, almost without exception, stated an intention to obtain a cow or calf when they had sufficient money to do so. Those who owned cows were, as a group, families who had been settled in San Vito longer than those without cattle. While ownership of a milk cow is high on the average settler's list of priorities, it comes after claiming a holding of land, building a house, planting food crops, and putting in a coffee grove.

Costa Rica's per capita consumption of milk is high largely because of the Tico's tradition of keeping a cow for milking. Nonetheless, the use of milk is not by itself sufficient to meet the quality protein requirement for

the rural population as a group. Many would benefit from an increase in this commodity's supply by extending the ownership of cows to all peasants and increasing quality and quantity through better animal husbandry and upgraded stock. In any respect, the Costa Rican's familiarity with dairy cattle and his taste and appreciation for dairy foods gives this country an advantage not enjoyed by other developing nations characterized by a general ignorance of cows, and where milk foods are not part of the traditional diet.

The pasture for milk cows owned by subsistence farmers in the San Vito area was poor. The native grasses, while lush and abundant, are not particularly nutritious. As of yet no attempts have been made to improve pasture through the introduction of more nutritious grasses. So far efforts of this nature have been restricted to the large commercial beef cattle ranches situated at lower elevations. The forage consumed by peasant farmers' cows was simply described as "pasto natural" (natural grazing grass). Peasant milk production would be greatly increased with the planting of suitable and improved types of grasses as is being done on the ranches. However, this is another example of efforts being directed only for the benefit of the large land owner rather than the small subsistence farmer.

Cows are milked regularly but because calves are left with cows in the same field all day, the supply of milk available to the family is greatly reduced. Most milk is consumed directly and not sold. When a surplus above the family's needs exists it will be bartered or sold to neighbors. No family produced milk in a volume large enough to be considered commercial, although one farm had five cows which were said to be producing as a herd "twelve bottles" a day. Locally a "bottle" approximates a

liter in amount. None of the milk was used for making cheese or butter, but several families stated they had done so before migrating to San Vito.

The cows were all of a type known as criollo, the same term being used for the common native breed of chickens discussed previously. Some were said to be part Holstein and Guernsey; however, the local agricultural extension office said this was most doubtful in the case of peasant owned stock. Cattle diseases and pests were not mentioned as serious concerns by dairy cow owners probably because of the criollo's hardiness, a trait derived from several hundred years of adaptation through natural selection to the environment of Costa Rica's highlands.

Several factors restricted peasants from butchering cattle to satisfy family food needs. Costa Rica law limits butchering to licensed butchers alone. But more significant, the monetary value represented by a steer or yearling together with a lack of means for preserving meat requires the small farmer to sell his excess cattle. Spoilage is an important consideration in determining that cattle, as well as hogs, must be sold and not consumed as food by the protein malnourished peasants.

Goats

Only one family owned a goat, and like the ducks and turkeys this animal was not kept for food or milk but as a family pet. Goats were described as being "very bad animals," with a habit of eating bark off coffee trees. Whenever asked about keeping goats, farmers stated they had no desire to keep these animals and would never consider them as a source of family food. The agricultural agent in San Vito felt it would be unwise to promote the raising of goats because their richer milk was more easily contaminated than cow's milk, and that goats by stripping vegetation

caused greater problems of erosion.³¹ Any program to expand the production of goats would certainly encounter strong opposition in the San Vito area.

Rabbits and Sheep

No rabbits or sheep were raised by families in the sample survey. But interest in keeping these animals was beginning to develop from instructional programs in the local vocational high school. A retired American executive who owned a small coffee finca in the area had donated to this school fourteen head of sheep, which were doing well with a minimum of care. In addition to sheep, rabbits of different breeds were being successfully raised as student projects and though only two families interviewed had children attending this school, most knew of the "experiments" with these animals. One farmer mentioned he had attempted to raise rabbits, but unlike chickens, "they ran off when left out to eat." He went on to say he would like to try them again and intended to do so when able to buy some breeding stock.

Hogs

Perhaps the most interesting finding in the Costa Rican segment of this study was the attitude of the Tico towards hogs, a very common Spanish farm animal and traditional source of meat. The Hispanic Ticos had among thirty-eight farm families a total of only two hogs despite the fact that pork competes with beef as the preferred meat in Costa Rica and is usually more expensive than the latter. The explanation for the

³¹ Interview with Carlos Retana, Agricultural Extension Agent, San Vito, Costa Rica, June 18, 1971.

unexpected low frequency of hogs encountered in inventories of animals on San Vito peasant farms was soon made evident.

Coffee production and the raising of hogs are not possible as concurrent activities under conditions found on the average subsistence farm. Almost without exception, when asked why no hogs were raised the reply given was, "son muy danoso," (they are very harmful). Their "harmfulness" was always with reference to coffee, the principal cash crop and for many the only source of cash or credit. Consequently, anything dangerous or harmful to coffee was of major concern to these peasants.

Hogs were considered as representing a potential threat to the valuable coffee plants because of their rooting and grubbing habits. When hogs rummage for food in this manner within coffee groves, roots are uncovered, broken, and torn; the result of which is a weakened and sometimes killed plant. Several farmers also considered hogs to be spreaders of coffee plant diseases, particularly the difficult to control fungus infections. By brushing up against an infected leaf, a scavenging hog could very effectively infect other leaves and plants by wandering through groves. This scientifically correct recognition by illiterate farmers of the hog's role as a vector of plant diseases was most interesting.³²

And as an example of the precautions taken to protect against possible damage from these animals, one of the two hogs inventoried was kept tied to a stake inside of a pen. In addition to these steps the animal's snout was threaded with crude wire rings to discourage rooting should the hog escape from the rope and pen (Figure 3).

³² Interview with Dr. Harry Finch, Plant Pathologist, California Polytechnic State University, San Luis Obispo, California, September 18, 1971.



Figure 3. Hog with Trompillas. The crude wire rings are called trompillas and are placed in the animal's snout to discourage rooting should it escape into the coffee groves. This preventive measure is in addition to the body harnesses and pens commonly used to protect crops from straying hogs.

Besides damaging coffee, the hog's omnivorous appetite together with a general absence of fences around field crops always presents a threat to these plantings and good relations with neighbors. On several occasions it was stated that these animals were not kept because neighboring friends didn't like hogs, and keeping them would jeopardize community rapport.

Feed is a critical factor in raising animals which cannot be allowed to scavenge or graze on natural pasture. This is especially true in the case of hogs with their high demand for food. Consequently, there is no niche for the hog within the ecological and economical structure of the subsistence farm as studied in Costa Rica. Utilization of grazing areas by cattle requires a minimum of fencing to keep the animals from getting loose. This same land if used for hogs would require fencing prohibitive in both labor and money required for construction. The peasant farmer correctly judged that using grazing land for dairy cows was more efficient than using it for hogs regardless of any consideration of fencing costs. Neither is the hog a more efficient competitor with the chicken for family food scraps and the limited quantities of maize for feed.

Added to these drawbacks are other limiting factors. A hog, even one of small size, cannot be consumed by a single family mainly because of meat spoilage. There is no refrigeration, and smoking or salting is not satisfactory for preserving pork in the extremely humid tropical climate of San Vito. Therefore, if hogs are raised, except for sucklings, they are raised as a source of cash income under conditions not favorable to the farmer. The principal markets for these animals are in the urban centers of the densely populated Meseta Central. Owing to transportation difficulties of time, distance, and cost, the subsistence farmer is unable to personally bring any of his produce or animals to the Meseta Central

markets and must sell to middlemen, locally called intermedios or comercios. These buyers, roads and weather conditions permitting, drive to rural areas to purchase farm products from small farmers. They then transport and sell these products in the central highland markets, with most being sold in San José, the capital and largest city. In the case of hogs, the middleman mark-up was said to be 200 to 300 percent. Aware of this situation and seeing themselves disadvantaged principally because of transportation problems, many farmers stated they would not raise hogs and be "slaves" of the comercios, who were always referred to in a most derogative way.

Fish

Tilapia, a fresh water fish native to Africa's Nile River system and recently introduced to the American tropics as a new source of animal protein, were being successfully raised on one farm. These fish are primarily herbivorous and have the ability to live in water with low oxygen levels. They were first introduced to the San Vito area in 1965 on the finca of an Italian colonist in cooperation with the Costa Rican Ministry of Agriculture. American Peace Corps volunteers with professional training in biological sciences assisted in providing technical advice.³³

One of the farmers interviewed in the San Vito survey was successfully producing Tilapia in a system of ditches, dams, and ponds he had constructed with a shovel as his only tool (Figure 4). This uneducated peasant enjoyed a respected reputation for an uncommon interest in experimenting with new crops and techniques on his small holding. After completing his aquaculture

³³A. da Silva, "Report on the Setting Up of an Experimental Tilapia Farm at San Vito" (Mimeographed report, Organization for Tropical Studies, San José, Costa Rica, 1968).

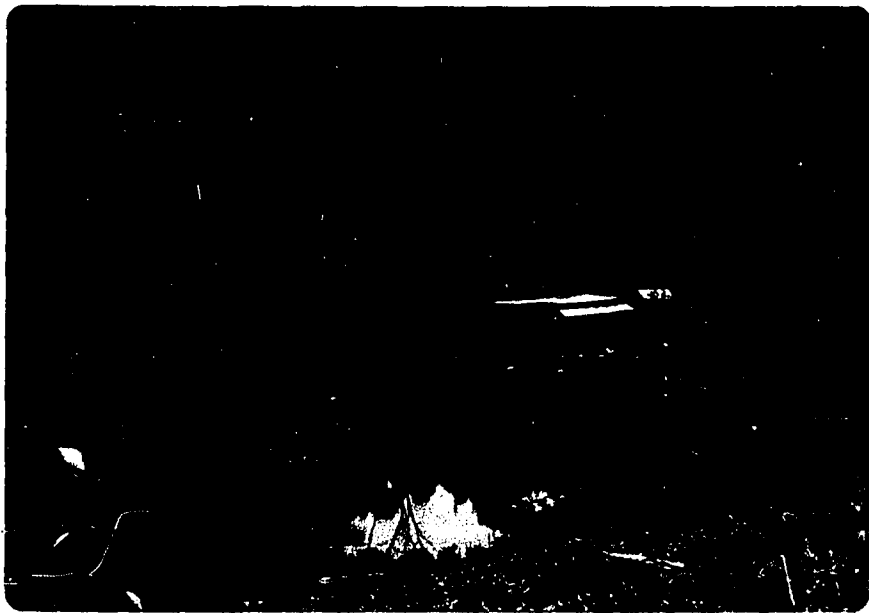


Figure 4. The Mejia Farmstead and Tilapia Ponds. This system of ponds, breeding tanks (straight sided square depressions), dams, and diversion trenches was constructed by the subsistence family residing in the pictured dwelling for the raising of Tilapia.

system, which centers upon two dams on a small stream crossing his fifteen hectare farm, he received a quantity of fingerling Tilapia from the Peace Corps volunteers. With protective care and a minimum of food to supplement the natural food provided by the newly built ponds, the Tilapia grew and multiplied. To protect against the toxic rain runoff coming from nearby coffee groves where lead arsenate fungicides are sprayed, this farmer, Francisco Mejia, carefully dug diversion ditches to bypass the runoff away from the fish ponds. The water in the protected fish ponds was then supplied only by naturally filtered ground water. When visited for an interview, hundreds of Tilapia weighing from one to two pounds were seen in the ponds.

Because of a discontinuance of appropriations, the Ministry of Agriculture is no longer participating in Tilapia production and Don Mejia was said to be the only farmer presently active in their production. As demonstrated by him, a dependable and cheap supply of protein can be provided through Tilapia farming. But in spite of the success achieved in farm fish production, the program must be recognized as a failure in that there has been no acceptance of fish as a food. Even the Mejia family admitted to eating fish only at Easter, and this was mainly because of adherence to local Catholic traditions. This family together with their neighbors enjoyed fishing, but simply for sport and not for food. However, one practical use of the fish was made by feeding small Tilapia and minnows to the family's chickens as feed. The fish would be caught by sprinkling maize meal on the surface of the pond and netting them while feeding on the meal bait (Figure 5). When asked why the chickens were fed fish, the answer was, "Fish are very rich in protein and make the hens healthy, and they lay better." The reply to a question asking why the fish were not



Figure 5. Poultry Being Fed Tilapia Fry. The young woman is feeding netted Tilapia fry to family flock of hens. The two small tanks to the right of the girl are used for the breeding of Tilapia.

eaten by the family so that they too could benefit similarly was, "We don't like fish."

The experience of the Mejia family and their Tilapia production underscores the complexities involved in attempting to solve problems of malnutrition. This case particularly demonstrates the limitations which culturally determined habits and values, such as no taste for fish, can impose on achieving a successful resolution. In this singular instance the fish were readily available at no monetary cost and their value as a source of protein was realized, but none were eaten except by the family poultry, which were the healthiest encountered in the course of the study.

CHAPTER IV

YAMARANGUILA: THE HONDURAN CASE STUDY AREA

Population and Malnutrition Characteristics in Honduras

Economically and culturally, Honduras is recognized as the least developed nation within Central America. This "poorest of the poor" like her sister republics suffers from critical and related problems of rapidly expanding population, malnutrition, and economic underdevelopment. A simple comparison of population and land area could falsely suggest that the man-land-food problems of Honduras are less critical than elsewhere in Central America. Such an assumption would only be partly true. Many areas of Honduras must be classified as overpopulated when their population is evaluated together with support factors of land resource quality and levels of agricultural technology. This is especially true of rather densely populated southern Honduras characterized by rugged and steep terrain, unreliable seasonal rainfall, and poor soils. Knowledge of the availability of unsettled and naturally better endowed land in the northern highlands has generated considerable migration to both this region and the developing Caribbean coastal lowlands.¹ Not all of this migration has originated within the borders of Honduras; considerable numbers of landless rural poor

¹Robert C. West and John P. Augelli, Middle America: Its Lands and Peoples (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1966), p. 419.

from densely overpopulated El Salvador have also been attracted to these same lands. It was this growing and largely illegal movement of peasants from El Salvador which precipitated the difficulties that culminated in the so-called "Soccer Mini-war" of 1969 between these two neighboring states.

The disparity in settlement existing between densely populated El Salvador and sparsely populated Honduras has an origin pre-dating the arrival of the Spanish. In pre-Columbian times what is now El Salvador was heavily settled by the sedentary agricultural Pipil Indians, while the highlands of Honduras were occupied by the less numerous but more warlike and migratory Lenca Indians. During the early colonial period the cultural identity of these two groups was largely lost in their assimilation into a Hispanic way of life; this was especially true of the Pipils. But because relatively few Spanish settled in Honduras and El Salvador, the Indian although not the cultural victor did continue as the racial dominant. According to James, 90 percent of the population is mestizo (a Caucasian-Indian mix), 7 percent unmixed Indian, 2 percent African, and 1 percent unmixed Caucasian.²

In Central America the term mestizo implies a cultural as well as a racial meaning and is commonly replaced by the word Ladino. This latter term being used chiefly in Guatemala, El Salvador, and Honduras, has an even greater cultural connotation than mestizo, which is employed in Mexico, Nicaragua, and Panama.³ Simply stated Ladino refers to an individual following a Hispanic way of life rather than that of the traditional Indian.

²Preston E. James, Latin America (4th ed.; New York: The Odyssey Press, 1969), p. 159.

³West and Augelli, Middle America, p. 389.

Oddly enough, this may even include persons who are full-blooded Indians.

In general, the typical Honduran Ladino on a basis of race is mostly Indian and on a basis of culture largely Hispanic.

Problems of malnutrition in Honduras are worsening despite significant advances in improving some conditions of the nation's general welfare. The consumption of protein within Honduras would, on a statistical basis, appear to be adequate if the total amount of quality protein foods produced in that country were evenly distributed for domestic consumption. This, however, is not the case. Much of the national meat production is exported and the relatively small high income segment of the population consumes an unproportionally large share of such commodities as beef, eggs and milk. Those quality protein foods which are available in local markets are for the most part priced beyond the effective demand of the low income majority (Figure 6). Consequently, protein consumption by the average individual is below established health norms principally because of economic limitations. A recent study of Honduras's nutritional difficulties presented this summary of the food problem:

The low and inadequate availability of foods necessary to satisfy the nutritional needs of the population is aggravated even more by factors that affect the distribution of foods between the distinct groups of the population. Dietary studies clearly show that the most nutritious foods are the most deficient ones and also the most expensive. These are consumed almost exclusively by the relatively small high income sector of the population. ⁴

With reference to the desired minimum daily intake of animal protein as established by the World Health Organization (WHO), the majority of the

⁴ Institute for Nutrition of Central America and Panama, Evaluacion Nutricional de la Poblacion de Centro America y Panama: Honduras (Guatemala City: Instituto de Nutricion de Centro America y Panama, 1969), p. 120.

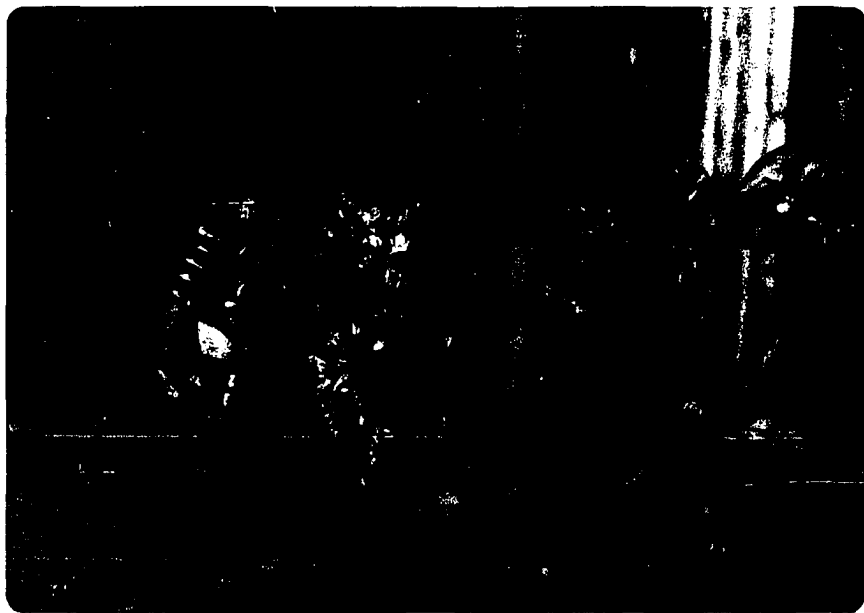


Figure 6. Smoke Preserved Animal Offals. The smoke dried entrails, meats and bones hanging from the pole are the only cuts that can be purchased by poor subsistence farm families. Perishable meat foods are preserved for short periods of time by suspending them from poles placed several feet above the family cooking fire. The pictured fruits are plantains (Musa paradisiaca), an important source of carbon hydrates.

Honduran population consumes amounts less than the ideal minimum and 8 percent consume no animal protein at all.⁵ Lack of protein, especially for the small child, is the principal nutritional crisis in Honduras.

In this country, as elsewhere in Central America, one finds the sad situation of a nation exporting protein rich foods abroad despite widespread domestic problems of protein malnutrition. Exports of beef and beans have been traditional sources of foreign income for Honduras. Until recently the principal markets for these commodities were neighboring Central America and Caribbean states. However, the last decade has witnessed a major re-orientation of this trade away from these relatively poor buyers and to the wealthier markets of industrialized nations. Of particular significance has been the growth of beef exports supplying the insatiable ground meat market of the United States. For the exploitation of this new and valuable source of trade balancing dollars, packing houses meeting the required sanitary standards of the American government have been established in the cities of Choluteca, Catacamas, Tela, Puerto Cortes, and San Pedro Sula.⁶

This development has stimulated the commercial production of beef in Honduras through an extension and improvement of grazing areas, the upgrading of cattle stock, and a greater utilization of modern practices of animal husbandry, especially in the utilization of veterinary medicine. Unfortunately, all of these advances have had the effect of making beef an expensive and scarce commodity for the Honduran domestic consumer. As exports of beef have risen, so too have domestic prices for meat. The net

⁵Ibid., p. 98.

⁶Ibid., p. 70.

result of this has been a decrease in meat consumption on a per capita basis.⁷

Much of the money and technical assistance responsible for the advances made in Honduran beef production have been obtained from the United States through AID. These programs must be recognized as unqualified successes if their planned objective was to bring about a substantial increase in beef production. In achieving these goals, measures should have been taken to prevent a worsening in the welfare of the poor majority of Honduras caused when shortages of meat on the domestic market resulted in prices beyond their economic grasp.

It is also unfortunate that no expenditures or planning efforts have been directed towards increasing animal protein production at levels lower than the large rancher or commercial poultry farmer. Executives in the Honduran Ministry of Agriculture stated without qualification that nothing was being done by the government to effectively assist production at the small farm level.⁸ Admittedly, this is recognized as the level most difficult to affect change, but it is here that the situation is critically worst and the need for improvement greatest.

Traditionally, Honduras has been an important supplier of beans to other Central American countries, especially El Salvador and Guatemala, even while domestic needs were not completely satisfied. This remains true of Honduran bean production and trade today. It is estimated that only 53

⁷ Interview with Robert P. Armour, Director, Pan America School of Agriculture, Zamorana, Honduras, July 16, 1971.

⁸ Interview with Manual Wills, Sub-director, Livestock Division, Honduran Agricultural Extension Service, Tequigalpa, Honduras, July 16, 1971.

percent of the quantity of beans needed to meet the minimum daily needs of the Honduran population is available for consumption within the country.⁹ Here too, the domestic consumer is of lesser importance than is the foreign buyer.

Beans as a staple are second only to maize in the composition of the Honduran diet and are the principal plant source of quality protein. Nevertheless, they have not been given recognition sufficient to keep their production growing at a rate capable of satisfying the nation's nutritional needs. Subsistence farmers as a group usually assign their best lands to maize production and delegate their less productive or marginal lands to the cultivation of beans. In terms of quantity, maize is a much better producer than are beans, and as long as maize returns a higher poundage of food per unit of land, the peasant will concentrate his labor and land resources on maize rather than beans.

In recent years former commercial producers of beans have shifted the use of their land to more lucrative forms of production such as cotton or cattle ranching. As a result, the per capita availability of beans in Honduras continues to decrease each year. Soya bean varieties suited to low latitude environments have been developed by the United Fruit Company; but because their production requires cultivation practices of a higher technological order than those practiced by the subsistence farmer, no progress has been achieved in introducing this nutritionally important plant.

Despite a large expansion of modern facilities for the production of eggs and milk, these commodities are not readily available to the average

⁹Marco Antonio Ramirez, Los Alimentos en Centroamerica (San Salvador, El Salvador: Organizacion de Estados Centroamericanos, 1968), p. 82.

Honduran buyer because of the high price and low income situation.

Commercial egg producers are very dependent on American imports of feed and poultry stock. The high import prices for these necessities results in egg prices that are open only to the high income urban populations. To satisfy this limited market, egg farms have located on the periphery of Tegucigalpa and San Pedro Sula, the only large population centers in Honduras. Until the country can produce its own supplies for the maintenance of a poultry industry, there can be little hope of realizing any reduction in egg or poultry meat prices to levels within the purchasing power of the poor majority. Therefore, eggs are consumed in quantities lower than that desired for the sustenance of good health. Any immediate improvement in the consumption of eggs will have to come from an increase in egg production from hens the rural poor own themselves.

Similar economic limitations restrict the resolution of protein malnutrition through commercial dairy production. Milk from such outlets is simply too expensive for the poor to afford. Many subsistence farmers keep cattle, but the milk yields from these animals are extremely low. Most of these animals are of the hardy but poor producing criollo stock. Any significant increase in milk production from the subsistence sector will have to entail the improvement of both the stock and husbandry practices of the small farmer.

Except for the coastal lowlands, seafoods have never been important in the Honduran diet. The recent development of fishing fleets and processing plants on the Caribbean coast has in large been a response to the growing demand for shrimp, fish, and lobster in the United States. In this respect the production and marketing of seafoods have paralleled the growth of that nation's beef industry. And as with the latter, increases in Honduran

seafood production primarily for an export market have resulted in higher prices for the domestic consumer.¹⁰ There is no reason to foresee a change in this situation or an improvement in nutritional problems through domestic seafood supplies.

Table IV shows the current and projected percentage availability of the traditionally important Honduran sources of quality protein. It clearly presents a pessimistic outlook in which, except for eggs, all foods instead of increasing in availability will decrease should present trends continue unchanged.

TABLE IV: CURRENT AND PROJECTED PER CAPITA AVAILABILITY OF
SELECTED PROTEIN FOODS IN HONDURAS FOR PERIOD
1965-1980

FOOD	Recommended Daily Intake In Grams	Availability 1965 %	Availability 1970 %	Availability 1975 %	Availability 1980 %
Milk	300	70	67	63	58
Eggs	24	58	64	71	76
Meat	90	26	25	24	22
Beans	75	53	51	53	52

Source: Marco Antonio Ramirez, Los Alimentos en Centroamerica
(San Salvador, El Salvador: Organizacion de Estados
Centroamericanos, 1968), pp. 87-90.

The Yamaranguila Setting

Yamaranguila, a small village situated in the southwestern highlands of Honduras, was selected as the site for a micro-geographic study of a group representative of the Central American Ladino. This village has an

¹⁰ Interview with Robert P. Armour, Director, Pan American School of Agriculture, Zamorana, Honduras, July 16, 1971.

altitude of approximately 5,300 feet and is located only twenty miles from the still undefined and recently contested border of Honduras and El Salvador. The terrain is without any extensive areas of level land and can be generally described as a region of rugged and highly dissected hills. The rainfall is much less than that of San Vito, the Costa Rican study site. Unreliable and poorly maintained precipitation records were obtained as collected for a weather station at La Esperana, five miles to the east of Yamaranguila. These records indicate an average annual rainfall of sixty-eight inches.¹¹ The distribution of this precipitation is seasonal, with most being received during the wet period extending from late April to October. The remaining months are relatively dry, but all do receive some rain. The natural vegetation is characterized by a dominating cover of oak (Quercus) and pine (Pinus) trees in those areas not recently cleared for cultivation or burned for pasture improvement.

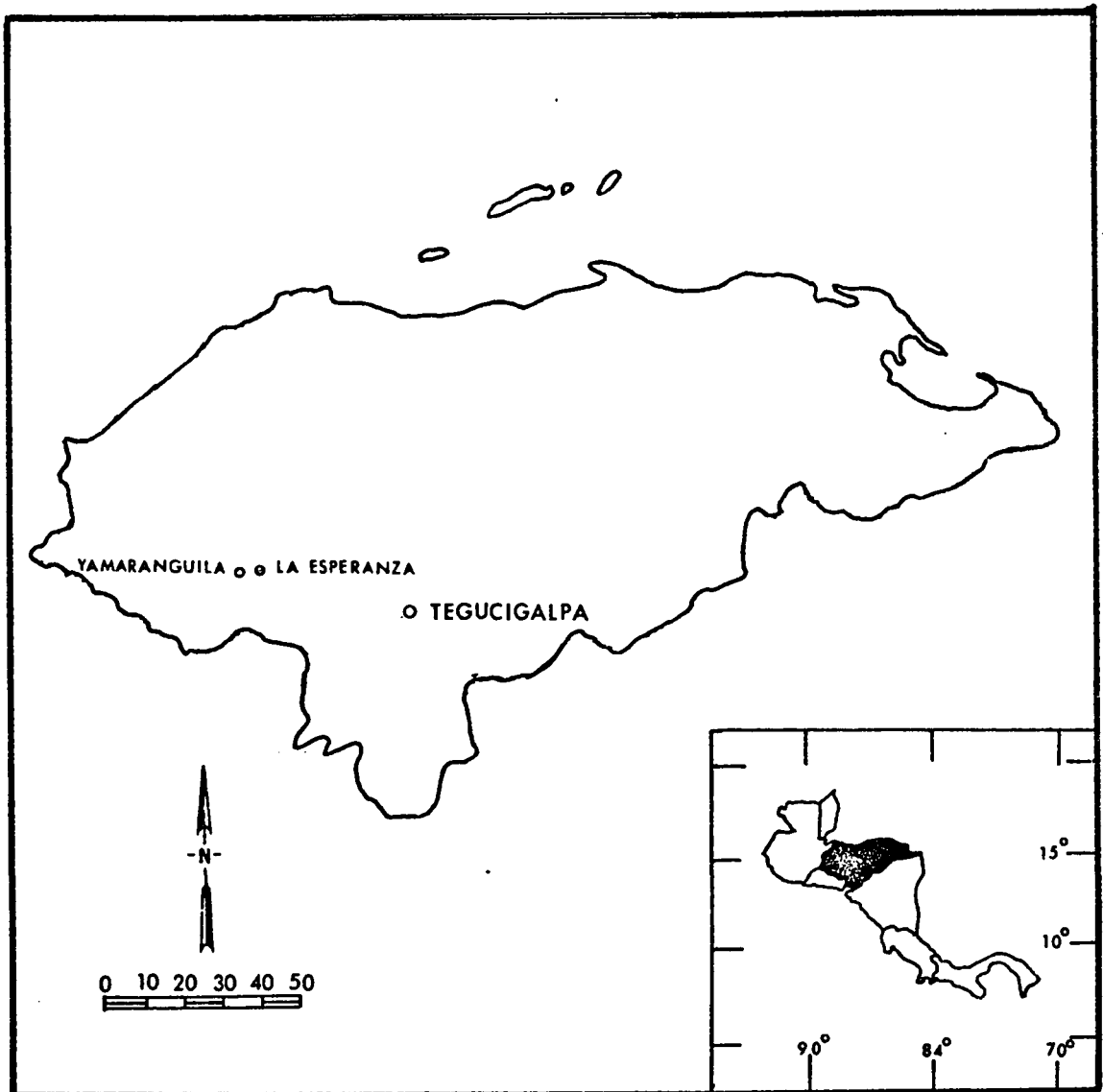
As a settlement, Yamaranguila has a history of occupance dating from Spanish colonial times. During the early colonial mining era in Honduras this region was one of the more important suppliers of cattle and wheat supporting the mining settlements. Because of its high altitude and relatively dry climate, Yamaranguila was one of the few places in colonial Honduras suited to the growing of wheat. This cereal is still cultivated as a cash crop by subsistence farmers but in ever decreasing quantities.

¹¹ Direccion General de Irrigacion Estudios Hidrologicos y Climatologicos Boletin No. 6 (Tequigalpa, Honduras: Secretaria de Recursos Naturales, 1966), p. 70. (Statistics available for the years 1944-55 were used in determining these averages, however, the amounts for the years 1947, 1948, and 1949 were not included. These gave annual totals of as little as one inch or less and were considered to be the result of poorly kept records rather than valid recordings of actual rainfall. For example, 1949 was reported to have 0.4 inches of rainfall while 1951, the next year for which records were maintained, recorded 52 inches.)

Recently imposed governmental restrictions prohibiting the use of fire as a means for clearing land to be used for wheat cultivation was stated as the principal reason for the local decline in the production of this crop. It was also mentioned that domestically produced wheat could not compete with wheat imported from the United States in terms of either quality or price. Of the two factors given, the latter is probably more significant in accounting for production drops.

Yamaranguila like many communities in the highlands of southwestern Honduras is rather isolated. Until two years ago the principal route of travel from this village was via a trail to the nearby larger town and departmental capital of La Esperanza. Through the efforts of an American Peace Corps volunteer assigned to Yamaranguila and surplus American "food for peace" used in lieu of cash salaries for workers, a serviceable vehicular road was constructed connecting La Esperanza and Yamaranguila, relieving the latter of some of its isolation. From La Esperanza a gravel road leads to the principal north-south highway of Honduras. Travel by truck to this major highway requires three hours of extremely rough riding over narrow and winding mountain roads.

Yamaranguila's population was recorded as 331 in the census of 1961, the latest census for which statistics are available. The same census indicates that the population of the town had decreased by 9.6 percent in the ten-year period since the 1951 census. This report of a declining population was not accepted by local authorities as being valid. However, no one debated those statistics contained in these censuses indicating the poverty and significance of agriculture in the economy of the local area. The latest census lists 96 percent of the work force in Yamaranguila as being employed in agricultural occupations, most of these as self-employed



Location of Yamaranguila, Honduras

subsistence farmers.¹² Other statistics listed in these censal documents present an overview of the town's backwardness and low state of welfare. Only 20 percent of the population was reported in 1961 as being literate, and many in this group must be considered as functionally illiterate in that they can only sign their name and read simple Spanish with considerable difficulty.¹³

If quality of housing is significant as an indicator of welfare, then the condition of Yamaranguila is extremely poor indeed. No dwellings in the community have electricity or running water and only 2 percent are listed as having toilet facilities of any kind.¹⁴ Most of the houses are classified as bajareque, a type of wattle and daub structure constructed with walls of upright posts interwoven with sticks and twigs plastered with clay.¹⁵ Even though windy winter night temperatures frequently drop to 45° Fahrenheit or colder, many of these houses are built without the sealing covering of clay.

Yamaranguila is one of several Honduran communities which have retained communal ownership of land as a common form of tenure. In the municipio to which it belongs the preponderance of land holdings are classified as communal or ejidal.¹⁶

¹² Direccion General de Estadistica y Censos, Poblacion y Vivienda: Departamento de Intibuca, 1961 (Tequigalpa, Honduras: Direccion General de Estadistica y Censos, 1963), p. 74.

¹³ Ibid., p. 11.

¹⁴ Ibid., p. 112.

¹⁵ Ibid., p. 114.

¹⁶ A municipio is a political administrative unit widely found throughout Latin America. It is the principal sub-unit within departments which are themselves the equivalent of states as in the United States. On this

Out of a total of 1,372 farms in the municipio of Yamaranguila, 1,240 (90.3 percent) are listed as ejidal in the 1966 agricultural census.¹⁷ The term ejido is used in referring to a single farm or holding utilizing ejidal land. Communal land owned by the municipio is assigned to individuals as ejidos for agricultural use. Land granted in this manner may not be sold or leased. To do so or to fail to farm the land efficiently may cause the municipio to withdraw its assignment as originally made. This system of land tenure has pre-Colonial aboriginal origins. Following the Conquest, the Spanish crown recognized and protected (sometimes poorly) Indian communal lands from being seized or exploited by haciendas. Through time and the dilution of Indian traditions, the ejidal system has disappeared in many areas where it was once the most dominant tenure form. The retention of ejidos in the Yamaranguila area is evidence of a formerly strong Indian cultural influence in the not too distant past.

Comments made by different persons and observations of the researcher suggest that the traditional form of ejidal land tenure is beginning to break down in this area. In the course of interviews no one admitted or volunteered to state that their land was held under ejidal rights. It appears that ejidal assignment of land has taken on many of the characteristics of private forms of tenure and is communal only in the eyes of a few municipio officials. Much of this must be attributed to the weakening of Indian traditions.

basis a municipio may be compared to a county, but on a much smaller scale. Yamaranguila, the town, is the administrative center (cabecera) of Yamaranguila, the municipio of the same name. Both are within the Department of Intibuca.

¹⁷Direccion General de Estadistica y Censos. Segundo Censo Nacional Agropecuario: 1965-1966 (Tequigalpa, Honduras: Direccion General de Estadistica y Censos, 1968), p. 20.

Racially, the population of this part of Honduras must be recognized as American Indian; but culturally, these people are predominantly Spanish American. Perhaps owing to the isolation of this region, the process of Ladinization is not as advanced here as elsewhere in Honduras. In other areas of Honduras where Spanish mining activities, ranching, and colonial administrative centers were more firmly established the Hispanic influence has been much greater. However, it would be a mistake to consider the highland peoples of southwestern Honduras as anything other than Ladinos, even though some retain Indian traits such as using the floor for cooking or a tumpline (mecapal) for carrying heavy loads.

Efforts to obtain topographic maps, aerial photographs and property lists for the preparation of household listings to be used in random selection of farms for interview purposes were futile. At the time of the survey, relations between Honduras and El Salvador remained strained as a consequence of their war in 1969. Because of this state of affairs and the fact that Yamaranguila's proximity to the Salvadorean border placed it within the "war zone," no maps or aerial photographs of the region could be obtained for field use from Honduran government agencies. A request for property and voting lists from municipio officials in Yamaranguila was answered with this reply: "No hay," (there aren't any). When asked the approximate number of farms located in the area immediately surrounding Yamaranguila, the given estimate was fifty to sixty. It was then decided to abandon attempts to conduct random sampling and base the survey on interviews of all the "fifty to sixty" farms.

The method of interview followed that used in Costa Rica, except that a guide was employed to assist in locating the farms scattered in the immediate area of Yamaranguila. Despite a more open natural landscape than

that of rainforested San Vito, the individual houses were more difficult to locate. As a rule the dwellings were not placed directly on the principal trails and could easily be missed, as initial efforts by the researcher without the services of a guide proved. It was also recognized that the guide, a life long resident of Yamaranguila, contributed through his presence to a more relaxed and truthful response from the families being interviewed. With his assistance a total of fifty-two families were visited and interviewed.

The average size of family farm holdings was 6.5 hectares. Two farms of sizes much larger than this were studied but not included in determining this average. One of these comprised 421 hectares of land and the other 70 hectares. The larger of the two was owned by a former mayor of Yamaranguila and the other by a cattle dealer. The relatively large size of these holdings did not allow their inclusion within the definition of subsistence farms. Eight households refused to give the size of their farms and three stated they had no land to farm. In relation to the groups surveyed in Guatemala and Costa Rica, the Hondurans, while friendly, were as a group much more suspicious and unresponsive, particularly with reference to inquiries related to land tenure and farm size.

Until recently the only cash crops these farmers produced were wheat and small quantities of maize sold at harvest. However, for reasons mentioned earlier, wheat production has been declining and few farmers continue to grow it. Most of the maize which is produced is consumed directly by the farm family. Seldom is there an appreciable surplus available for sale.

In the last two years potatoes have been receiving attention as a new cash crop and a miniature boom is developing around their production. For

some time the Honduran market for potatoes has been dependent on imports from Guatemala. The bulk of this trade between Guatemala and Honduras moved via the Pan-American Highway which passes through El Salvador. When this flow of goods was interrupted by the war between Honduras and El Salvador, one consequence was a shortage of potatoes. At that time the possibility of growing this crop in the cool highlands of the La Esperanza-Yamaranguila area was realized. During the summer of 1971 when field work for this study was conducted in Yamaranguila, the local farmers were exhibiting much enthusiasm towards potatoes as a new cash crop. In relation to this, they were fearful that "outsiders" were being attracted to the area to take up land for potato production. Being without legally clear titles to the land they held under extremely tenuous usufructure rights of ejidal tenure, also added to their apprehension of strangers. These conditions centering around the potato boom contributed to making these people less secure, even though none of the families interviewed had yet begun cultivating potatoes as a cash crop.

In addition to having land in the immediate locality of Yamaranguila, it was not uncommon for some farmers to claim separate holdings in both the warmer lowlands and cooler and more humid mountainous regions of the municipio. This three-fold division of land holdings in distinctly different ecological zones was also later encountered among the highland Indians of Guatemala. Land farmed in the lowlands produces two crops of maize annually, while the cooler climate of the highlands is limited to the harvesting of a single maize crop. The highest mountain land was utilized primarily for transhumance grazing purposes during the dry season when forage was more abundant because of greater amounts of orographic rainfall.

Peasant Animal Production

Chickens

The most commonly raised source of animal protein was chickens. Of the fifty-two families interviewed, only two did not raise any poultry. The average family flock consisted of eleven birds. Most of these were of the criollo type or of mixed strains of mid-latitude breeds. No farm had a flock in which all the chickens were of a single recognized breed. Except for the criollo types no two hens appeared to be the same. Fourteen families had more than two dozen chickens in addition to a number of turkeys and ducks. Eighteen families were raising five or fewer hens.

All farms, without exception, allowed their poultry to roam freely for food scavenging. When asked why it was not a custom to raise the chickens in an enclosed chicken yard, these reasons were most frequently offered: need to scavenge for feed; penning not considered as necessary; and no money to buy the materials such as wire required for the construction of a chicken yard or pen. An insufficiency of feed more than any other factor limited the number of chickens kept by the average family. Most families are able to supplement the scavenging of chickens with small amounts of maize or grain sorghum. Both of these grains are family staples (the latter to a much lesser degree) and when in short supply for the family's own food needs, the chickens only receive an amount necessary to keep them from straying or joining the flock of a neighbor who is feeding his flock grain. No household stated they would purchase maize or any other type of feed to be used for the singular purpose of raising poultry. This finding agrees with a study conducted by INCAP in conjunction with that agency's

nutritional survey of Honduras. Only 2 percent of the families surveyed by INCAP workers stated they purchased concentrated feed for their chickens; however, none admitted that their flocks depended primarily on scavenged food or scraps left from family meals.¹⁸ Knowing toilets, outdoor privies, and latrines do not exist on the majority of these farms, it is assumed that human wastes are included in the diet of the chickens. In this way, poultry when allowed to roam freely, do contribute to the sanitation of the individual farm. The importance of this function of poultry on subsistence farms is not fully appreciated, and no one was willing to discuss this "embarrassing and shameful" habit of chickens. But it is felt that because poultry are omnivorous scavengers the farm settlements are much less plagued with flies and offensive odors than are the slums and shanty towns of cities like Tegucigalpa and San Pedro Sula which are without toilets and sewers. This researcher cannot avoid concluding that scavenging poultry are significant in keeping the environment of the average farm cleaner and healthier than it would be without them. In his classical study of Old World food taboos, Simoons frequently refers to the avoidance of poultry meat and eggs as food because of "filthy and unclean eating habits."¹⁹ This particular habit and function of poultry is therefore a commonplace occurrence in areas other than Central America.

Predators were not claimed to be as serious a problem in Honduras as in Costa Rica. It is speculated that the reason for this may in part be because Yamaranguila, unlike its Costa Rican counterpart, is located in a

¹⁸ Institute for Nutrition of Central America and Panama, Honduras, p. 88.

¹⁹ Frederick J. Simoons, Eat Not This Flesh (Madison: The University of Wisconsin Press, 1961), pp. 65-78.

long settled agricultural region rather than within a frontier zone of recent colonization. The greater modification of the ecology of the Honduran locality over a longer period of time has undoubtedly affected wildlife populations, including the reduction in numbers of larger mammal predators which would normally prey upon loose or poorly protected farm poultry. However, it should be noted that the coyote (Canis latrans), the principal predator in the Yamaranguila area, is one wild animal that apparently favors an agricultural environment and is a constant menace to both poultry and sheep production. Another mammal reported as responsible for a large number of chick losses is the ordinary house rat (several related species, all of genus Rattus) found within the immediate vicinity of most farmsteads.

A more important reason for predators being considered as a lesser problem in Honduras is due to the better and more protective roosting coops provided the chickens. All Honduran farms had substantial coops made of logs or planks and placed on stakes as high as ten to twelve feet above the ground. The ladder or pole used by the hens for entry and exit is taken down at night and the coop door then securely shut. These coops are basically the same as those used in Costa Rica. But while many families had chickens and no coops in that country, all the chickens in Honduras were carefully cooped at night, principally as a precaution against prowling coyotes (Figure 7).

Several farmers in discussing problems with predators referred to the stealing of poultry by "two legged coyotes." Thievery of farm animals (and maturing crops) was a community problem of greater scope than expected, and all farms found it necessary to take measures to protect against thieves. This is the reason for practically every household having

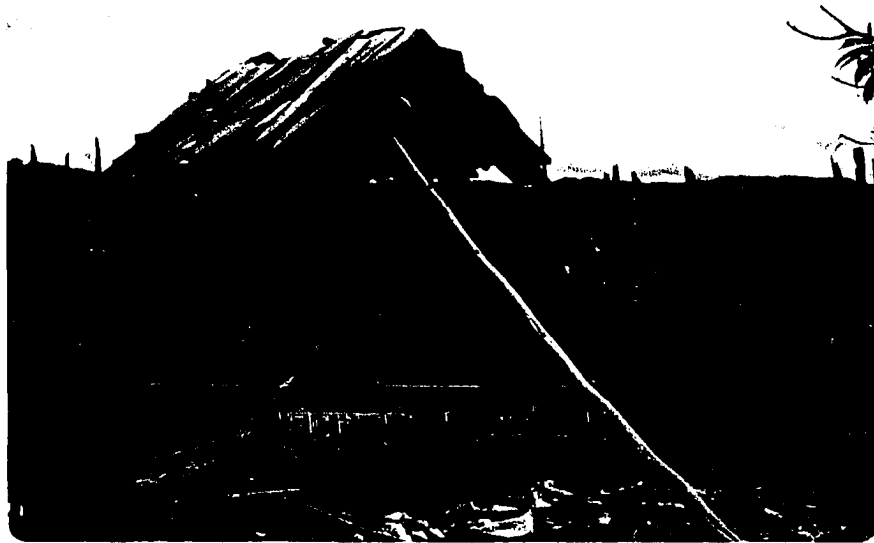


Figure 7. Raised Wooden Poultry Coop. Elevated coops such as these are used to protect poultry from predators.

watch dogs. These poorly nourished animals must compete with the farm poultry for the sparse table scraps, and it is not uncommon for the family to lose some of the already small egg production to its own hungry watch dogs unless measures are taken to protect the hen nests.

Although losses to thieves and predators do occur, these represent a mere fraction of the number of poultry that die as a result of poultry diseases and parasites. As many as half the number of chickens kept by the average family may be lost within the course of a year due to causes of sickness. This high incidence of disease should be recognized as being directly related to the inadequate and unbalanced feed provided chickens and the failure to safeguard against disease through vaccination. Some Yamaranguila families were surprised to learn that poultry could be vaccinated.

Chickens were raised principally as a source of food for the family and to a lesser extent for the supplemental income obtained from selling them or eggs in the regional market at La Esperanza. Flocks of fifteen to twenty hens averaged only four or five eggs a day because of their poor feed rations. Such low production hardly allows for a surplus to be sold. Unless a farm is able to adequately feed chickens it would be unwise to recommend the use of less hardy but more productive (under proper conditions) mid-latitude breeds.

Other Poultry

Both turkeys and ducks were kept by a greater percentage of Hondurans than Costa Ricans. This was especially true in the keeping of turkeys where exactly one-half the families surveyed were found to be raising these birds. The average number of turkeys per family was four, much less than

the average number of chickens which was eleven. Turkeys were raised principally for family consumption on festive occasions. It was generally agreed that these birds were more demanding of food and care than were other types of fowl. But because they bring status as a prestige food, the extra feeding and care is considered worthwhile.

Ducks were raised in small numbers by only eight of the fifty-two families. Two households had seven ducks each and the others only two or three. Except for the families owning seven ducks, it appeared that these birds were being raised as household pets rather than sources of food. Many who were without ducks referred to them as a community menace for their habit of muddying and polluting streams supplying water used for drinking and washing. The threat ducks pose to local water resources is particularly high during the drier part of the year when streams all but cease flowing. As in Costa Rica, some of the families in Yamaranguila wrongly thought that ducks could not be raised unless a pond or tank were provided them for daily swims.

Pigeons were raised by three families in insignificant numbers, only five or six per farm. All three of these households raised the pigeons to produce squabs for home consumption. As with other fowl, they were mainly dependent on foraging for food and were only fed negligible amounts of maize to keep them from nesting elsewhere.

Cattle

The uneven terrain, poor soils, and relatively low rainfall restricts much of the land around Yamaranguila to cattle production, both beef and dairy. Of the families surveyed, 69 percent were keeping cattle to produce steers for sale or milk for family use. Sixteen of the thirty-two farms

stated their animals were raised primarily for milk production. However, there was no particular distinguishing of local cattle on a basis of breed type. If a cow were kept for milk, it was said to be a dairy cow; other animals of the same type but not used for milk would be referred to as beef animals. Identification was simply a matter determined by an animal's utility rather than its breed.

In describing these cattle two words were used interchangeably with no apparent distinction, these were: criollo and comun. Both terms refer to the type of cattle discussed earlier in Chapter III. The criollo found in the highlands around Yamaranguila was described by the local farmers as being slightly different than the more common lowland or savanna criollo cattle of Honduras. The former was said to be much smaller (some less than four feet at the shoulder) and to have a heavier and darker fur. These two different characteristics may be the result of natural selection, the smaller size a useful adaptation to the hilly environment and the darker and denser coat providing more warmth in a cooler climate (Figure 8). It was interesting to learn that some small farmers are in the process of "improving" their cattle by breeding lowland criollo blood into local herds.

Not having a cash crop comparable to the coffee produced by the peasants in San Vito, cattle are of greater significance in Yamaranguila as a small scale source of cash income. Of the thirty-six families with cattle only fourteen had more than two and there were just three with ten or more. Cows were kept to produce calves rather than milk. The calves were raised for later sale to local cattle buyers. These buyers move the cattle to lowland areas where they are sold to ranchers or slaughter houses. Many of these animals are taken into El Salvador or Guatemala for sale and consumption in those countries. In the recent past this trade has involved



Figure 8. Mature Yamaranguila Criollo Bull. The animal in this photograph exhibits the small size and dark coloring typical to many of the criollo cattle in the Yamaranguila region. Note the animal's height in comparison with the four strand five foot high barbed wire fence.

the annual movement of as many as 50,000 head of cattle across the borders of Honduras.²⁰ The hostilities between Honduras and El Salvador have disrupted the flow of cattle into the latter. However, important changes in the traditional trade patterns of this cattle trade have been affected by the development of meat plants within Honduras processing beef for export to the United States. With reference to the movement of cattle from the savanna covered upland basins of Honduras to Guatemala and El Salvador, it should be noted that Yamaranguila is centrally located in the area traversed by many of the heavily used cattle trails. By virtue of this ideal locational situation, it is in an excellent position to sell cattle. The higher and wetter mountain slopes around Yamaranguila contribute to cattle production by allowing the small subsistence farmer to practice transhumance. During the dry period from November to April, cattle are taken to the mountains for grazing on pasture watered by rains resulting from orographic lifting. When this seasonal movement occurs, local availability of milk is reduced. This is just as well, because those few cows which are not transferred to the higher slopes can barely produce enough milk on the scanty pasture to maintain their calves. If this milk were not reserved for the calves, they would surely be lost. It is because of this that calves are almost always given priority over the family children in the consumption of the limited quantities of milk usually available.

As in Costa Rica, these peasants never killed cattle to provide meat for their own needs. A steer or cow represents an investment much too expensive for use as family food, not to mention the lack of any means for

²⁰West and Augelli, Middle America, p. 421.

preserving large quantities of highly perishable meat. Practically all the beef production in Yamaranguila moves out of the immediate area. Paradoxically, in this cattle producing area meat is in short supply. It was not unusual to find customers gathering at the entrance to the butcher shop in La Esperanza two hours prior to its opening. But local demand as great as it is does not equal that of the large packing houses and urban markets of the principal cities. Consequently, local cattle are not available for consumption in the area where they were grown.

It was common for families owning several head of cattle to go a month without eating meat. Once when a mother was asked on how many occasions her family ate meat during an average month, she replied with this question, "Why don't you ask how many times a year?" When cattle are sold, the money obtained is used to buy necessities, most commonly maize which the family may not have. A British rural economic advisor offered this observation, "It is sad to see these poorly fed people exchange high quality protein foods for low quality carbohydrate foods. But this is what they so frequently do every time a hog or yearling is sold to buy several hundred pounds of maize. They had the protein; now they have the calories."²¹

Hogs

In comparison with those owning poultry and cattle, the number of families having hogs was relatively insignificant, only six out of the fifty-two interviewed. In raising so few of these animals the Honduran peasants were like the peasants surveyed in Costa Rica. In both areas the same factors accounted for the average subsistence family not raising hogs.

²¹ Interview with Rodney Stares, British economic advisor for the Honduran government, Comayagua, Honduras, July 27, 1971.

Most households do not grow sufficient quantities of feed to raise hogs restricted to pens. If allowed to scavenge for part of their food, they are very likely to damage flower gardens, maize crops, or vegetable plantings, in that few farms have fences capable of protecting against the incursions of hungry scavenging hogs. The average farmer surveyed in Honduras, while not appreciative of loose hogs, was not nearly as apprehensive about these animals as were the farmers interviewed in Costa Rica. This is probably explained by the absence on Honduran subsistence farms of a cash crop equal in importance to the coffee crop grown by the small Costa Rican farmer. Scavenging hogs are frequently seen in the towns and villages of Honduras (Figure 9). To make it difficult for them to pass through wire strand or split log fences, they are sometimes fitted with a wooden yoke around their necks. These devices, called gauchos or paletas, may also be put on cows for the same purpose (Figure 10, page 107).

Because scavenging hogs will consume animal wastes and carrion, they are usually infected with different types of parasites, especially trichinosis.²² However, like the dog and chicken, these animals are important for the service they perform in disposing of household garbage and excreta, and it is not far-fetched to regard them as being critical in the sanitation of many towns and farms that are without septic tanks or sewers. According to Simoons, this function of pigs has long been recognized in Asia:²³

The pig in the traditional Chinese economy was a household scavenger which survived on table scraps and chaff. In many places pigs were actually quartered in the family garbage pit and regularly fed human

²² Institute for Nutrition of Central America and Panama, Honduras, p. 71.

²³ Simoons, Eat Not This Flesh, p. 27.



Figure 9. Diseased and Poorly Nourished Hog. This animal is typical of the hogs allowed to roam and scavenge in the villages and towns of Central America. Note that the hog's condition of malaise includes the loss of both ears from dog attacks.



Figure 10. Paleta Yoked Cow. The wooden paleta (yoke) worn by the criollo cow is a protective device placed on cattle and hogs to prevent their passing through fences and damaging crops.

excreta and garbage. Thus they not only converted into flesh certain plant nutrients that the human digestive system could not absorb directly, but may actually have performed an important health function too: human parasites such as hookworm may have been destroyed in the pig's intestine.

A similar use and method for raising hogs is reported by Oakes as a common practice among some Ladinos in Guatemala. In a stay with one family without an "outhouse," she reports that "the pigs which were kept in the patio ate the human excrement, and the people ate the pigs."²⁴

Other Animals

No sheep or goats were inventoried on farms in Yamaranguila during the course of the survey. Nor did any farmer state an interest in keeping these animals. But there is no reason why goats and sheep could not be raised to produce both additional food and income. Except for possible losses to coyotes there would be nothing to restrict their utilizing land not suited for the grazing of cattle because of steep slopes or scanty grasses. However, careful precautions would have to be taken to protect against erosion which could result from dangerous overgrazing so common to goats and sheep. Two flocks of each type of these animals were being raised on the ranch of a retired Honduran army colonel. Both had been introduced the year before to learn if they were profitably suited to the environment of Yamaranguila. The goats had done particularly well but coyotes had reduced the sheep to half their original number. It was reported that the goats were capable of protecting themselves against coyote attacks while the sheep required the constant protection of a shepherd.

²⁴ Maud Oakes, Beyond the Windy Place (New York: Farrar, Straus and Young, 1951), p. 146.

With a relative abundance of unused land there is nothing to prevent the average subsistence farmer from maintaining one or two milk goats to provide his family with milk on a regular basis and meat from an occasionally slaughtered kid. While recognizing the considerable damage these animals have done to soil resources in many areas of nearby Mexico through overgrazing, there is no reason why with proper control these animals cannot be used to improve the diet of malnourished children in much of rural Honduras. An introduction of goats would require an instructional program to inform the peasants of this animal's utility as a source of food and to also make them aware of the dangers of overgrazing by goats.

CHAPTER V

PANAMAQUIB: THE GUATEMALAN CASE STUDY AREA

Population and Malnutrition Characteristics in Guatemala

Physically and culturally Guatemala is without question the most complex of the Central American nations. Within this country, smaller in size than the state of Louisiana, volcano rimmed highland basins, densely populated with Indians living a way of life little changed from that of their Mayan ancestors, contrast with the hot, dry, and almost desert-like environment of the lowland interior valleys occupied by Hispanic Ladino cattlemen. One tenth of Guatemala's population of five million resides in Guatemala City, the nation's capital and Central America's largest metropolis; while the sparsely populated lowlands of Peten containing over one-third the land area are settled with less than 1 percent of the population.¹

Guatemala's distinctive character derives from it being the most Indian of all Middle American countries. Approximately one-half of the population is aboriginal in language, dress, religion, and other cultural traditions. The remaining half of the nation is almost entirely Ladino; and even though Hispanic in cultural traditions, this group is mostly Indian in racial composition. The Indians of Guatemala are largely concentrated in the Southwestern highlands. As many as 80 percent of the

¹Nathan L. Whetten, Guatemala: The Land and the People (New Haven: Yale University Press, 1961), p. 22.

inhabitants in the departments of this region may be classified as Indian. In these areas the non-Indian Ladino minority is usually found in the urban centers as administrative civil service workers, shopkeepers, or professionals. The Indians occupy the countryside and smaller settlements supporting themselves primarily through subsistence farming, seasonal employment on commercial farms and as producers of cottage industry products such as pottery, hand woven textiles, and basketry.

After 450 years of Spanish and Ladino domination, the Indians of Guatemala continue to retain their own culture and refuse to be assimilated into the pattern of the Western World. These Indians are ignorant of their distinct cultural and racial unity because of local diversities among them of dress and dialect. As a result, they have never unified to present themselves as a concerted influence in the affairs of either a colonial or independent Guatemala, even though they have long constituted a majority in the nation.

The Guatemalan Indians have been successful in maintaining their way of life to a greater degree than other Middle American aborigines because of several factors: firstly, the area they occupied was without the attractive mineral wealth of other regions within the Spanish colonial empire such as the Mexican Plateau and Peruvian Andes; secondly, the cool and humid highlands were not suited for the production of tropical commercial crops like indigo and cacao or the establishment of cattle haciendas; and thirdly, this same environment was less conducive to the growth of Old World pathogens introduced by the first Spanish, consequently diseases such as typhus, measles, diphtheria, and smallpox were less devastating on highland native populations than was the case among lowland groups which were decimated.²

Except for intrusions of Catholic priests and civil administrators, the Indians were generally left to themselves in the rugged and isolated highlands. In their missionary efforts the clergy succeeded in having the Indians accept only a minimum of orthodox Catholicism. Outwardly, the religion of contemporary Indian societies manifests characteristics of Christianity, but in totality it is a blend of Catholicism and pre-Columbian animistic beliefs. For much of their history since the Conquest, the Indians have been without the regular services of priests, the principal diffusers of both Catholicism and Hispanic culture. Holleran reports that there were only 119 priests in the entire country in 1872 and a total of 120 in 1946; this indicates that not only was the figure low in the past, but that the number has decreased in proportion to population growth.³ Exposure to other Ladino influences was limited to contacts with non-Indian merchants, political administrators, and seasonal work experiences on commercial farms.

Traditionally, the Indians have been required to pay tribute or taxes to the government and ruling minority class. Having little of value, except for crops such as wheat and corn, it was common for these assessments to be made in the form of labor. This system has long subjected them to many abuses sanctioned by law and which were repealed only as late as 1945.⁴ Without sufficient land resources in the highlands and a rapidly expanding

²Robert C. West and John P. Augelli, Middle America: Its Lands and Peoples (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1966), pp. 267-268.

³Mary P. Hollerman, Church and State in Guatemala (New York: Columbia University Press, 1961), pp. 235-236.

⁴West and Augelli, Middle America: Its Lands and Peoples, p. 393.

population (in excess of 3 percent annually), the Indians more than ever are required to seek work as seasonal laborers or rent lands at expensive rates in the nation's less settled but fertile lowlands.⁵ Their lot has changed but little and they are presently caught in a crisis as hopeless and desperate as any they have ever been submitted to in a long history of poverty and mistreatment.

The sparsely populated lowlands and Pacific piedmont are mostly owned by wealthy cattle ranchers or coffee and cotton growers. Though much of this land is not cultivated, it is not open to settlement by Guatemala's landless poor, either Ladino or Indian. Some of this land is rented to grow maize for transfer to the highlands after harvest; but permanent settlement is discouraged and restricted. In the past, the tropical lowlands, particularly those along the Pacific versant, were important sources of agricultural products to supplement the needs of the always relatively dense highland populations. It is only within the last 100 years that lands on the coastal plain and piedmont, owned through communal forms of tenure by highland Indian communities, have been lost to haciendas. Much of this loss occurred when the agricultural potential for coffee cultivation was first realized and the land taken from the Indians for the export production of this crop. The construction of a railroad along the piedmont divided many communal holdings and also contributed to a weakening of the control and utilization of traditionally important Indian lands. McBryde reports that as recent as the late nineteenth century highland Indian communities actually had political boundaries extending onto the coastal plain. These

⁵Lehman B. Fletcher et al, Guatemala's Economic Development: The Role of Agriculture (Ames, Iowa: The Iowa State University Press, 1970), p. 22.

were probably relic retentions of a pattern established long before the Spanish conquest.⁶ Indians continue to migrate to the coastal cotton farms and piedmont coffee plantations (fincas) for supplementary income or to rent land for corn production; but they are not privileged to work these lands with the degree of freedom enjoyed by their ancestors nor is the income and food obtained sufficient to ameliorate the worsening demographic and economic conditions found in the crowded highlands.

Official statistics reveal how serious the crisis is in the eight predominantly highland departments (states) of Chimaltenango, Solola, Totonicapan, San Marcos, Huehuetenango, El Quiche, Alta Verapaz, and Jalapa. Each of these has a labor force with a high proportion (over 80 percent) involved in agriculture at subsistence levels. Between 1951 and 1966 the share of the GNP generated by these departments decreased from 16 percent of the nation's total to 6.4 percent. Of further significance the per capita output fell from \$97.00 U.S. to \$51.00 U.S. during the same period, a decline of almost 50 percent.⁷

The highland region contains over 90 percent of the nation's farms, most of which are extremely small.⁸ According to the 1950 census, 47.6 percent of these minifundia (small holdings) are smaller than 3.5 acres in size and include only 3.3 percent of the total farm land. At the opposite extreme, this same census reported that the large farms (latifundias)

⁶ Felix Webster McBryde, Cultural and Historical Geography of Southwest Guatemala (Smithsonian Institute, Institute of Social Anthropology Publication No. 4, Washington, D.C.: U. S. Government Printing Office, 1945), pp. 23, 34, and 91.

⁷ Fletcher, et al, Guatemala's Economic Development, p. 23.

⁸ Ibid., p. 61.

occupied 50.3 percent of the land while representing only 0.3 percent of the farms.⁹ Since 1950 this situation has deteriorated even more. By 1964 pressures generated by a rapidly growing population combined with the division of peasant land holdings among family heirs had resulted in a 50 percent decrease in the average size of the already miserably small minifundias in the highland region.¹⁰ This process represents a subdivision of holdings originally inadequate for supporting a peasant family through farming, into even more units of lesser size.

Caught in this predicament of expanding population, diminishing income, insufficiency of land, and without the freedom or capacity to migrate to areas not fully cultivated, the rural poor of Guatemala's densely populated highlands are threatened with consequences of Malthusian doom.

The principal misery generated from these conditions is malnutrition. Perhaps because INCAP is headquartered in Guatemala City, more research has been devoted to the problems of malnutrition in Guatemala than in any other Central American state. But despite the admirable efforts and scholarly reputation earned by this nutritional institution, little actual alleviation has been achieved in resolving the nutritional ills of this nation.

The Melvilles state that the Guatemalan government refused to allow the publishing of a report attributing 50,000 infant deaths a year to malnutrition, because it was a "communist document."¹¹ Considering Guatemala's

⁹Whetten, Guatemala, p. 93.

¹⁰Fletcher, et al, Guatemala's Economic Development, p. 61.

¹¹Thomas Melville and Marjorie Melville, Guatemala: The Politics of Land Ownership (New York: The Free Press, 1971), p. 253.

population of 5,000,000, this figure does appear to be unrealistically high, even with consideration given the food and health difficulties of the country. However, INCAP reports that protein and calorie malnutrition contribute to the deaths of more than 5,000 children a year. In comparing Guatemalan infant mortality rates with those of the United States, this agency discovered the former's rate to be twenty-five times higher than the latter's for children between the ages of one and two years; most of this vast difference resulting from deaths directly due to the related diseases of malnutrition and infection.¹² Projected figures of a recent nutritional survey indicate that within the total child population of Guatemala under five years of age, 408,000 suffer from malnutrition of the first degree, 220,000 of the second degree, and 40,000 of the third degree. These are extremely high projections for a national population which numbered less than 5,000,000 persons when surveyed in 1969.¹³

Like the other Central American states, the nutritional problems of Guatemala result primarily from a low consumption of quality protein foods. While most Guatemalans are able to satisfy their daily caloric needs, the majority fail to meet the recognized minimum requirements for protein, particularly that derived from foods of animal origin such as eggs, milk and meat. Maize is the principal supplier of both calories and protein. But because the quality of protein contained in maize is of a low biological value, large quantities must be consumed to fulfill the human need for

¹²Institute of Nutrition for Central America and Panama, Evaluacion Nutricional de la Poblacion de Centro America y Panama: Guatemala (Guatemala City: Instituto de Nutricion de Centro America y Panama, 1969), p. 60.

¹³Ibid., p. 13.

amino acids if maize alone is the major food in a diet. The Guatemala poor, especially the Indian, eat large amounts of this cereal (Figure 11, page 118 and Figure 12, page 119). Whetten reports an average weekly per capita consumption of 8.1 pounds and the Melvilles estimate that "the average family of five in the highlands needs approximately one quintal (100 pounds) of maize a week, or 52 quintals a year, since its diet is almost exclusively made up of this cereal."¹⁴⁻¹⁵ Adults who consume such large amounts of maize together with beans are not deficient in their protein ingestion; but children restricted to diets containing only these foods are, as Dr. Behar explains:

In the case of a maize and bean diet, we have found that the optimal combination is one in which 50 percent of the proteins are provided by maize and 50 percent by beans....On this diet, a child of two years would have to consume 250 grams of maize and 90 grams of beans daily. According to the usual way of preparing these foods, this means that the child would have to eat 300 grams of cooked beans and 500 grams of tortillas per day. No child of this age can consume such quantities.¹⁶

Statistics provided by INCAP show that in Guatemala the majority of the population daily consumes between five and fifteen grams of animal protein, an amount much less than the minimum established by WHO as the necessary minimum for maintenance of health.¹⁷ Because of this situation, children with their greater biological need for protein are the ones who suffer most from shortages of quality protein foods. If diets could be

¹⁴Whetten, Guatemala, p. 199.

¹⁵Melville and Melville, Guatemala: Politics and Land, pp. 297-298.

¹⁶Moises Behar, "Meeting Protein Requirements of Young Children in Tropical and Subtropical Areas," Journal of Tropical Pediatrics, Vol. IV, No. 4 (April, 1964), p. 92.

¹⁷Institute for Nutrition of Central America and Panama, Guatemala, p. 12.



Figure 11. Panamaquib Woman Shelling Maize. Woman seated in foreground is performing daily task of shelling maize for the following day's food needs. The stone walled structure in the upper left is the family temascal (steam sweat bath).



Figure 12. Panamaquib Woman Grinding Lime-soaked Maize.

supplemented with only small quantities of eggs, cheese, and milk, many of the nutritional deficiencies could be corrected, but little hope exists for such a provision.

Upon considering the ineffective purchasing power of Guatemala's poor majority, the low availability of certain foods for domestic purposes after export quantities are deducted, the limited land and low levels of technology available to producers of food crops, the rapidly growing population, and political instability, it can easily be realized that this nation will have extreme difficulty in alleviating its food-population crisis. The production and availability of eggs, milk, meat, and beans will continue to fall short of satisfying the nation's minimum needs should population and economic growth rates follow predicted trends. In this way the supply-demand outlook for these quality protein sources follows a pattern of shortages typical of Honduras and Costa Rica.

A modern beef industry has been developed in Guatemala within the last ten years, but for service to the United States' export market and not for domestic needs. Only eleven years ago, Whetten was giving this description of Guatemalan meat production: "Guatemala does not produce enough cattle for export; hence the industry is devoted to supplying local needs."¹⁸ Certainly, no one who studied this industry today would report a devotion to the domestic market. In the short period of time since Whetten made his analysis, the emphasis has been completely reversed. Between 1961 and 1967 exports of beef by the two leading packing companies increased 800 percent. Significantly, but unfortunately for the domestic consumers, the rapid rate of increase in beef exports during this period was not matched by increases

¹⁸Whetten, Guatemala, p. 134.

in the cattle production. The expanding and continuing rise in exports without any sizeable increases in the number of domestic cattle has resulted in shortages and higher prices for the local markets. To correct this situation export quotas have been decreed by law; however enforcing agencies have yet to impose quota limitations on beef exports.¹⁹ Once again a situation is encountered where national consumers unfortunately suffer rather than benefit from the improved and increased production of critically needed foods.

Fifty percent of Guatemala's cattle are raised on the south coast on fairly large holdings. About 65 percent of this stock is straight criollo cattle, with first and second crosses from Brahman, Santa Gertrudis, Charolais, Holstein, Brown Swiss, and Jersey bulls making up another 30 percent. Only 5 percent can be considered purebred or third cross. Along with this upgrading of stock there has been a parallel program of pasture improvement. Both have been financed through government loans, and the overall development stimulated by the profitable export market.²⁰ During the rainy season grass is plentiful, but becomes very short towards the end of the dry season. This seasonal pattern of pasture availability along with difficulties in curing roughages during the wet season, makes it difficult to maintain a normal plane of nutrition for cattle entirely dependent on range feeding. Because of this most herds in the dry period experience high weight losses and reduced calf crops. Should the foreign demand for beef diminish, a greater supply of this beef originally produced for the export market might be diverted into the domestic market, at hopefully lower

¹⁹Fletcher, et al, Guatemala's Economic Development, p. 181.

²⁰Ibid., p. 180.

prices. However, when the United States government in combatting rising prices for beef produced in that nation raised import quotas on foreign beef, it created a market situation of high prices and easier accessibility that has never been more attractive to foreign meat producers, particularly those of Central America with their advantage of market proximity.

The domestic availability of milk remains inadequate even though the Guatemalan dairy industry has been rapidly growing since 1960 and the country has become an exporter of dairy products to other Central American countries. Production is largely concentrated on the south coast, and as with beef, this segment of the agricultural industry is adversely affected by the seasonality of pasturage. INCAP reports this to be a major obstacle confronting the efficient production and marketing of milk. It is common for a large surplus to exist during the rainy season when pastures are lush. This oversupply frequently results in market prices that are below production costs. Conversely, during the dry season an inadequacy of pasturage creates a situation characterized by milk shortages.²¹ But because the price of milk is fixed by government controls, milk produced during the dry season may have to be sold at prices equal to or below cost. Consequently, the production of milk is not the attractive investment proposition that beef production is, and until these problems are resolved there can be little hope of resolving Guatemala's milk needs through commercial dairies.

Not being a very profitable business by itself, dairying is frequently part of a dual purpose operation producing both milk and beef. In many

²¹ Institute for Nutrition of Central America and Panama, Guatemala, p. 70.

cases milk production being secondary to beef production, it is common for the dairy-beef herds to be comprised of native criollo and Brahman cows, primarily beef animals, which are milked only when pasture and market conditions are opportune.²²

The subsistence sector of the economy especially that of the Indian, produces very little milk. This, together with prices beyond the effective purchasing power of the poor majority, keeps dairy food consumption at extremely low levels and many rural peoples never consume dairy foods as part of their diets.

Currently, Guatemala is unable to produce eggs by commercial farmers at prices economically open to most of the public, and it does not appear that this situation will be satisfactorily adjusted in the immediate future. The commercial producers are successfully supplying the relatively well-off urban population at present, but low cash income levels of the poor majority continue to keep eggs in a luxury food class for these people. Thus, this segment of the population represents at most a potential market which will not be open until purchasing power is increased or the price of eggs is considerably lowered.

The critical shortages of milk, eggs, and beef along with related problems of malnutrition could be partially alleviated through an increase in the average consumption of beans. Unfortunately, this vegetable source of high quality protein is in short supply too. Statistical data on bean production is rather unreliable, or bean production is subject to considerable fluctuation. In attempting to analyze past production levels for the projection of estimated future supplies, a team of economic advisors

²²Fletcher, et al, Guatemala's Economic Development, p. 185.

encountered a situation where official reports stated the 1966 production of beans to have been 112,000 metric tons. This same statistical source went on to report that the 1967 level had dropped to 68,000 metric tons, or approximately half of the previous year's crop.²³ Whatever actual production figures are, one fact is certain; beans are not available at prices low enough to be bought by the needy population. Investments made in commercial bean production do not bring returns equal to those made in other crops; and land short subsistence farmers give maize cultivation a higher priority than that of beans in the utilization of their limited agricultural resources. Fields put into beans yield less crop weight than fields used for maize. Therefore, until the subsistence farmer has more land made available and ceases to consider diet only on a basis of caloric quantity, bean production and consumption will remain at levels beneath desired nutritional standards.

Projected estimates on the overall availability of meat, eggs, milk and beans, the traditionally important sources of quality protein, present an outlook that predicts little improvement. As indicated in Table V, page 125, the future supply of all these essential foods will be less than sufficient for satisfying the nutritional needs of Guatemala's population.

The Panamaquib Setting

The initial research proposal for this study tentatively proposed to survey peasant Indian farmers in the locale of Ostuncalco, Guatemala. Preliminary field reconnaissance and inquiry suggested that the survey be shifted to an area located at a lower altitude than that of Ostuncalco,

²³Ibid., p. 93.

TABLE V: CURRENT AND PROJECTED PER CAPITA AVAILABILITY OF SELECTED PROTEIN FOODS IN GUATEMALA FOR PERIOD 1965-1980

FOOD	Recommended Daily Intake in Grams	Availability 1965 %	Availability 1970 %	Availability 1975 %	Availability 1980 %
Milk	250	58	64	70	76
Eggs	24	40	40	41	43
Meat	90	42	40	46	45
Beans	75	36	35	34	32

Source: Marco Antonio Ramirez, Los Alimentos en Centro-america (San Salvador, El Salvador: Organization de Estados Centroamericanos, 1968), pp. 71-74.

which has an elevation of 7,875 feet and is above the tierra templada altitudinal zone. Because the study areas of San Vito, Costa Rica and Yamaranguila, Honduras were both within the tierra templada, it was considered preferable to have the Indian case study in a generally similar physical environment. In that the research focuses upon cultural and not physical factors influencing peasant animal production, cultural factors would be more readily recognized by studying the different groups in the same type of physical setting, namely cool humid tropical highlands.

These basic requirements were found in the thoroughly Indian village of Panamaquib. This small settlement is situated at an altitude of 4,550 feet on the east facing slopes of the twin volcanoes Tolimán and Atitlán, and is only four miles from the southern shore of magnificently beautiful Lake Atitlán. Politically, it lies within the municipio of San Lucas de Tolimán, a lakeshore town of approximately 5,000 people. Both of these communities are included in the department (state) of Solola.

The Lake Atitlán region, while being dominantly Indian, is characterized

by a considerable degree of cultural complexity, which McBryde describes as being without equal:

In all, there are about 23 settlements, villages, and towns, close to the lake....

Fourteen villages have been built close to the lake shore, but high enough to avoid inundation.

The highest degree of micrographic diversity anywhere in Guatemala is to be found here; it is probably not exceeded elsewhere in the world. Many of the villages may be separated from their neighbors by two miles or less, and yet, being isolated by physical barriers such as precipitous headlands, cliff shores, and a dangerous lake surface, they may have distinct economies, dress, and even vocabularies....Within an almost vertical 600 m (1,968 ft.) elevation zone, crops range from sugarcane to wheat and potatoes; fruits, from papayas to peaches....

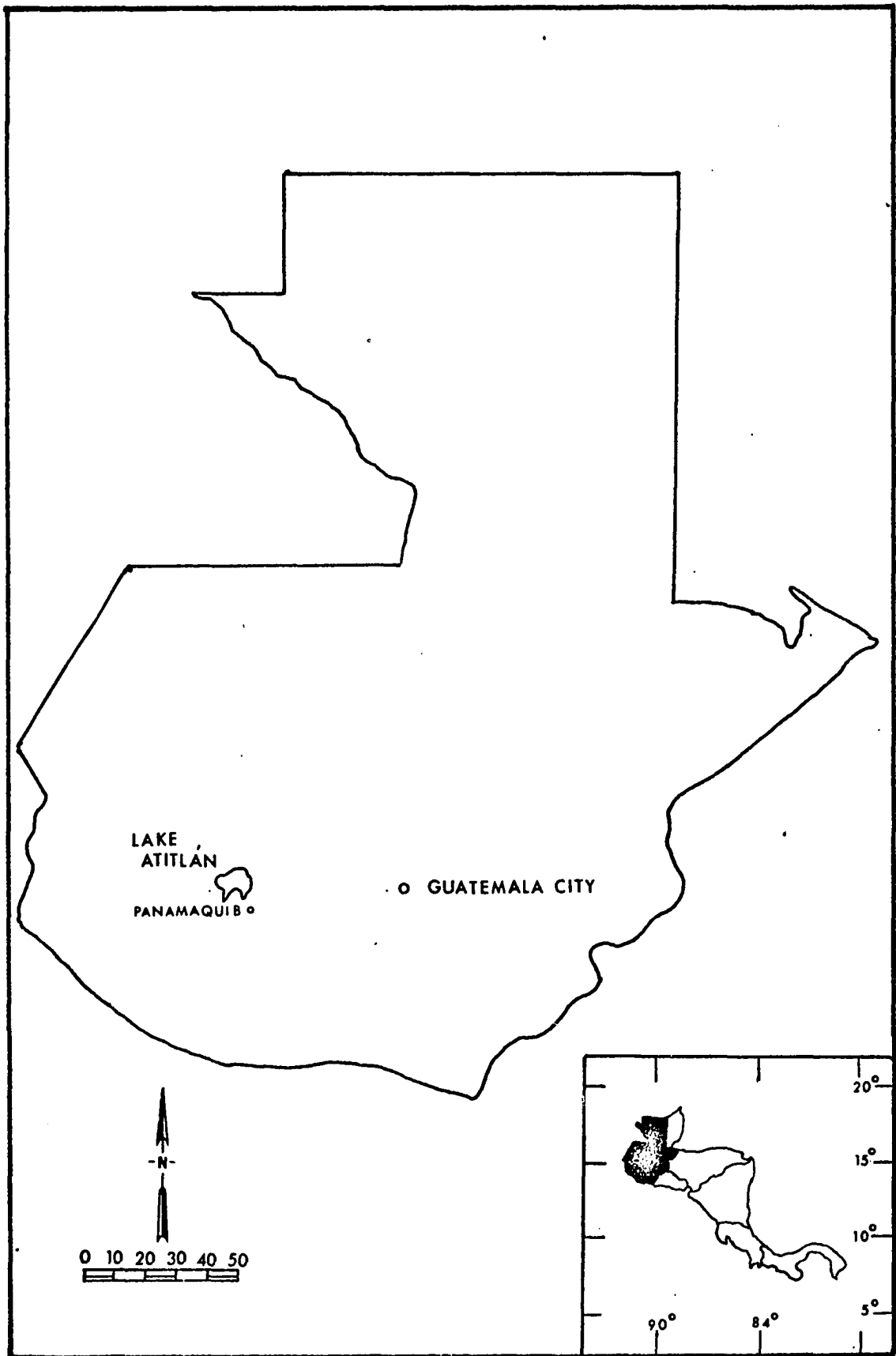
Add to this the convergence of three linguistic areas, also the recent injection of several small communities from remote regions in different directions, and the picture of complexity is fairly complete. ²⁴

Panamaquib's climate is cool year-round and rains, approaching 100 inches annually, come principally during the six months of summer. Most of this rainfall results from the orographic cooling of warm humid marine air masses in their ascent of the Pacific slope. Soils are naturally fertile, being derived from volcanic ash and lava. Both climate and soil are ideal for coffee, a crop important as a supplementary source of cash income for a few of the small farmers. Panamaquib is located at the upper altitudinal limit of coffee production, and as with most crops grown near the upper limit of cultivation the quality is high.²⁵

These same conditions that provide for the production of quality coffee also promote a good maize crop. However, the relatively low temperatures retard maturation and only a single yearly harvest can be obtained in comparison to the two of the warmer lowlands. Except for small

²⁴ McBryde, Southwest Guatemala, p. 3.

²⁵ McBryde, Southwest Guatemala, p. 128.



Location of Panamaquib, Guatemala

plots of coffee trees owned by some of the Panamaquib Indians, practically all of the arable land belonging to the village inhabitants is devoted to maize production. Most of the surrounding locale has been repeatedly cut and cleared for maize, so that those areas not in cultivation are covered with weeds or scrub.

Panamaquib is relatively isolated and cannot be reached by wheeled vehicle. The principal access route is via a one mile footpath leading from the village to a hard surfaced road linking the larger lakeshore towns with the coastal lowlands. This road follows a highland-lowland trade route important since pre-Columbian times.

As common for settlements of its size, Panamaquib is locally classified as an aldeia (village). The individual family dwellings comprising the village are dispersed along footpaths in an irregular pattern with the homes occupying plots ranging from an eighth to a quarter of an acre in size. Without exception all the families are best described as subsistence farmers, although one did operate a "store," whose limited inventory of manufactured goods was represented by flashlight batteries and the ever ubiquitous Coca Cola. A one room school, newly constructed by the Guatemala government, and a thatched three walled "chapel" were the only community buildings apart from household structures.

The houses are all of the bajareque type and despite the chilly night temperatures experienced during winter months some of these dwellings have stick walls which have not been sealed with the typical clay plaster. Each house consists of a single undivided rectangular room having side dimensions between twelve and sixteen feet. This room serves simultaneously as the living space, bedroom, and kitchen. Cooking is done on the floor using an open fire built between three stones located in a corner of the room. Wood

is used for fuel and in the absence of chimneys smoke is ventilated through the walls and thatched roofs. When seen from the outside while cooking is being done, these chimneyless houses, with smoke filtering up through the thatched roof and from the many openings in the walls, give a newcomer the impression that they are on fire. The lack of ventilation gives a permeating and characteristic odor of smoke to the houses and all their contents, even including the occupants themselves. It also contributes to a high incidence of eye disorders and pulmonary diseases, particularly tuberculosis. On the positive side the smoke and heat from the cooking fire assist in keeping the homes less damp and relatively free of insect pests and fungi.

The average dwelling has little or no furniture. Simple beds made of leather or rope strung on a wooden frame were seen in some homes; however it is more common for sleeping to be done on petates (straw mats) placed directly upon the floor of packed dirt. In that homes with tables and chairs are the exception, most families eat their simple meals on the same floor used for sleeping.

In addition to the house, each homestead has a storage building for tools and harvested crops. These structures are commonly built in the same fashion as are the houses. Approximately one-third of the families in Panamaquib also had temascales (sweat baths). These are constructed of stone, stand about five feet high and are usually five by seven feet along the sides. Steam for bathing is produced by pouring water over hot stones. These baths are used by most families once or twice a week.

By living together in a single settlement and daily journeying to their fields, the peasant families of Panamaquib differed from those of San Vito and Yamaranguila, who for the most part lived in dispersed homes

located on their principal holding of land. Though all the Panamaquib houses are clustered as a group along the mountain slope, it is difficult to see more than one or two houses from any single point. The broken terrain within the village combined with a dense plant cover of shade and banana trees, coffee and maize plants, and vegetable gardens, provides most families with some degree of seclusion from neighbors (Figure 13, page 131 and Figure 14, page 132). The absence of open land derives from the need to fully utilize all soil resources rather than being simply a desire for privacy. All homes are without utilities and village water must be obtained from springs issuing from the walls of a nearby ravine.

The people of Panamaquib are poor, illiterate, and malnourished. The limited amount of land available to them is not sufficient to supply all of their food needs; therefore, like many of Guatemala's highland Indians, they must regularly seek supplemental income from seasonal work on coffee, banana, or cotton farms and raise additional maize from land rented in the adjacent Pacific lowlands. Having to migrate to fincas (large commercial farms) for work or to the lowlands for maize cultivation results in a large portion of the population being away from the village for extended periods of time. Periodic trips are made throughout the year by those farmers producing two maize harvests on the coastal plain and lower piedmont. Land for this purpose may be rented in different ways, some of which are as follows: giving a fixed amount of the harvested crop to the landowner; agreeing to work a predetermined number of days for the landowner; or by clearing virgin forest to use for the cultivation of maize, which upon following the harvest is ready for the landowner to put into use as permanent pasture for cattle. Land rentals are seldom made through cash payments; it is much more common to use the above mentioned exchanges of labor



Figure 13. Panamaquib Farmyard. The dwelling in the photo is typical of Panamaquib. Standing next to the corn is Marcos Tun, the interpreter for the Guatemalan segment of the study.



Figure 14. Indian Coffee Plant Nursery. The small plants growing in the shaded and unfenced bed are coffee seedlings.

or portions of the harvest.

Travel to the lowlands is always by foot with perhaps two days of walking being required to reach the work area. The typical Indian farmer who harvests one highland maize crop and two lowland crops is able to schedule his field work so that the three crops do not interfere with each other, and to also provide a period of free time for employment on a commercial farm. Lowland clearing and preparation for planting is done in February followed by the seeding of the first crop in March or April. Monthly weeding and hoeing is done up to August when the first lowland crop is harvested and the second is planted. While the second crop is growing, many of the Indians -- men, women, and children -- seek work on fincas harvesting coffee. Because of the altitudinal range of coffee plantings from 1,000 to 5,500 feet, the coffee does not all ripen at the same time and harvesting may extend over a period from one to three months. When the coffee is harvested, the Indians of Panamaquib return to the village and harvest the single highland planting of maize which was planted in January. After this is completed, workers return to the coast to harvest the second lowland maize crop.

In the past, lowland maize would be transported to Panamaquib in sacks on the backs of the Indians. This ancient and laborious method is in the process of being abandoned. It is not uncommon today for Indians to hire trucks with shares of maize for shipping their crop via this means to the point where the trail leading to Panamaquib meets the paved road. This pattern and schedule of agricultural migration is common in most of the highland Indian communities.

In recent years cotton has become extremely important in Guatemala and its production like that of coffee is dependent on an abundance of

cheap labor. Although it is reported that between 300,000 to 400,000 workers are required for the cultivation and harvest of this crop (more than coffee), few of the Indians in Panamaquib sought work on the cotton farms.²⁶

Maize which accounts for approximately 80 percent of the adult Indian's diet is supplemented with beans, the second most important food. These two staples are usually produced together in the same field. The common practice in the Lake Atitlan region is to plant five or six maize seeds in a single hill. After the maize plants emerge one or two beans are planted and allowed to climb the maize. Although this method is widely used, it is much more common to grow maize in mono-culture. In explanation, the Indians reported higher total yields when maize was grown alone.

The Indians of Panamaquib grew and consumed a greater variety of vegetables, particularly different types of squashes, than did the peasant families surveyed in Honduras and Costa Rica. On several occasions women were seen preparing greens which had been collected from the wild. These were regularly consumed in meals and as a dietary habit this is customary principally among Indians and not Ladinos, who as a group do not utilize wild greens. With reference to this greater variety in plant foods, it was noted that the markets in Indian areas generally offered a much wider range of vegetable foods than was characteristic of Ladino markets. However, the availability and consumption of quality animal protein foods such as milk and meat is much less evident among the Indians.

The low animal protein diet, marginal housing and poor sanitation conditions found in Panamaquib contribute to causing an extremely low

²⁶ Melville and Melville, Guatemala: Politics and Land, p. 174.

standard of village health, including child protein malnutrition. Personnel in the medical clinic in nearby San Lucas de Tolimán stated that all the Indians suffered from intestinal parasites. In administering tuberculin tests, this same clinic reported positive reactions from more than half of the local village and finca Indians.

Random selection was not employed for farm selection in the survey conducted in Panamaquib. The small number of households in the village (forty-seven) permitted the interviewing of all except seven families. Six of the seven not interviewed were away from the community working in the coastal lowlands, or marketing some of their produce in regional markets. The one other family simply stated a desire not to participate in the study. If attempted, random selection in Panamaquib or any other Guatemalan Indian settlement would have been difficult (perhaps impossible) if dependent on large scale topographic maps, aerial photographs, and lists of land titles or tax assessments.

At the time the survey was conducted, Guatemala was in a state of "de facto" martial law because of open terrorism between opposing leftist and rightist groups. In attempting to control this violence the Guatemalan government had imposed strict controls on the use and sale of maps and aerial photographs. Permission was kindly granted this researcher to use both types of these resources in the National Institute of Geography, but no large scale topographic maps or photographs could be purchased for use outside of the institute building. Land title and tax lists were not available. Records related to these types of information are scanty and unreliable. Consultation with local officials gave the impression that no person or agency is absolutely certain who is the legal owner or rightful user of many farm holdings in the highland regions of Guatemala.

Most of the land was originally held under ejidal forms of tenure. Losses to large private landowners, land appropriations by the government, occasional returns of some land to Indian communities and illegal sales of community land to individual Indian families, has resulted in creating a tenure situation of considerable complication and confusion. In his classical study of this region, McBryde writes that, "No accurate data on land ownership are available."²⁷ Conflicting findings on this subject by other Guatemalan scholars illustrate how uncertain ownership rights are. Adams, for example, states that lands in the municipio of Totonicapan are mostly held under communal rights.²⁸ In referring to land tenure in this very same area, Whetten describes the department in which Totonicapan municipio is located as "the most Indian of all and where 98.9 percent of the landholders own their farms."²⁹ It would be difficult to fabricate two findings of greater opposition.

Answers by Indian farmers to questions related to land tenure and size of holdings frequently are misleading and incorrect. Such inaccurate replies are not always given intentionally, but result from the farmers not being able to give correct answers mainly because they themselves are not certain of the involved facts. As Sol Tax states, "the answers to many questions are not in the 'heads' of the Indians themselves."³⁰ Estimates

²⁷McBryde, Southwest Guatemala, p. 95.

²⁸Richard N. Adams, Cultural Surveys of Panama, Nicaragua, Guatemala, El Salvador and Honduras (Washington, D.C.: Pan American Sanitary Bureau, 1957), p. 302.

²⁹Whetten, Guatemala, p. 94.

³⁰Sol Tax, Penny Capitalism: A Guatemalan Indian Economy (Chicago: The University of Chicago Press, 1953), p. 186.

on the size of any particular holding are likely to be inaccurate due to the fact that no surveyed titles are held and also because there is no systemized use of standard areal measurements. The principal areal measuring or property unit used in the study area was the cuerda. Replies to inquiries on the size of any individual land holding were always stated as so many cuerdas. Hectare and manzana (1.75 acre), terms common throughout Central America, were never mentioned. A cuerda is a square, the size of which may vary from twenty-five to forty varas; a vara being a unit of linear measurement equal to approximately thirty-three inches. The difficulty and confusion encountered in the study of agricultural systems where cuerda measurements are employed derives from the fact that there is no single universal cuerda. The cuerda used by one farmer may be of thirty varas while that used by a neighbor may be of thirty-three varas. McBryde reports the one most commonly used in the Lake Atitlan region to be equivalent in size to a fifth of an acre.³¹ Accepting this as a standard, a hectare would then contain approximately twelve and a half cuerdas. The size of land holdings in Panamaquib will be expressed in terms of hectares of twelve and a half cuerdas to facilitate a comparison with the other survey areas, where hectares were used.

Because very few Indians spoke Spanish and the researcher was without any competence in the Indian language of Panamaquib, the survey required the services of an interpreter. The parish priest in San Lucas de Tolimán, Father Gregory Schaefer, a Catholic missionary from Minnesota, made available his leading catechist, who was fluent in Spanish and all three of the principal Indian dialects of the Lake Atitlán region. This Indian

³¹ McBryde, Southwest Guatemala, p. 94.

gentleman, Senor Marcos Tun, was born in Panamaquib and although no longer a village resident was treated with considerable respect and deference by the inhabitants of Panamaquib. His rapport with these people and personal knowledge of their way of life were principal assets in this segment of the study.

Peasant Animal Production

Chickens

All the households in Panamaquib had chickens. The average number of birds kept by each family was ten. One family had as few as four, while the largest flock numbered twenty-one. None of the chickens were raised in enclosed yards, and where coops were provided, they were small and frequently placed directly on the ground.

As in Yamaranguila and San Vito, little feed and even less attention were given to the raising of household poultry. All chickens depended heavily on foraging for much of their food and were fed a minimum of maize, particularly during periods when this grain was in scarce supply for the family's own food needs. Noting that dwellings in Panamaquib, like those of most rural Central American communities, are without any sanitary facilities, scavenging fowl must be given positive consideration for contributing to the community's overall health. This function is of even greater significance in settlements where the individual homesteads are clustered rather than dispersed widely.

Because the Panamaquib farm families live closely together in a single community and all households have chickens, competition for feed obtained from scavenging is high. Consequently, it would seem that more feed must be provided chickens kept by households in communities like Panamaquib,

than in situations where families live on the land they farm. In the latter case, the forage area available to any individual family's flock would be larger and thus the potential food supply greater. Nevertheless, in relatively crowded Panamaquib every household had poultry, while in San Vito and Yamaranguila, where the individual farmsteads are dispersed more widely in the countryside, this was not the case.

Predators were seldom referred to in Panamaquib as a problem for chickens. This differs from the other two study areas where losses to wild animals and hawks were reported to be high. The three factors probably accounting for this difference are: the high population density of this region, lesser amount of land left in natural vegetation to serve as a refuge or habitat for wild animals, and the greater degree of protection offered domestic animals and fowl when raised in villages rather than on single farmsteads. Although predatory losses were few in general, losses to rats and thievery of chickens within the community were said to be problems. When the adults in a household were required to go away to market or the fields, the family chickens would carefully be rounded up and locked in a coop. As a rule one of the family's older children would remain at home and would be responsible for watching the house and the household animals.

Poultry diseases were reported to be the principal restricting factor on the number of chickens raised by families in Panamaquib. More references to this problem were made than to limitations imposed by feed shortages. A nationwide survey conducted by INCAP found that subsistence farmers annually suffered the loss of half their chickens as a result of diseases and parasites.³² No doubt many of these losses were indirectly caused by

the poor housing and feed usually provided chickens on the average subsistence farm.

Despite the fact that poultry are a very common element of the average Indian farm as typified in Panamaquib, the use and consumption of eggs and poultry is probably much less than would be expected. Chickens are not valued as a food by the Indian to the degree that they are by the peasants studied in Honduras and Costa Rica. In Panamaquib poultry are for various reasons too valuable to be used as family food.

Among the poverty stricken Indians chickens are looked upon as a form of savings which can be converted into cash when a need for money arises. It is possible to sell a hen in the markets of nearby towns much more easily than any other possession. This use of chickens was also found in the Costa Rican and Honduran study areas, but not to the same degree as in Guatemala. The Indians of Panamaquib stated they seldom killed a chicken for their own use.

The women in a household have considerable freedom in deciding how poultry will be utilized, because it is they who generally raise them. In Indian society, much of the status enjoyed by women is dependent upon the clothing they wear. All the women of Panamaquib dress in the traditional costume of the local municipio and none wear Western type clothes. Despite the fact that the native women weave most of the cloth used for family clothing, they must have money to purchase the necessary threads and dye. It is not unusual for the materials used in making an elaborate huipile (blouse) to cost \$30.00 - \$40.00 U.S.³³ From the occasional sale of a

³²Institute for Nutrition of Central America and Panama, Guatemala, p. 105.

chicken or two, enough material can eventually be obtained to make a new blouse and skirt. It is seldom that a husband will have sufficient cash at any one time to buy the needed materials, let alone consent to using "his" money for the purpose of clothing. In her study of the Quiche Indians of Chichicastenango, Ruth Bunzel records an Indian's description of this aspect of raising animals:

If a man breeds a sow or a hen, the care of them is up to the wife, and if the hen lays, whatever eggs she may lay belong to the man, and if the sow fattens and they sell it, the money belongs to the man. But if the woman has her own chickens and they lay, the eggs are hers, and if she owns a pig and it fattens and she sells it, the money is hers to buy clothing and anything she may need in the kitchen. ³⁴

This statement underlines the responsibility given to women for the raising of "household" animals and notes the emphasis given to animals and poultry as objects to be sold for money rather than eaten by the family as food.

In a male dominant culture such as that of the Guatemalan Indian, the wife in earning money must be discrete so as not to embarrass her husband who has the responsibility to provide for his family's needs. In referring to this sensitive point of male pride which may be easily offended, should the wife indiscreetly earn too much money, the Indian quoted above went on to say, "This is bad, very bad, because the woman will have no respect for the man if she has her own money and does not depend upon him."³⁵

Chickens are also commonly exchanged as a form of payment in return for services. Should a family have need of a local Indian midwife or

³³ Interview with Marina Flores, Institute for Nutrition of Central America and Panama, Guatemala City, Guatemala, August 7, 1972.

³⁴ Ruth Bunzel, Chichicastenango, A Guatemalan Village (Locust Valley, New York: J. J. Augustin Publisher, 1952), p. 29.

³⁵ Ibid., p. 30.

curandero (healer who uses folk medicine), it is very likely for the fee obligation to be satisfied with food in the form of a chicken rather than cash. To pay religious or civil costs incurred from a baptism or the registry of a birth, a couple of hens may be sold to obtain the money for these needs when none is available from other sources.

Another non-food demand for chickens is represented by their frequent sacrificial use in Indian religious rituals. To meet these requirements, families must have poultry available or the money to buy them. Much of the sacrificial usage of poultry centers around the production of maize. Prior to the planting of his maize crop, the Indian farmer in a ritual more animistic than Christian will sacrifice one or two chickens in the field along with the burning of incense. Prayers will be offered at this time to insure a good crop and that no harm will come to those who work the fields. Whetten describes the rather heavy demand for chickens required in rituals related to maize production from the time of initial clearing to the conclusion of harvest thanksgiving. With reference to the planting, he writes as follows: "Husband and wife rise early to observe the required rituals, such as praying, sacrificing a chicken, and burning incense mixed with chicken blood."³⁶ After this is completed, "the father of the family goes alone to the fields, plants a makeshift cross in the plot and burns two candles before it, swinging a censer containing the chicken incense mixed with chicken blood."³⁷

While the crop is growing, periodic sacrificial rites are observed in which both chickens and eggs are used. "Each weeding of the plot requires

³⁶Whetten, Guatemala, p. 110.

³⁷Ibid.

similar rituals: prayers, incense, and the sacrifice of chickens. Sometimes chicken eggs are used in place of blood. Prior to the harvest "the husband clears a space in the field with his machete leaving two maize stalks before which a candle is burned, a chicken is sacrificed, and incense again burned."³⁸ Upon completion of the harvest, similar rituals involving chickens are performed in a thanksgiving for the crop.

These rituals are evidence of the high retention of pre-Columbian beliefs and underscore how important maize is in the life of these simple peasants. For them maize is and has been life itself and all that they may possibly do to insure that "those above" will produce a good crop is done without question or hesitation, including the killing of ten or twelve chickens for ritual needs from planting to harvest time.

The Indians in Panamaquib were reticent in discussing their use of poultry for religious purposes. This was taken as an indication that they continued to use them for such. The hesitancy to talk about the subject was also probably influenced by the fact that the survey's interpreter was a catechist charged with the responsibility to educate them away from these "pagan" beliefs. Senor Tun, the catechist interpreter, stated that the people in Panamaquib still practiced costumbre (ritual prayers and sacrifices) and that they commonly used brujos and chimanes (terms for native shamans). Twice in the course of the survey places with poultry feathers scattered on the ground and ashes from a small fire were seen. These were identified as having been scenes of recent costumbre involving the use of poultry.

³⁸ibid.

Chickens are sacrificed in other rituals apart from those directly related to the cultivation of maize. Some Indians will sacrifice their finest rooster for the specific purpose of insuring that rainfall will be sufficient for their crops. These ceremonies are usually conducted at traditionally revered sites, such as mountain or hill summits. The finer the bird and the greater the degree of value given it by the owning farm family, the more likely will be the assurance of good rain.³⁹ If an Indian requires the services of chimane for services such as warding off an evil spell suspected to have been caused by the envy of a neighbor, the countering protective ritual will very commonly demand the use of poultry for sacrifice or as payment for the chimane's service. In referring to use of poultry for these purposes rather than food, Oakes writes from her experiences among the Guatemala Indians that while "food was quite a problem, few people wished to sell their chickens, as they liked to keep the hens for laying and roosters for sacrifice."⁴⁰ She describes one particular ritual the Indians allowed her to witness in which approximately twenty roosters were sacrificed for the purpose of obtaining prognostications for the coming year. It was as follows:

Just before midnight the wife of a chimane carried into the room a beautiful white rooster and handed it to the three chimanes who sacrificed it in the corral.... The two chimanes held the rooster, head down, while the one officiating cut its throat.... Then two turkeys were sacrificed. By that time it was nearly midnight. A boy sitting next to me told me that since sunset many birds had been sacrificed, twenty in all....⁴¹

³⁹ Centro Desarrollo Integral, "Estudio de la Comunidad Municipio San Pedro Mecta" (Mimeographed report, Huehuetenango, Guatemala: Maryknoll Mission Center, July 1970).

⁴⁰ Maud Oakes, Beyond the Windy Place (New York: Farrar, Straus and Young, 1951), p. 45.

The greater value attached to roosters over hens as sacrificial offerings explains at least in part why some families in Panamaquib had as many as one cock for each three or four hens. Though unschooled, these farmers must certainly know that such a high ratio of roosters is inefficient, unless they are raised for purposes other than meeting family food or money needs.

As stated earlier, chickens were not raised primarily for household consumption. The average family feels it can afford the luxury of eating chicken only in celebration of some community or family festivity. Eggs were consumed on a more regular basis, but these too are used in ritual or sold to buy other commodities felt to be of greater need. On a basis of simple economics, the usual four cent value of an egg will buy a pound of maize. For an Indian a pound of maize satisfies more of the family's food needs than does a single egg. Consequently, when maize supplies are low, eggs rather than being eaten are more likely to be sold and maize bought with the money. It should also be noted that when maize is in low supply so too is the supply of eggs. This is because less maize is available to feed the hens which in turn results in a lowering of egg production.

Other Poultry

Considering the cultural background of the Guatemala Indian, only one family in Panamaquib had turkeys and these numbered only three. The turkey and the Muscovy duck were the only fowl domesticates possessed by the American Indians at the time of the Conquest. Partly because of this it was expected that the number of turkeys encountered in the three survey

⁴¹ibid., pp. 123-124.

areas would be highest among the Guatemalan Indians of Panamaquib. But such was not the case. While no turkeys (except for one family with a pet wild turkey) were found on the more European influenced farms of Costa Rican peasants in San Vito, one out of every two Honduran farms surveyed raised some of these birds.

Differences of climate may account for the disparity. Turkeys are much more susceptible to disease in humid environments than in dry environments. San Vito and Panamaquib with rather humid climates are without turkeys while in relatively drier Yamaranguila these birds are common to the majority of farms. The Indians of Panamaquib stated that poultry diseases were particularly threatening to the "very delicate" turkeys.

Because of the value placed on turkeys in Indian ritual and their greater prestige as festivity food, more of these birds were expected to be found even with a consideration of possible disease and climatic restrictions. McBryde reports turkeys were traditionally raised for their decorative feathers.⁴² Both Oakes and LaFarge make numerous references to the preferred use of turkeys rather than chickens in sacrificial ceremonies. Oakes reports that when one village was plagued with an uncontrollable epidemic of whooping cough, daily sacrifices of turkeys were made on nearby hill tops for an extended period of time in requesting deliverance from the disease.⁴³ She also points out that the sacrificing of turkeys is a privilege reserved only to those Indians holding high office within the community's politico-religious hierarchy.⁴⁴ The religious value attached

⁴²McBryde, Southwest Guatemala, p. 37.

⁴³Maud Oakes, The Two Crosses of Todos Santos: Survivals of Mayan Religious Ritual (Princeton, New Jersey: Princeton University Press, 1951), p. 84.

to turkeys and the restriction of ceremonial rights to certain authorities strongly suggest that this fowl may have been originally domesticated principally for religious purposes rather than for usage as a food.⁴⁵

In addition to the limitations caused by turkey diseases, several Indians stated they did not keep these birds because of their tendency to "run away and become wild." Similar explanations were given in Costa Rica by peasants. It is possible that the turkey as a species is not domesticated to the degree that the chicken is, and consequently requires more care to keep it from wandering off if allowed to scavenge freely on a regular basis. Another explanation for the few turkeys in Panamaquib may be found in the weakening of Indian religious traditions as relates to the ritual role of turkeys, and a shifting of this function to the chicken, a fowl more easily raised and of greater utility.

Aside from chickens and an occasional turkey, doves were the only other poultry kept by the Indians in Panamaquib. Five families had from one to two doves each in small wooden cages, usually hung on an outside wall of the family dwelling. When questioned why these birds were kept, every family stated without exception that the doves were pets and particularly enjoyed for the pleasantness of their cooing. According to the Indians, they were never captured to be used for food purposes.

Hogs

Although eleven of the forty families interviewed in Panamaquib had among them a total of thirteen hogs, these animals cannot be looked upon

⁴⁴Oakes, Two Crosses, pp. 59-60.

⁴⁵Oliver LaFarge, Santa Eulalia: The Religion of a Chchumatan Indian Town (Chicago: University of Chicago Press, 1947), p. 122.

as a source of quality protein food for the village inhabitants. Hogs more than chickens are valued as an investment or form of savings which can be readily converted into cash when needed. The peasants of Panamaquib are too poor to slaughter a pig for themselves even though they may have raised it.

Weanling pigs are bought in the town markets and taken back to the village where they are raised on a meager ration of family food scraps and small amounts of maize. As is common in most of Central America, the maize fed animals and fowl is poor quality grain that has been partly spoiled by insects or fungi. Some of this damage may have occurred in the field prior to harvest but considerable spoilage also results from the primitive means of storage available for keeping the family maize supply. Feeding grain not satisfactory for human food to hogs and chickens is practical but it is seldom sufficient. It is unfortunate that the maize fed to hogs and chickens is never cracked prior to feeding. The simple cracking of maize would improve the food value of the grain by making it easier to digest completely. This "stretching" of an already skimpy ration is well worth the small amount of time and effort required to crack the maize.

Pigs are not allowed to forage for food. The presence of vegetable plots and coffee groves between the individual family houses are open and exposed to damage by scavenging animals. Approximately half of the pigs in Panamaquib were kept in small pens about ten feet square. The others were secured to stakes or trees with rope body harnesses. From day to day the harnessed pigs were shifted to different places where they could graze and root without damaging cultivated plants. The village inhabitants openly stated that pigs had dirty eating habits. This probably meant that these animals like chickens consumed body wastes both animal and human.

The hogs raised by the Indians were of a stock also referred to as criollo. All were quite small and none appeared to weigh more than seventy pounds (Figure 15). The marketing of these animals is not done on an economically sound basis. Hogs which have matured and are no longer gaining weight will be retained rather than sold. This is because they are considered more as a form of savings or insurance to be used in time of financial need and not as an agricultural product to be sold at the point of maximum profit return.

Goats

Panamaquib was like San Vito and Yamaranguila in that few goats were raised. Only one family had five goats at the time of the survey. These were also used primarily for the purpose of producing a cash income and not for family meat or milk. Surprisingly, this family stated they never milked the goats and did not know how to make cheese. This was particularly unusual considering that they said the family flock sometimes numbered as many as two dozen full grown goats. When asked why this available source of milk was not utilized, the stated reason was, "goat milk makes you sick." The five goats then owned by the family were the last of a flock which had numbered seventeen three months earlier. Owning only 2.3 hectares of land, the owners of the goats were able to utilize non-arable lands on the higher slopes of the volcano for the grazing of their relatively large flock. The practice of corralling the goats at night for a period of three or four weeks on a piece of ground which may later be cultivated was not employed. The herding of sheep and goats in movable corrals for soil enrichment is common in other highland areas of Guatemala. However, the Panamaquib Indians made no systematic effort to use the manure

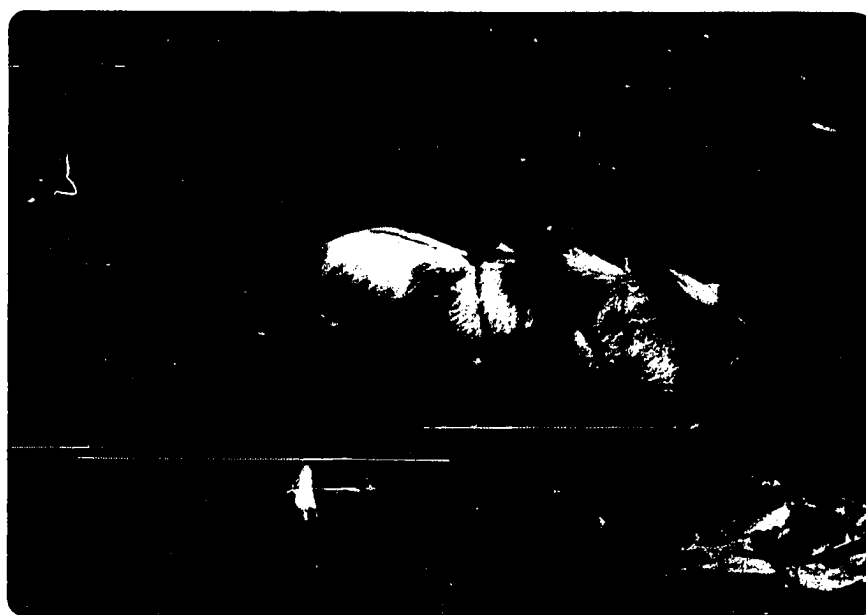


Figure 15. Panamaquib Criollo Hog. The small eight-month old criollo hog is kept from straying through use of a chest harness.

of goats or any other animals (Figure 16).

The diet of the village families could be significantly improved if an effort were made by each to maintain a family milk goat. Sufficient forage would be available simply by staking goats out in areas too rocky or steep for cultivation or along weed bounded trails and paths. The many children who do not go to school or who are too young to do heavy work could be given the chore of herding a few goats and perhaps even taught how to milk these animals.

Cattle

An outstanding difference between the farmers of Panamaquib and the two other groups of peasants is the insignificant production of cattle. Of the forty Indian families surveyed, only one owned cattle. The two animals owned by this family also fell into the pattern of production for cash income rather than food for the family's needs. It is interesting to note that according to their statement, this family owned only 0.3 hectares of land and yet was able to maintain two cows. Consequently, for grazing they were dependent on fields in fallow or land not suited for cultivation. There seems to be no direct relationship between the size of landholding claimed to be owned and the number of cattle raised. The only cows in Panamaquib were owned by a family with one of the smallest holdings while the family with the largest holding of five hectares had the village's single horse but no cattle. The reason most frequently stated for not keeping cattle was, "It is not our custom." Restrictions such as shortages of land available for grazing cattle, problems of disease, or lack of money to buy stock were not referred to as the major limiting factors. These limitations would certainly be major obstacles to an increase in cattle



Figure 16. Panamaquib Goats. These healthy appearing animals belonged to the single Panamaquib family having goats. Note the unused accumulated manure compost.

production and would make difficult any attempts directed to this objective. However, the Indians gave the impression that cattle raising would not be of interest to them, even if an abundance of grazing land were available. Cattle production simply does not fit into their traditional way of life.

Because so many families are involved in seasonal employment or the cultivation of lowland maize crops for extended periods of time in places distant from Panamaquib, it must be expected that such activities impose restrictions on the keeping of animals and poultry. This would be particularly true in relation to animals which are more demanding in requirements for care and that represent a much greater investment than do poultry. Consequently, a farmer owning a cow or hog would be very hesitant in entrusting it to a neighbor. Chickens being of lesser value are less of a consideration or burden to those families having the adult males periodically away from the village for several weeks or more.

CHAPTER VI

PROBLEMS RESTRICTING INCREASED PRODUCTION

Significant differences exist in the types and numbers of animals raised by each of the peasant groups studied. However, all three -- the Guatemalan Indian, the Honduran Ladino, and the Costa Rican Tico -- can be characterized as not meeting their potential for producing greater quantities of eggs, milk, and meat. The reasons for their failure to do so are complex and many. Outstanding among these are the following:

- 1) General ignorance of what constitutes a balanced nutritious diet, particularly the importance of protein rich foods.
- 2) Poor animal and poultry stock raised with equally poor husbandry practices.
- 3) Low availability of land and lack of any significant cash income.

Dietary Prejudices and Ignorances

While most of the peasant families interviewed in this study recognized animal derived foods as being of high dietary quality, practically all these people were not fully aware of how essential these foods are to the maintenance of good health. For the most part, a good diet and nutrition are simply equated as having a full stomach, a matter of quantity not quality. With reference to this, the comments of the director of the vocational agriculture and commercial high school in San Vito are recalled.

When at the outset of this study it was explained to him that local subsistence farm families would be interviewed on animal production as relates to the problem of protein malnutrition, this gentleman colorfully but realistically remarked, "Sir, you may as well speak to them in Chinese about Russia."¹

Economic, political, and cultural factors all have important influences on food consumption. The relatively high cost and unavailability of so-called protective foods are major reasons for protein malnutrition in Central America. But even where food is or could be made available at reasonable cost, dietary habits born of ignorance and prejudices impede good nutrition.

A study conducted by a team of Mexican nutritional scientists found that levels of income and the availability of quality foods were not the principal decisive factors influencing dietary habits among Mezoamerican peasants. It was shown that variables such as the cultural background of the mother, attachment to a traditional way of life, lack of exposure to modern communication media, and size of family were all more important nutritionally speaking than any other variables, including total available food and total income.²

Dietary patterns and the degree of influence they have on agricultural practices are largely determined for any particular people by tradition. Cultural differences among the peasants of Central America do offer

¹ Interview with Carlos Arguello, Director, Collegio Agropecuario de Coto Brus, San Vito, Costa Rica, June 29, 1971.

² J. Cravioto, L. Rosales, and G. Fernandez, "Food Habits in Pre-Industrial Societies in Mezoamerica," Regulation of Hunger and Satiety, Vol. II, Proceedings of the Seventh International Congress on Nutrition, ed. J. Kuhnau, 5 Vols. (Braunschweig: Vieweg & Sohn, 1967), p. 170.

explanations for areal variation in the production and consumption of animal food products. The basic food habits of the Guatemalan Indian were already firmly established prior to the Conquest. Those of the Costa Rican peasant on the other hand are strongly influenced by European dietary traditions inherited from their Spanish ancestors. The relatively high production and consumption of milk by Costa Rican subsistence farmers as opposed to the absence of cows and milk foods among the Indians of Guatemala can be appreciated and understood only through a consideration of their respective cultural backgrounds.

TABLE VI: PERCENTAGES OF INTERVIEWED FARMERS IN EACH OF THE SURVEY AREAS RAISING DIFFERENT TYPES OF FOOD ANIMALS AND FOWL

Animal or Fowl Type	San Vito Costa Rica %	Yamaranguila Honduras %	Panamaquib Guatemala %
Chickens	63	96	100
Hogs	5	12	28
Cattle	50	69	3
Turkeys	3	50	3
Goats	3	0	3
Sheep	0	0	0
Ducks	3	15	0
Pigeons	3	6	0
Rabbits	0	0	0

Although this study is primarily concerned with cultural factors influencing the production of animal protein foods, mention should be made of recent findings related to differences among genetic-racial groups in their ability to digest and tolerate milk. Scientists have recently discovered that Caucasian adults have a much higher milk tolerance than do persons of other races. Simoons reports that research conducted in Oklahoma, Texas, and Nebraska indicated lactose intolerance levels among

Negroes (77%) and American Indians (67%) were much higher than in Caucasians (19%). Only adult Caucasians as a group seem to retain the biological capacity for producing lactase, the enzyme required for hydrolyzing lactose. A lactase deficient individual who consumes milk in any reasonably large amount (a glass) may suffer abdominal distension, discomfort, diarrhea, and cramps.³

Should these preliminary findings be correct, the Guatemala Indian may be scientifically correct in associating illness with milk consumption. Verification of the concept that biologically inherited tolerances for milk digestion are partly responsible for spatial variations in milking habits appears to be validated in the research conducted in this study among groups who differed both racially and culturally. The largely Caucasian Costa Ricans valued milk as a food and were the only group characterized by a strong desire for each family to own a milk cow. In contrast, the racially different Guatemalan Indian almost completely disregards milk as a food except for infants and young children and expresses no interest in producing milk even when owning cows or goats. The Ladino, culturally and racially transitional between the Guatemalan Indian and the Costa Rican Tico, interestingly enough represents a midpoint in having a greater appreciation of milk as a food than does the Indian but not to a degree comparable to that of the Costa Rican peasant.

The pre-Columbian Mayas were an agricultural people who did not possess any domesticated animal for the production of milk. This partly explains

³Frederich J. Simoons, "Primary Adult Lactose Intolerance and the Milking Habit: A Problem in Biological and Cultural Interrelations," American Journal of Digestive Diseases, Vol. XIV, No. 12 (December, 1969), pp. 819-836.

why their descendants, who have retained much of the Mayan culture, do not value cow's milk as essential in their diet. Knowledge of this aspect of the Indian cultural background facilitates an understanding of how it is possible for an Indian family with as many as two dozen goats not to utilize their large flock for milk and to be ignorant of the simple process of making cheese.

A similar situation exists with reference to meat. While the Indians do have a taste for poultry meat, beef, and pork, their demand for these foods is not as great as that of other Central American peasants. Meat of any type was seldom consumed by the pre-Columbian Mayas. Perhaps nothing illustrates this more than the presence of a special verb, teibex, meaning "to eat meat" as distinguished from a general verb, lobex, meaning "to eat."⁴ Meat has always been considered a luxury available only to the relatively rich. It is only on special occasions that meat of any kind -- fowl, beef, or pork -- is part of the Indian meal.

Food prejudices, faddism, and quackery are common to the illiterate majority of Central America and contribute to many of the dietary habits that contribute to the underproduction and low consumption of milk and meat. Many of these misbeliefs and ignorances have been identified and studied by scholars associated with INCAP. Some are peculiar to certain ethnic groups while others are shared by most peasants in varying degrees of adherence.

The so-called "hot and cold" food dichotomy is widespread within Latin America. According to this concept foods are classified as being

⁴Oliver LaFarge, Santa Eulalia: The Religion of a Chchumatan Indian Town (Chicago: University of Chicago Press, 1947), p. 37.

"hot" or "cold" without any relationship to their temperature or spicery.

In one village chicken meat, because of tradition, may be considered "hot" and pork thought to be "cold," while in another nearby community a reversal of these values may be assigned the same foods. It is possible that the many different ideas and concepts concerning "hot" and "cold" foods are the products of ongoing Hispanic acculturation which has led to a complex re-interpretation rather than a complete rejection or dismissal of former dietary beliefs.

Ideally, everyone who is normal should have a certain degree of "hotness" in his body. If this state is adversely affected by eating an excess of either "hot" or "cold" foods or by physical exertion from over work, then the person is susceptible to becoming ill. Therefore, if chicken is a "hot" food, it would not be wise to eat it unless a balancing "cold" food such as plantains is also consumed.⁵ Solien interestingly notes that "cold" foods are generally considered to be more dangerous than "hot," however, most cold foods may be altered in some way so that they become "less cold" and safe to eat. Thus, milk boiled with cinnamon is no longer "cold" and pork cooked with pepper and cloves becomes "regular."⁶

Foods may also be classified on a basis of being "strong" foods. In a study of dietary habits among lower income groups in Guatemala City, this categorization was thought to be more important than the "hot and cold" dichotomy. The consumption of "too much" of any "strong" food,

⁵ Nathan L. Whetten, Guatemala: The Land and the People (New Haven: Yale University Press, 1961), p. 226.

⁶ Nancie L. Solien, "Beliefs and Practices Concerning Medicine and Nutrition Among Lower Class Urban Guatemalans," American Journal of Public Health, Vol. LIV, No. 10 (October, 1964), pp. 1728-1729.

including meat, is considered harmful for everyone, but more so for some than for others who have strong "constitutions." Children, especially those less than two years of age, cannot handle "strong" foods well, and for this reason are not given them. When meat is fed to children, it may be given in small quantities to be chewed and spit out. An important difference setting strong foods apart from the "hot and cold" foods is that the former's qualities are unalterable. In addition to meat, milk is sometimes classified as being "strong," particularly goat's milk.⁷ This may offer partial explanation of why many farmers would not consider keeping goats and also why no family surveyed in Guatemala, Honduras, and Costa Rica would give any consideration to raising these animals principally for the production of milk and cheese. Those few goats which were encountered in the course of the surveys were kept as pets or for eventual sale to butchers, but never to provide milk.

Eggs, on the whole, are free of any taboos and prejudices which may restrict their use as valuable sources of protein.^{8 & 9} This may help explain why all peasant families will attempt to raise a few chickens. However, in competition for the few eggs produced by the household chickens, the family diet frequently suffers the loss of them to the local market, where one egg can generally be exchanged for cash to buy a pound of maize.^{10 & 11}

⁷ Ibid., p. 1729.

⁸ Ibid., p. 1730.

⁹ Moises Behar and Nancie L. Solien de Gonzalez, "Child-rearing Practices, Nutrition and Health Status," The Milbank Memorial Fund Quarterly, Vol. XLIV, No. 2, Part 2 (April, 1966), p. 82.

Other Latin American beliefs which discredit the biological value of certain protein rich foods and their necessity for good health include the following: pork is bad for the liver; fish should be eaten only during Holy Week; it is a mortal sin for a Catholic to eat fish and meat at the same time; the eating of too much fish will cause insanity; milk is only for the sick and children; refrigerated milk is less nutritious; and milk taken after drinking alcohol is poisonous.¹²

Cultural traits and beliefs related to food do play an obvious part in influencing the decisions of peasant farmers in deciding upon what types of animals will be raised. The food taboos and prejudices outlined in the preceding discussion are examples of the many misbeliefs these protein mal-nourished peoples must be educated away from before they can be expected to increase their production and consumption of milk, eggs, and meat. As part of any overall development program, it would be judicious to insure that persons charged with the responsibility of working in the area of food and nutritional improvement be made aware of the significant influence folk traditions impose upon dietary habits.

Problems and Differences in Stock and Husbandry Practices

Much of the failure for peasant subsistence farmers to produce greater

¹⁰ Marina Flores, "Estudios de Habitos Dieteticos en Poblaciones de Guatemala," Archivos Venezolanos de Nutricion, Vol. VIII, Nos. 1-2 (December, 1957), p. 60.

¹¹ Alfredo Mendez Dominguez, "Organizacion Social y Prevalencia de la Malnutricion Proteica en Una Comunidad de Guatemala," Guatemala Indigena, Vol. II, No. 2, 1962, pp. 5-15.

¹² Juan Zapata Olivella, "The Fear of Food," Regulation of Hunger and Satiety, Vol. II, Proceedings of the Seventh International Congress on Nutrition, 5 Vols., ed. J. Kuhnau (Braunschweig: Vieweg & Sohn, 1967), p. 173.

quantities of animal food products results from the combination of raising inferior animal and poultry stock with poor practices of husbandry. The inadequate and unsupplemented feed fed by these farmers to their animals and poultry hardly provides the nutrition needed to protect against the ever present dangers of disease and parasites so common in the cool and humid highlands of Central America. Consequently, stock raised under such conditions must be of strains hardy enough to endure demanding environmental conditions while given an absolute minimum of food and care. It is the possession of these necessary attributes which qualify the criollo types of chicken, hog, and cattle to the subsistence sector of Central American agriculture. The ability to survive is of primary importance, much more so than are efficiency and quality of production.

In recent years much publicity and recognition have been awarded the scientists responsible for the "Green Revolution" and the truly revolutionary results achieved from the "super" wheats and rices these agriculturists have developed to relieve the world's food crisis. However, it is unfortunate that equally "super" chickens and milk animals have not been produced for the poor and malnourished developing nations, so that the generally poor diets of their populations may be nutritionally better balanced with the quality proteins of meat, eggs, and milk.

Until now the small farmer of the tropics has not received much assistance from science in the genetic improvement of animals and poultry adapted to his peculiar environmental and resource situation. There is absolutely no reason to believe that researchers in animal husbandry could not manipulate genetics to breed dual purpose beef-milk cattle better suited physically for tropical subsistence farm situations than are the traditional types of cattle now available. The remarkable success obtained

from the genetic upgrading of the Zebu-Brahman breeds of cattle for quality beef production in tropical regions is evidence of what can be accomplished in rather short spans of time.

It would not be economically feasible to recommend the raising of large primarily beef cattle such as the improved Brahman to small peasant farms. But it would certainly be beneficial to have geneticists breed an animal which while possessing the hardiness of tropical cattle like the criollo would also be a better producer of both beef and milk, and perhaps ideally be smaller in size and require less forage.

Geneticists have available to them for genetic improvement a breed which would be ideal for small tropical highland farmers. This animal is the Blanco Orejinegro of the Antioquian Highlands of Colombia. These small tough cattle are Spanish in origin and do exceedingly well in humid tropical highlands within an altitudinal range from 1,300 to 6,500 feet. The following description by Payne of this animal's utility for Colombian peasants is offered in justification for recommending its upgrading and distribution among subsistence farmers in the highlands of Central America where no comparable breed is found:

Living under...adverse conditions and with a restricted feed intake the breed cannot be expected to produce much of anything. However, to the small holder, it is an invaluable animal, giving him milk for his household and acting as a sort of savings bank as he can sell one or two steers per year. It is a common sight in Caldas to see a little boy bring home a Blanco Orejinegro calf tied to a short rope every evening and give it gruel or kitchen refuse, just as chickens may be fed. These animals are good climbers and walkers and will carry packs at a fast clip over incredibly steep roads that would be forbidding even for a mule. 13

Payne does negatively note that the Blanco Orejinegro's same tough skin

¹³W. J. A. Payne, Cattle Production in the Tropics, Vol. I (London: Longman Group Limited, 1970), p. 193.

that protects the animal from ticks allows it to be contemptuous of barbed wire fencing. It is also a hard milker requiring the use of a calf for "let down." However, even with the acceptance of these undesirable traits, it would be difficult to conceptualize an animal potentially better adapted and more useful to small farmers such as those surveyed in San Vito and Yamaranguila. As a producer of beef or milk, the Blanco Orejinegro is in no way equal to the beef producing Brahman or dairy Jamaican Hope. But these latter two breeds were developed primarily for tropical commercial producers and therefore are not at all suited to the marginal husbandry of subsistence farms. One can only speculate on the contributions that could be derived from genetically improving a multi-purpose pack-beef-milk animal like the Blanco Orejinegro specifically for the small tropical highland farm.

The same problems of disease and inadequate feed which affect cattle and force a reliance on hardy but inefficient criollo stock also hamper poultry production. Only hardy strains of poultry can survive under conditions where days may pass without maize or any other ration being fed and where fowl must compete with dogs and pigs in scavenging for food in the form of meager table scraps and household refuse.

The food potential from chickens could be greatly increased if all subsistence farmers were taught (and would follow) simple but proper practices in poultry management. It could easily be demonstrated to peasants that the small and limited amount of feed available to them for feeding chickens would be best used to produce more eggs if only fed to six hens kept in clean pens than if casually thrown on the open ground to a loose flock of fifteen. By the same token, maize fed to poultry would be "stretched" if first cracked rather than being given as whole kernels.

Furthermore, there is no reason for poultry being lost at night to marauding predators because coops are not provided when the necessary material for their simple construction is readily available from nearby forests.

Breeds of chickens such as the White Leghorn and Rhode Island Red will do well in tropical environments if vaccinated, fed adequately, and properly housed. However, these birds cannot survive, let alone reach the quality standards of production for which they are noted, when raised under conditions encountered on the average tropical subsistence farm. Recognizing the reality of not being able in the immediate future to educate and convince Central American peasants of the necessity to be more systematic in their raising of poultry, some improvement in the reduction of poultry losses to disease and increases in egg production could be achieved through the breeding of a better criollo chicken. It would be unwise to attempt the introduction of mid-latitude breeds ill suited for demanding tropical environments, as long as poultry are raised by small farmers not providing adequate feed and housing. The upgrading of a criollo type chicken as a layer without the loss of this fowl's hardiness would be of great benefit in dietary improvement. As yet, poultry scientists have devoted slight research to breeding fowl for tropical subsistence farm situations. Tropical egg and poultry meat production could also be enormously assisted if nutritional scientists would identify plants native to the tropics which could be fed to poultry. This would facilitate poultry production and reduce the competition between chickens and humans for scarce and costly cereal grains. Stronger efforts should also be made to provide quality vaccinated chicks at reasonable prices and to establish feed mills capable of producing feed at prices open to small farmers.

It is unfortunate that the high quantities of waste and by-products

from the Central American fish and meat export processing plants are not utilized to produce cheap animal protein feed supplements. Every ton of Central American shrimp or lobster tails prepared for export generates three tons of offal material which can easily and cheaply be processed to provide a feed supplement with a 29 percent protein content. At present this potentially valuable by-product is treated as undesirable waste and disposed of accordingly.¹⁴

The discovery that ramie (Boehmeria nivea), known previously only as a fiber plant, is a high protein forage plant for livestock and poultry provides another example of the possibilities available for increasing animal feed availability in tropical environments. Test plots in Guatemala averaged yields of more than thirty to forty-five tons of green forage per acre. The young ramie plant if cut before stalks are twenty inches high has less fibre and more protein than does alfalfa harvested before bloom stage. Experiments have shown it to be feasible and recommendable for subsistence farmers to plant small beds of ramie fertilized with quantities of manure as a source of quality forage for their animals and poultry. The plant can be continuously cut for periods exceeding two years without any requirement for replanting.¹⁵ The potential ramie offers small farmers illustrates one of the many different approaches which can be utilized to increase the production of eggs, milk, and meat without heavy investment of capital or any requirement for highly skilled

¹⁴Food and Agricultural Organization, Poultry Feeding in Tropical and Subtropical Countries (Rome: Food and Agricultural Organization, 1965), p. 24.

¹⁵Robert L. Squibb, "Ramie -- A High Protein Forage Crop for Tropical Areas," Journal of the British Grassland Society, Vol. IX, No. 4 (December, 1954), pp. 313-319.

technicians for implementation.

In all three survey villages relatively few of the farmers attempted to raise pigs. Feed shortages and the threat scavenging pigs represent to cultivated crops are the two principal factors which explain why few farms had these animals. Few peasant families produce quantities of maize or other foods in amounts sufficient to feed both themselves and penned hogs. Consequently, if a hog's feed needs are to be met, the animal, like the family chickens, must be allowed to scavenge. But the lack of protective fencing and the hog's omnivorous diet together with his damaging rooting habits make this impractical. The few hogs which are raised are kept for cash income rather than food. It is felt that the attitude of valuing hogs more as sources of money and not food will persist and continue to restrict their use as food for peasant farm families. Another aspect of pigs working against their production in greater numbers by subsistence farmers lies in this animal not producing a food product in a quantity easily and readily consumable without problems of spoilage or waste. In this regard the hog cannot compete with the cow or goat for milk or the chicken for either meat or eggs. Because hogs are not efficient utilizers of the meager land resources of small holders or practical protein food producers, it would be wise for peasants to be discouraged from producing them at the subsistence farm level.

Costa Rican farmers in San Vito kept very few hogs because of the danger these animals posed to their coffee plots. With respect to this, it is interesting to note that experiments with sheep and geese indicate they can be raised within coffee plantings in a way mutually beneficial to the production of coffee and animal products. Because they will not eat any part of a coffee plant, sheep can effectively control weed problems

in coffee groves. A single adult animal will consume as much as twenty pounds of weeds per day.¹⁶ While also desirable as weed controllers, geese must be withdrawn from coffee groves when harvest nears because they will eat the mature fruits. By using sheep and geese in this manner, undesirable weeds are converted into organic fertilizer; meat, wool, and mutton are produced; and the farmer is freed from the difficult and time consuming task of weed removal. Of negative consideration, the sheep may diffuse coffee fungus diseases within the groves, and both they and the geese would require more fencing to prevent straying. However, the cost of an additional fungicide application or requirement for fence construction would appear to be well worth the positive returns received from rationally using coffee groves closed to hogs and cattle for the production of quality protein foods in addition to the coffee crop.

Land and Economic Obstacles

Many of the problems characterizing subsistence agriculture, including the production of protein rich animal foods, are related to the small size of the average holding and the critical need for land redistributive reform programs. For example, the extremely small holdings of Guatemala Indians preclude their raising of dairy cows regardless of their traditions which do not recognize milk as an important food. These same small holdings so typical of most peasants in Central America frequently fail to produce enough maize for family needs let alone provide a surplus sufficient to properly feed animals.

¹⁶R. L. Squibb, R. Jarguin, and C. Muirragui, "Como Limpiar los Cafetales e Incrementar la Cria de Ovejas y Gansas," La Hacienda (New York), No. 12 (December, 1957), p. 57.

In addition to restrictions imposed by a shortage of land, other economic difficulties are faced by peasants who as a group have limited cash resources. As long as the cost of a single quality hatchery chick (50 cents U.S.) is equal to a half of a day's labor, it would be unrealistic to think that penniless peasants will attempt or be able to raise chickens of good stock. Several of the Costa Rican families who were without a milk cow stated that a lack of cash needed to purchase a calf was the only reason for their not having such an animal. Economic problems of this nature could be partly resolved if the respective national governments made serious and responsible efforts to assist small holders. Much could be achieved if non-profit national hatcheries and breeding stock farms were established for the primary purpose of assisting the small farmer in obtaining quality animals and fowl at the lowest price possible.

Peasants who would like to invest money in improving their production potential through purchases of items such as fertilizer or a milk cow can seldom obtain loans at any rate of interest, not to mention a loan with reasonably honest rates. A study of rural credit facilities in Indian municipios of Guatemala estimated that 10 percent of the Indian farmers in any year would make loans. Usually these loans were small, ranging from 5 to 100 dollars per borrower and for short periods of time. The interest rates were high and computed on a monthly basis. These varied from 3.2 percent per month to 12.6 percent per month. The average was 7.9 percent per month. This is equivalent to a yearly interest rate of 94.8 percent.¹⁷ Obviously, such usurious charges prohibit the using of credit as a means for improving one's standard of living.

¹⁷Whelton, Guatemala, p. 156.

One contributing factor responsible for the low availability of loans with reasonable interest rates stems from the fact that few peasant farmers have anything of value to offer for collateral other than their unharvested crops. Most farm land is claimed on the tenuous basis of usufructuary rights, and by not having clear legal titles to their property, small farmers are precluded from using this universally acceptable form of loan security. The limited credit which is available in the Central American agricultural sector goes principally to large farmers producing export commodities. It is estimated that only 5 percent of the money lent by private and public lenders is granted to small farmers. For example, in Guatemala two government agencies are charged with the responsibility of providing credit to small producers. Loans from these sources are annually made to only about 10,000 farmers; these represent only 2 to 3 percent of the small farmers in the country.¹⁸ Similar credit situations are common to all Central American states and seriously affect improvement at the lower levels of agricultural production.

It is now beginning to be realized that a strong case can be made for a larger share of financial resources being directed towards subsistence agriculture in Central America. In the past the agricultural export crops, and the commercial agricultural sector for domestic consumption to a lesser degree, received the bulk of assistance. This reflected an emphasis on objectives such as the balance-of-payments equilibrium and short run maximization of profits.¹⁹

¹⁸Lehman B. Fletcher, et al, Guatemala's Economic Development: The Role of Agriculture (Ames, Iowa: Iowa State University Press, 1970), p. 136.

¹⁹Fletcher, et al, Guatemala's Economic Development, p. 53.

The promotion of agricultural export commodities such as coffee, cotton, and beef has had negative consequences. The increase in their production has resulted in an overall extension of the latifundium system while doing little to promote the development of small holdings. Moreover, world-wide production of tropical cash crops has in many cases depressed world prices and actually lowered income from these products. Money earned from the export of agricultural commodities almost never goes to improve nutrition or domestic food productivity. It is usually spent to better the life of the small socio-economic well-to-do class through purchases of the products of the industrialized nations. Furthermore, it has been proven that domestic food deficits cannot be counterbalanced by food imports paid for with the foreign exchange earned from exports. This is simply because imported food sold through commercial outlets is beyond the economic reach of Central America's majority which exists in the subsistence sector.²⁰

It is now being successfully demonstrated that dollar for dollar payments returned on investments directed to the subsistence sector are higher than those placed in the commercial-export sector. Money made available to Guatemalan subsistence farmers for purchases of fertilizers resulted in yields proportionally higher than those obtained from commercial growers who also received loans. In addition to making more food available to the rural poor, such investments absorb more labor, increase productivity per worker, raise incomes, stimulate the rural market system to demands for more goods, and elevate the overall standard

²⁰ A. E. Schaeffer, J. M. May, and D. L. McLellan, "Nutrition and Technical Assistance," Malnutrition Is a Problem of Ecology, eds. Paul Gyorgy and O. L. Kline (Basel, Switzerland: S. Karger AG, 1970), pp. 101-109.

In decrying this lack of attention and responsibility for the problems of the rural poor, Dr. Ricardo Bressani, the noted Guatemalan nutritional scientist, reports the following observation of neglect in Latin America:

Many of their problems could be solved if more competent agricultural experiment stations were carrying out research needed to help the small farmer solve his problems, and if governments paid more attention to agriculture....Practically all the agricultural experiment stations in this area of the world are situated on richer lands and devote their efforts to solving the problems of the big producers who can afford to institute the new procedures and buy the equipment necessary for large scale operations. The result is that the producers of crops such as coffee, cotton, sugar, and rubber reap the benefits... while the problems related to producing food for increasing populations are scarcely recognized and rarely given attention. 22

The San Lucas de Tolimán Mission:
An Attempt At Improvement

The grass-roots efforts of an American priest to improve the nutritional status of poor Guatemalan Indians through programs promoting the raising of hens, hogs, and milk goats are worthy of discussion as examples of what can be attempted to resolve the problem of protein malnutrition. Using his small mission farm at San Lucas de Tolimán as an operations center, Father Gregory Schaefer administers several programs assisting subsistence Indians to become owners and raisers of quality stock. In addition to providing the necessary animals and fowl, these simple and direct programs also support the small farmer by making available feed concentrates, veterinarian medications, and marketing direction.

²¹Fletcher, et al, Guatemala's Economic Development, p. 197.

²²Ricardo Bressani, Observations on the Nutritional Deficiencies, Food Traditions, Supply, and Needs in Latin America, INCAP Publication 1-248 (Guatemala City: Instituto de Nutricion de Centro America y Panama, 1962), p. 27.

For egg production the mission purchases from United States hatcheries vaccinated White Leghorn hen chicks. These are flown to Guatemala and are raised in brooders at the mission farm until they reach laying maturity. Indian families are then solicited to participate as program owners of a laying flock of twenty-five hens. When a family states a desire to raise a flock, an advisor from the mission will go to their home and with the help of the household construct a simple well ventilated coop equipped with runways. In order to reduce the danger of poultry diseases, the wire mesh floor of the coop and runways are raised off the ground. After the coop is completed, the hens are delivered along with a fifty pound sack of complete poultry feed and a preventive antibiotic for daily administering through the hens' drinking water. The family is carefully instructed on the necessity of maintaining a clean coop, of daily collecting grasses to feed the hens for dietary bulk, and the importance of not allowing the hens out of the enclosed coops and runways. Payment for the hens, coop materials, and feed is made by returning a portion of the egg production to the mission until the debt is liquidated.

This micro-level approach represents a great opportunity for the impoverished and malnourished Indian family to better its nutritional and economic status. The daily consumption of a few eggs in the family meals balances the protein contained in maize and resolves the problem of protein malnutrition. The well fed quality flocks of twenty-five birds average almost twenty eggs a day which usually sell for 4-5 cents each. The gross income derived from selling only half a day's egg production compares most favorably with the prevailing daily wage of 50 cents for an Indian laborer toiling in a coffee grove from sunrise to sunset.

Periodic checks by trained native members of the mission staff are

made for the purpose of giving advice and to insure that proper care is given the flocks. The owners are encouraged to collect and utilize the poultry manure for fertilizer. An important aspect of the poultry program provides for the replacement of old hens with young pullets. When records indicate that the laying efficiency of a flock is declining because of aging, any family owning such a flock may exchange its less productive hens for pullets just beginning to lay on a one-to-one basis free of any additional costs. The exchanged older birds are then sold for meat in Guatemala City. Money received from these sales covers the expenses incurred by the mission in purchasing and raising chicks to the laying age.

Father Schaefer encounters difficulty in finding Indian families willing to participate in what appears to be an easy and profitable scheme. The reasons for this lack of enthusiasm and acceptance are not fully understood. Part may derive from a suspicion by the long abused Indians towards anyone stating desire to help them. Some may also resent the periodic checks and strict requirements of the systematic and regular feeding and sanitary routines set by the mission director. However, experience has proven that without these controls, most Indians will lapse back into traditional practices of poor husbandry. The hens are then stolen, lost to dogs, or succumb to diseases and parasites.

A program similar to that involving poultry is provided to assist Indians in the raising of hogs. The principal objective in this case is to provide a supplementary cash income rather than a quality source of protein for family consumption. Quality breeding hogs are maintained by the mission, all of which have been imported from the United States. The mission boars are four to five times larger than the local criollo stock and are the attraction of Indians and Ladinos who come long distances to view them.

Animals which have been weaned, vaccinated, and neutered are made available to small farmers free of any immediate cash charges. Before a hog is given out, the new owner must consent to building a small closed pen with a concrete floor. The mission farm provides the needed cement and technical assistance required in the construction of a suitable pen. When the young hog is delivered, the owner also receives a sack of milled swine feed concentrate, along with instructions to daily clean the pen and to provide water and quantities of green forage. The mission maintains records of all hogs being raised and determines when the economic situation in local markets warrants the selling of hogs which have reached a marketing age. Owners of marketable hogs are contacted and asked to bring their animals to the mission for delivery by truck to purchasing butchers or meat processors. The mission's hog program in a very short period of time has succeeded in developing a reputation for quality, and no difficulty is encountered in the marketing of these animals. Costs for the hog, cement, and feed are subtracted from the sale price and the difference returned to the Indian raiser in the form of profits which usually equal one or two months' wages.

Unfortunately, this program, like that related to chickens, is not well received by the local Indians. Problems similar to those handicapping the poultry scheme are experienced. Moreover, there is a reluctance for Indians to return their animals for sale when the mission determines it is economically opportune. This is because many continue to follow the tradition of valuing the hog as a form of savings to be used in time of financial need. In so doing they fail to comprehend the economic futility of continuing to feed an already mature animal specifically produced for marketing.

An Indian who was pleased with being able to raise a hog under the mission program was asked in an interview why he didn't raise more than one, as the mission would allow. In explanation he stated a fear that neighbors may become envious of his success and make him the object of an evil spell. Such apprehension reflects the concept of "limited good" noted by many anthropologists as being common among Mesoamerican lower classes. Simply stated, it centers upon the belief that only so much "good" exists in the world. Anyone increasing his share of "good" does so at the loss of a neighbor's portion of the limited "good." The individual who selfishly assumes more than his due share exposes himself to retaliation, commonly done through the casting of an evil spell.

At the time of the Guatemalan field study, the mission was beginning to experiment with a program making goat's milk available to Indian families. This was to differ from the egg and hog projects in that the milk goats would be kept in centrally located community corrals and milk sheds. Tentative plans were made requiring each participating family to milk an assigned goat and to daily deliver to the corral a quantity of grass to supplement the milled feed provided by the mission. Half of the milk obtained each day would be retained by the mission for the making of cheese, with the remaining half being kept by the milking families for their personal use. Profits from the sale of the cheese would be used to defray the purchase and maintenance costs of the goats. Any net income would be distributed between the owners of goats on a basis proportional to the amount of milk each delivered.

In addition to schemes discussed above, Father Schaefer was in the process of establishing a breeding herd of milk cows and rabbits to be

used in similar programs. These programs, though only partially successful in their experimental stages, are important for suggesting what can be done in resolving the critical and unseemingly complex problem of protein malnutrition. It is significant to note that the principal difficulties encountered in attempting to promote these grass-roots means of production were socio-cultural in nature rather than economic or technological. Such approaches will not eradicate the food crisis alone, but they do provide a "breathing space" in the interim awaiting population growth control, the implementation of land reform, and a general improvement in educational levels -- all of which are necessary if there is to be any hope for a permanent resolution to the overall problem of poverty -- of which malnutrition is but a single expression.

CHAPTER VII

CONCLUSION

Findings

Central America, like many of the so-called developing areas of the world, is experiencing rapid population growth within an economic framework characterized by a strong dependence upon subsistence agriculture for the satisfaction of most basic human needs and wants. This situation has created difficult social and economic problems. Foremost among these is a critical shortage of quality animal protein foods -- a shortage that steadily worsens as population growth continues at a rate greater than that of economic growth. To resolve this problem, it is necessary for Central America, like other areas in similar distress, to efficiently utilize all available human and natural resources. These would include those necessary to bring about an increase in the production of eggs, milk, and meat at the subsistence level. With reference to the utilization of all such resources, increased attention is being given to the role culturally determined factors have in influencing the production and consumption of food by subsistence farmers.

The principal findings of this study on decisional influences in peasant animal production in the highlands of Central America are as follows:

- 1) Central America is currently suffering from severe problems of protein malnutrition and this situation can only be slightly improved with

quality protein foods produced and distributed through commercial channels.

2) The large rural subsistence sector of the population does possess a potential for producing increased quantities of eggs, milk, and meat to improve the nutritional composition of their presently unbalanced diets.

3) Cultural factors, including food taboos, poor utilization of farm animals, malpractices of husbandry, dietary ignorance, and ethnic traditions, restrict the production and consumption of animal protein foods as much as do other influences such as environmental conditions of climate and the size of land holdings.

4) Reflecting the significance of cultural determinants, distinct Central American ethnic groups living within the same general natural habitat do exhibit differences in their use of the land resource base in raising animals for food.

Recommendations

A single question continually arises with reference to Central America's critical problem of protein malnutrition -- what, if any, are the alternatives available for satisfying the need for quality protein?

Optimistically, this question can be answered with a degree of hope. But before considering any possible solutions, it is necessary to understand that alternatives applicable to highly literate and materially wealthier societies having more sophisticated economies will not apply to the Central American situation. It would be foolish to hope or expect that the illiterate and poor father of a typical Central American family of eight will spend fifty cents, the equivalent of a day's wages in many parts of the area, for a small bag of Incaperina or pound of beef. The nutritional value of these foods is not appreciated nor is their seemingly

low price within the purchasing power of the average rural family. Not until the general levels of income and education are raised can it be expected that the poor and uneducated majority will become regular purchasers and consumers of these nutritious but relatively costly foods. There is a direct relationship between income, education, and quality of diet that cannot be ignored.

It should be noted that agricultural development programs in Central America which were initiated to increase the commercial production of beef on large ranches have actually reduced and made more expensive domestic per capita meat consumption. Similarly, the recent expansion of commercial poultry and dairy production has not been successful in placing these needed foods on the market at prices open to Central America's poor majority. All these experiences have demonstrated that a solution to the problem, as it presently exists, cannot be obtained from commercial sources alone.

One practical approach to the crisis lies in assisting the small farmer to produce more eggs, milk, and meat himself for his family's consumption. Recognizing that limitations are imposed by conditions such as size of holdings, prevalence of certain endemic pathogens, and ignorances of good husbandry, authorities are now beginning to realize that a solution should be sought at the subsistence level.

Because the factors inhibiting the production and utilization of quality protein foods by small farmers are complex, any program specifically must be comprehensive and should include the following:

- 1) An equitable re-distribution of land.
- 2) An educating of the population on the essentiality of a balanced diet and the foods that constitute such.

3) The breeding of stock suited to the marginal and demanding conditions of the average subsistence farm and provisions for their distribution at costs open to the small farmer or through low interest, long-term loans.

4) The identification and use promotion of native plants which are nutritious foods for animals and fowl in order to relieve the competition between beast and human for limited quantities of maize.

5) A basic husbandry extension program directed towards teaching simple but correct practices of feeding, housing, and preventive medicine for the raising of animals and fowl by small farmers.

6) A strong emphasis concentrated on the production of poultry for eggs and meat and cattle for milk, in that these animals produce foods which are readily consumed in forms and quantities requiring little preparation or protection from waste through spoilage.

7) A de-emphasis of the production of swine and beef cattle by peasant farmers in that given the land resource base of the common subsistence farm these animals are less efficient as producers of food than are poultry and milk animals.

It would be unrealistic to assume that the program outlined above, or any other with similar goals, can be accomplished in a Central America governed by a selfish minority and burdened with the world's highest regional population growth rate. For there to exist any hope for a sustained improvement in the material well-being of Central America's people, two fundamental social and political changes must occur.

First, it is necessary that programs directed towards ameliorating conditions of poverty, illiteracy, health, and hunger be initiated and administered by leaders of government who have more than sympathy alone for

those suffering from such conditions. Little or no progress will be achieved as long as a small but privileged group retains effective control of the region's limited resources for the satisfaction of their own selfish interests while doing little to assist the poor majority. Secondly, but of perhaps greater importance, is the need for reducing Central America's rapid rate of population growth. Problems of hunger and disease will steadily worsen if demographic increases continue at rates exceeding those realized in the production of commodities and services for basic human needs.

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