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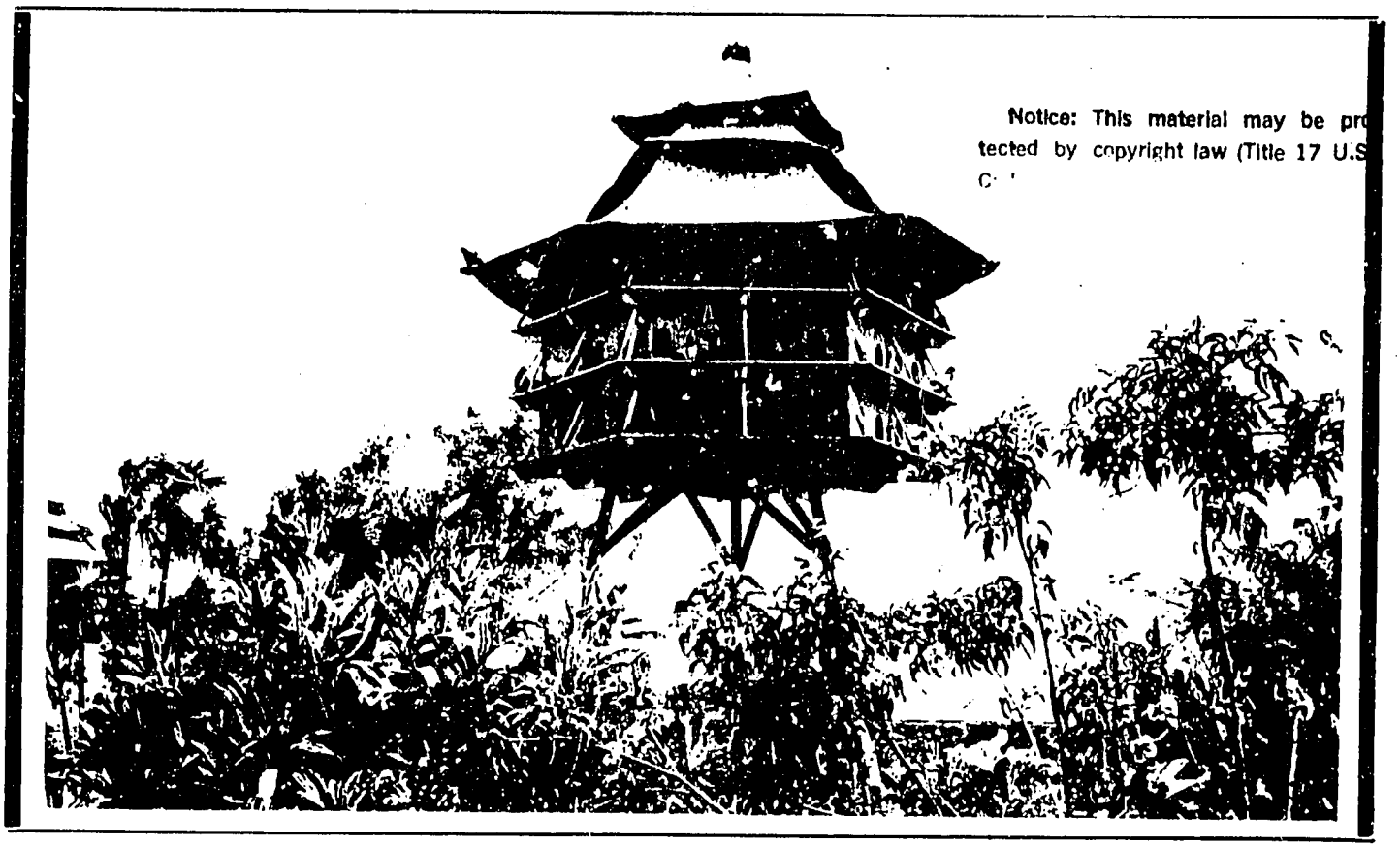

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The FAO Regional Office for Latin America at Santiago, in cooperation with Member Nations of the Region, is initiating a series of activities entitled "Small animals for small farms" as part of its Regional Programme for Basic Food Production. It is hoped that, if the small farmer can make better use of his limited resources by rearing small animal species, his economic and nutritional conditions will improve. The main objective of this article is to promote and generate interest in the idea. Specific publications will follow on the husbandry and production of the various species under small farm conditions.

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SMALL ANIMALS FOR SMALL FARMS IN LATIN AMERICA

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• **D.L. Huss**

There are millions of small farms in Latin America that do not have the resources to raise large animals either for income or for food for home consumption. Thus, since the diets of most rural families consist mainly of products produced on their farms, they are highly deficient in proteins and energy of animal origin. This, coupled with a generally deficient diet, has created a situation in which millions of people suffer from malnutrition.

A small farm, for the purpose of this article, is considered as one that does not have the capacity to support large animals in sufficient numbers to provide any one or a combination of the following:

- A regular supply of animal protein for household consumption;
- An income necessary for an acceptable standard of living; or
- Income in addition to that obtained from other farm products.

In most cases, this definition would cover farms with 10 or less hectares, depending upon productivity. This small-farm classification would also include farms considered economically as "sub-familiar" and most of those considered as "familiar".

"Sub-familiar" farms are small farms on which the laoour provided by the family is all that is needed, there being, for all practical purposes,

Opposite page. *A pigeon house on a small farm in the Dominican Republic accommodating some 50 birds*

Left. *A Jamaican small farm rabbitry, the rabbits of which are maintained on the grass and by-products of the holding*

Below. *Goats kept on a small farm in the Dominican Republic, which obtain most of their feed from adjoining shrubland*

no farm sales. To generate income, the farmer and his family must seek employment elsewhere at least on a part-time basis. Moreover, farm production on such farms usually does not meet the food requirements of the family. "Familiar" farms may require additional labour, and a larger percentage of the farm products are sold. This gererates a higher income and thus a higher standard of living for the farmer and his family.

The number of small farms in Latin America is very great indeed and they continue to increase owing to the ever-rising population and demand for land. According to a census carried out in the 1970s, there were approximately 4.3 million farms of five or less hectares each and 3.4 million of between five and ten hectares each (Instituto Interamericano de Ciencias Agrícolas, 1978). These farms involve some 31 million people, not including the 11 million landless rural inhabitants and agricultural workers.

The serious economic and nutritional predicament of Latin America's small farmers and their families, especially those with farms considered as "sub-familiar" is well known and is not the subject of this article. Of particular significance here is the lack or deficiency of animal protein and energy in the overall deficient diets of the people involved. If this problem is to be corrected, even partially, there need to be new concepts and new technologies suited to the small farmer's situation.

Since the farms are small and producing only a little animal feed, the question may be asked, why not use highly productive small animals adapted to the situation? Such animals could at least produce some food of animal origin for household consumption and, under certain circumstances, they could also provide additional income as well as contributing to national "off-the-farm" food supplies. This idea is not entirely new. There are many examples in various parts of the world, both in developed and developing countries, of small farmers successfully farming small animals to supply their own consumption needs and selling surplus produce. In fact, the meat, milk and cheese supplies of some countries are largely dependent upon small animals raised on small farms.

It is considered, therefore, that a programme designed to promote and develop small animal production systems in Latin America could help to alleviate the serious predicament in which many small farmers find themselves.

Major advantages of small animals over large animals for small farms are:

- Small animals reach productive or sexual maturity more rapidly and at a younger age than do large animals. For example, sheep and goats can give first birth and commence lactation around 18 months of age (less in some cases) compared with 32 or more months of age (normally more in Latin America) for a cow. Some breeds of fowl reach maturity in six to eight weeks.
- Large animals are usually selective consumers of feed and forage whereas small animals, at least some species, are less selective and consume whatever is available. For this reason, some animals can be raised on feeds and forages, including kitchen refuse, that would otherwise be wasted.
- The space required for handling and feeding small animals is much less than that required for larger animals. This is particularly important in respect of feed production because the space required to produce feed for a few small animals is less than that required for one large one. Thus, it could become feasible for many small farmers, although not all, to cultivate both food and feed crops.
- Some animal species and even some animals of the same species have more efficient feed conversion ratios than others so that the former require less feed per kilogram of liveweight gain. For example, the ratio for fattening improved breeds of pigs on a balanced ration can be less than 4:1 whereas for cattle it is around 9:1. Thus, in most cases, animals with highly efficient feed conversion ratios would be best suited for a small farm with its limited feed resources.
- The productivity of improved

breeds of some small animals under good management can be similar or even superior to that of large animals when compared on an animal unit basis. For example, the 1967 average milk production for the Saanen goat in Israel was 1 818 kg in 294 days of lactation (Devendra and Burns, 1970). This is equivalent to 10 908 kg for a cow based on the standard animal unit ratio of six goats being equivalent to one cow (some scientists claim seven or eight goats are equivalent to one cow). As a matter of interest, the milk production of Holstein cows on improved pasture and concentrate supplement in Santa Cruz, Bolivia, was reported to be only 2 402 kg per cow per year (Wilkins and Ali, 1979).

- In general, there are fewer fertility problems in the case of small animals under good management than in the case of large animals. In considering the fertility problems of cattle in the Latin American Region, this could prove a most important advantage.
- Finally, the relatively small size and low cost of small animals makes them more freely available to low income households who have neither space nor capital for a large animal. In this respect, small animals might also be utilized by landless labourers.

Examples of small animals suitable for small farms. There are many kinds of small animals that could be exploited by Latin American small farmers. Examples of some of these along with a brief description of their characteristics and productive capacities are given below. Many of the species mentioned are already being successfully reared and have high levels of production in a number of countries of the Region, indicating that the idea is practical and needs only to be promoted and extended.

Goats. Other than the dog, the goat has the widest ecological range of any domestic animal. It can be said that there is a breed of goat suitable for almost any kind of environment. They are valuable for their meat, milk, fibre and leather. They are often called the poor man's cow because two does bred at alternate intervals can provide a family with a year-long supply of milk together with some meat. Goats flourish on a variety of feedstuffs and they can be raised on feeds, including kitchen refuse, that would not be consumed by other animals.

There are many breeds of goats that have been improved or bred for special purposes such as milk, meat, hair and leather; and their productive capacity under satisfactory levels of nutrition can be outstanding. As an example can be quoted the lifetime record of a doe in the United Kingdom that yielded 16 968 kg of milk in 2 966 days, an average of 5.7 kg/day (Lindahl, 1968). However, yields of 200 to 300 kg per lactation for an average milch goat may be considered realistic under small farmers' conditions. Normally, fertility is no problem, and twinning and more than one gestation per year are quite common. Under range conditions, annual kid crops, for example, of 150 percent or more are common in northern Mexico and this can be increased through improved breeding and nutrition (Carrera and Diego, 1971). The carcass weight of kids varies with breed and age at time of slaughter. The use of goat hair, except in the case of Angora and Kashmiri, is not so important but the skins are used for home consumption or are sold for cash.

Sheep. Sheep are valuable for meat, milk, wool, leather and pelts, and they too have a wide ecological range. There are many breeds that have been developed either naturally or by man for specific climates or for specific purposes. These vary from the hair sheep of tropical America to the fat-tailed breeds of the African and Near Eastern deserts. The former are well adapted to tropical climates and some breeds, such as the Barbados Blackbelly, are very prolific. The latter, of which there are many breeds, are remarkable in that they store fat in their tails during the favourable seasons and subsist, at least partially, on the stored fat during the dry season. Of the many sheep breeds, there is no doubt that some, including those of Latin America itself, would be suitable for small farm exploitation in each of the various ecologial zones.

Sheep are efficient converters of forage to meat. They can produce a consumable lamb within seven or eight months after conception without it having to be fed concentrates. Under certain circumstances, it is possible to have three gestations in two years and multiple births are common in some breeds. Litter sizes of two to three are not uncommon in the case of the Barbados Blackbelly while a new breed, called the Cambridge, has been developed in the United Kingdom which has a lambing rate of three per birth, and up to six lambs have been recorded by Howells (1979). A small flock of such highly productive sheep can produce large quantities of meat.

Milk yields of sheep decline rapidly after a few weeks of lactation and this is one of the reasons why total yields are comparatively low. Nevertheless, sheep milk is an important food item in many countries. In Greece, for example, sheep provide around 50 kg of milk per person per year. An average annual yield of 45 kg per ewe under extensive management is common among the indigenous sheep of the Near East. While sheep milk is relatively unknown in Latin America, there are many areas where multi-purpose sheep (meat-milk-wool) can be raised on small farms.

While wool is the major crop of some production systems, this product, as well as pelts, would only provide some supplementary income to small farmers with a few animals. Emphasis should be placed on the production of meat and milk.

Pigs. Pigs are more efficient converters of feed to meat than any other red-meat producing animal. Pigs can thrive on a variety of feeds including

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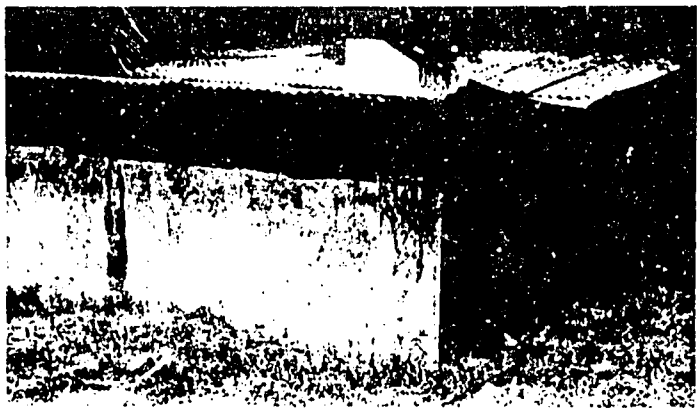


Above. *Small flock of chickens raised on kitchen refuse and scavenging around farmstead in Chile*

Left. *A rainfall harvesting and storage system on a small farm in Jamaica*

In spite of this, small farm poultry production could be greater than it is at present. The production of the many small flocks of poultry that scavenge around the farmstead, contributing little or nothing to the farm's economy or food supply, could be improved with only a few inexpensive managerial inputs. For example, the hens in these flocks are usually old and their production is negligible. Laying hens should not be kept for more than one laying year because egg production decreases 20 to 25 percent in each successive year. A simple improvement in management, consisting of replacing old hens with young ones (which could be hatched on the farm) on a regular basis, would tend to increase egg production as well as provide more birds for consumption or sale. Of course, the programme could be more effective if improved breeds were made available for replacement or for upgrading the local stock. Extension and assistance programmes aimed at improving small flock management could also be of considerable value.

pasture. They have a high reputation for their ability to consume agricultural and industrial by-products, garbage and other such feeds that would otherwise be wasted. It is for this reason that many pigs in Latin America and other regions are already raised under back-yard conditions, and also because their space requirements are minimal.

While pigs do not produce milk for human consumption, they make up for this by their superior ability to produce meat. Females can be bred around eight months of age and two gestations per year are normal. They are prolific and can produce up to 12 piglets per birth, which can reach 30 to 40 kg within three months and 70 kg or more within six months. However, without care, piglet death rates can be high. Dressing percentages for pigs are 65-80 percent compared with 50-60 percent for cattle and 45-55 percent for sheep. There are many improved breeds of pigs and local breed types can be improved through crossbreeding including the use of artificial insemination.

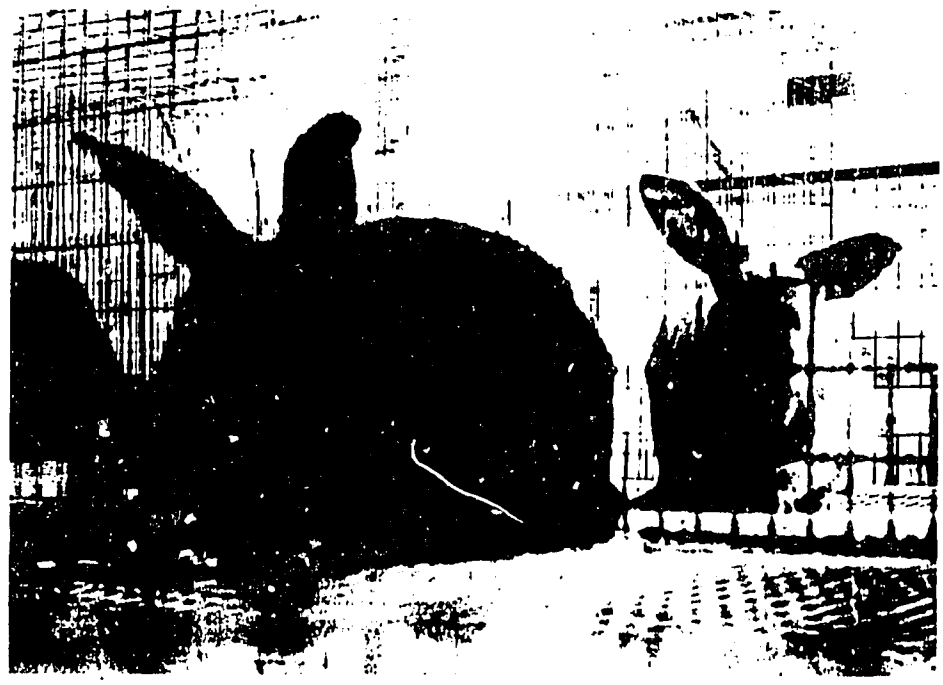
Poultry. The results of research in poultry nutrition and genetics in recent years have created revolutions in poultry production. Economical birds can now be raised intensively at any time of the year in almost any country. Production levels are very high at relatively low costs because the feed required per kilogram of production is small: in the case of broilers, it is around 2:1. Consequently, poultry are contributing significantly to the world's animal protein supply and are likely to contribute even more in the future. However, the technologies required for high and efficient production are very advanced and are best suited for large-scale production; it would not be wise to apply these technologies on small farms.

Rabbits. Throughout the world, many different varieties of rabbits are raised for meat, fur or wool. Rabbits have many characteristics that make them suitable for small farm or back-yard rearing. One of them is their high production potential. A caged doe can produce, depending on the breed, 32 to 43 kg of dressed meat per year. No other animal can be kept in a space of approximately one square metre and produce eight to ten times its own weight in meat in one year. The by-products, such as skins, used in the manufacture of fur garments and other such items, the feet, used in the making of good-luck charms, and the manure, used as fertilizer, are also valuable.

It is possible in practice to feed a small rabbit flock with farm-produced products and by-products: leafy plants, root crops, shrubs and kitchen refuse (except meat and greasy scraps). While some concentrate supplementa-

tion for pregnant and lactating does is normally needed to obtain high levels of production, there are examples of rabbits being successfully raised on high-protein forages alone. It is important that rabbit production on small farm areas in developing countries be undertaken on the basis of locally produced inputs.

Very little space is required for rabbit husbandry and most of the necessary elements required, such as cages, water and feed troughs, hay mangers and nest boxes, can be constructed locally. The skills for successful rabbit production can be readily taught to small farmers or their family members. They are not labour-intensive and in many cases it is largely women or children who take care of them. Rabbit meat is a healthy food and close to 80 percent of the carcass is edible. Consideration of this animal for small farm rearing deserves special attention.



Individually-caged rabbits on a small farm in Jamaica

Quail. Japanese quail husbandry is known in the Latin American Region and there are already large-scale enterprises in some countries such as Brazil and Colombia. The productivity of this small bird is outstanding and it certainly represents a comparatively new protein and energy resource for human consumption. An economic study in Chile has shown that the production of quail eggs, when equated to a common denominator, costs less than the production of chicken eggs (Errázuriz and Díaz, 1971).

The Japanese quail reaches sexual maturity within 40 to 45 days and is ready for consumption as a meat product at a weight of 120 to 160 g at around six weeks of age. An average egg production of 260 to 290 per hen per year can be expected with proper management. Some birds produce two eggs per day and there are examples of hens producing 500 eggs per year. A hen weighing 120 g can produce 3 kg of eggs per year.

It has been stated that the nutritive value of quail eggs is superior to that of chicken eggs. However, a major disadvantage of the quail is its nutritive requirements, especially in protein. This can be appreciated when it is realized that a hen lays almost daily one, and perhaps two, eggs weighing 1/12 to 1/10 of her body weight. It appears that quail production, like chicken production, is primarily suitable for large enterprises that have the capacity to provide adequate nutrition and husbandry. Nevertheless, the possibility of raising quail on small farms deserves consideration.

Others. There are many other kinds of small animals that could be successfully raised on small farms such as turkeys, ducks, geese, guinea pigs, rodents, ants, llamas and alpacas. Turkeys, for instance, rank next to pigs in the efficiency with which they convert their feed into food for humans. Geese are generally raised on pasture and roughages, especially breeding geese, and their forage preferences have made them valuable as weed-control agents for certain crops. Breeding ducks can also be raised on pasture, especially where water is available. With good nutrition, their offspring can reach 2.25 to 2.75 kg at 10 to 12 weeks of age. Duck and geese eggs are relished by some people.

The guinea pig is an important and traditional meat item in Peru and its culture is spreading to other countries. An FAO project in Ecuador has demonstrated that guinea pigs can be raised mainly on forage with a minimum of concentrate supplement. It has been calculated from data provided by the project (Souza, personal communication) that one hectare of alfalfa can feed 132 reproducing guinea pigs per year yielding, at low levels of production per animal, 396 kg of meat (assuming a 50 percent dressing percentage).

There are also examples of other wild rodents that are used for human consumption, such as the vizcacha of Argentina and the Latin American capybara. The capybara, which weighs between 40 and 60 kg, is the largest of all rodents. It is especially adapted to flood plains, but it can also be raised in captivity. González-Jiménez (1977) has demonstrated that the capybara is 3.5 times as efficient in feed conversion as cattle and that capybaras are capable of producing 63 kg of liveweight meat per hectare per year on flood plains, compared with

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14 kg/ha/year for cattle. The possibilities of expanding the production of this rodent deserve further attention.

Some special considerations. Small animals, like all animals, have certain managerial and nutritional requirements that must be met in order for them to achieve maximum production. Simply to introduce them to or provide them to small farmers would not be sufficient. The basic technologies required for their rearing must also be introduced. In most cases, this would probably include the introduction of new crops, especially feed and forage crops, or new cropping systems to the farmer. Some 18 percent of the croplands on small farms in Argentina, Brazil, Chile, Colombia, Ecuador, Guatemala and Peru are each year under fallow (Comité Interamericano de Desarrollo Agrícola, 1971). A programme aimed at replacing fallow with soil-building fodder legumes in rotation with other crops would provide a new feed resource for the successful rearing of small animals. Such crop rotations would also be likely to increase food crop production.

The successful introduction of small animals onto small farms will not be easy and will require considerable effort. However, the problems involved are not insurmountable. An example can be quoted of the Suwannee County Swine Improvement Program, Florida, USA (Whitty, 1970). The small farmers in Suwannee County, who traditionally raised tobacco, were being forced to abandon their land because of depressed tobacco prices and, as a result, the entire economy of the County was failing. The businessmen and agricultural leaders of the County launched a swine improvement programme, which they thought would improve the overall economy as well as that of the farmers.

A five-year programme was initiated beginning with only five farmers who each received five crossbred gilts and one purebred boar; 18 other farmers received one purebred boar only. Those farmers receiving only the boars had to give three market pigs within a year, these being sold to provide funds to sustain the programme. Technical assistance was given to each farmer and the programme was boosted with artificial insemination services.

It has been estimated that an original expenditure of US$100 000 added $1.5 million to the County's economy during the first five years of the programme. It was further estimated that the original animals during their useful lifetime gave a $4.5 million benefit to the farmers. It would be of interest to know how much food they also yielded.

A major constraint to the successful implementation of a programme of small animals for small farm projects may be the reluctance of the individuals involved to consume a product that is not a part of their traditional diet. However, there are experiences that indicate that this problem can be overcome. Ghana has an extensive action campaign for promoting the consumption and rearing of rabbits and it is successful. Milch goat numbers increased rapidly in Europe and Japan during World War II, even though people preferred cow's milk. Rabbit production reached its peak in the United States during the same war and many traditional red-meat eaters found rabbit meat to be a delicious substitute.

It might be possible to develop a programme in some areas in which small farmers could raise small animals on a contract basis with industrial or marketing organizations. Arrangements similar to this is one of the reasons why the poultry industry has grown rapidly in certain countries. The industry in these countries provides chicks, guidance and financial assistance on a contract basis and the individual provides the facilities and his time. In this way, risks are minimized for both parties. The possibility of developing some such arrangements in the case of small farmers in Latin America deserves serious consideration. □

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