Integrated Farming—Would it Work in Papua New Guinea?

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The use of animal faeces for the production of methane gas, algae, fish, fertilizer and irrigation water is practised in several countries of the world. The system works on the principle that waste matter is collected in a tank (the digester) and is broken down by bacteria to simpler substances. At the same time a gas, methane, is given off, which can be used for heating or lighting. The "simpler substances" are used as food for algae (green water weed). The algae then provide food for fish, ducks or pigs. These in turn become food for man.

Considerable attention is being given to the possibility of such a system of management being introduced into villages all over Papua New Guinea. A model unit has been established at Port Moresby and a much larger unit is under construction at Bomana Corrective Institution. The main purpose of these models is for the production of methane gas from animal waste matter, but the system has considerable agricultural implications.

The theory of the integrated system of farming works along the lines that waste matter is washed into a tank in which anaerobic breakdown or digestion takes place. A result of this digestion is the production of methane gas which is stored by means of a floating top on the tank. The waste matter and water are held for 24 hours in the tank and then overflow into an algae pond when the next day's waste material is washed into the tank. The overflow encourages algal growth which is harvested daily and fed wet to animals as high protein food. Water flows from the algae pond to the fish pond which produces fish for the animals and farmer. Ducks are also kept on the fish pond and these support themselves on larvae and algae. The overflow from the fish pond is used to irrigate an area of garden in which food is grown for the farmer and animals. The animals recommended for the system are pigs and poultry.

The idea of a complete farm enterprise in this sense is practised extensively in Taiwan and China. There is no doubt that it works effectively in these countries where there are high populations as well as severe land pressures.

Mr G. Chan, Lecturer in Environmental Health at the University of Papua New Guinea, presented a paper at the Sixth Waigani Seminar entitled "Waste Utilization in Rural Industrialization (with particular reference to the South Pacific)." He has also been instrumental in having two model units built—at Port Moresby and the Bomana Corrective Institution—as well as having a demonstration model working at the 1972 Papuan Agricultural Show. This has naturally created much interest in the system which is causing some concern to the Department of Agriculture, Stock and Fisheries as the system has considerable agricultural implications which the Department is not yet prepared to support.

Methane gas is produced at the experimental unit built at the Council Health Services Centre, Boroko. Algae have also been grown, and fish, ducks and vegetables. This does not necessarily mean that the system is a viable one for Papua New Guinea merely because it has worked on a small scale in Port Moresby. Besides certain technical aspects which could cause a breakdown in the system, there are social implications to be considered.

Presumably the village people of Papua New Guinea would be the people most likely to benefit from such a system as this. It is generally recognized that these people have a traditional dislike of food which has been fertilized with animal or human waste. At the moment DASF is more concerned with the technical aspects. These include:

1. Does the air temperature affect digestion and gas production?
2. Is a good water supply needed for high gas production?

3. What loading of faecal waste-matter gives the optimum level of production?
4. What are the labour requirements to maintain a family unit?
5. What sort of training would a farmer require to operate one of these units?
6. What sort of financial return can the farmer expect from the total enterprise?
7. What stocking rate will give optimum results?
8. What level of production can be expected from the algae and fish ponds? Is this enough to maintain the animals?

Experience of DASF officers in the past has suggested that pigs and fish ponds have not worked well when put together. One problem has been that frequently the supply of faeces was too great for the size of the pond. This was the cause of most of the failures in the Western Highlands District, where quite a few "fish/pig" projects have been tried. It may be that putting the faecal matter through the digester will overcome this problem.

Experience has also shown that pig project owners are reluctant to supply water in sufficient amounts to water their stock, let alone to wash faecal matter in the digester. They are also reluctant to feed their animals properly and in some cases do not maintain adequate gardens.

These and many more important points need to be clarified before DASF can support the adoption of this system.

The Tropical Pig Breeding and Research Centre at Goroka has set up a research programme to investigate these and other aspects of a technical nature in conjunction with Mr Chan. When this work has been completed we will be in a position to see whether the system is suited to coastal and highland conditions, whether it is technically sound and whether it could have a place in the villages of Papua New Guinea.

New Opportunities for Training in Agriculture

1973 will see two big steps forward in agricultural education in Papua New Guinea. The Faculty of Agriculture at the University of Papua New Guinea will commence a 4-year course leading to the degree of Bachelor of Agricultural Science, while DASF will open the Highlands Agricultural Training Institute which will concentrate at first on providing further training for staff already in the department.

The University course in Agriculture will, in general, follow the Science course for the first 2 years, though the study of Economics will be included right from the start. In the third year it will concentrate on specific aspects of agriculture, and in the fourth year the students will move to Lae where there are greater opportunities to see a diversity of agricultural developments. The course in Lae will be conducted at the Institute of Technology which has excellent facilities for instruction in agricultural engineering.

At the Highlands Agricultural Training Institute the students will, for the most part, be Rural Development Assistants and Project Managers. Some of these officers have had considerable experience in the field but they have missed the opportunity for advanced agricultural training. To make up for this lack, the course will broaden their general education and give them specific training in farm management, extension methods and rural credit facilities. Probably the most frequent help asked of DASF field staff is by farmers wishing to apply for a loan from the Development Bank. All extension staff should be able to assist in this matter. The course is primarily designed for DASF staff but applications will be considered from those who have had similar experience in private enterprise.

Vudal Agricultural College and Popondetta Agricultural Training Institute will continue to operate their current programmes. Entry to these institutions is not limited to those already connected with DASF, nor does it involve any kind of bond to the Department.