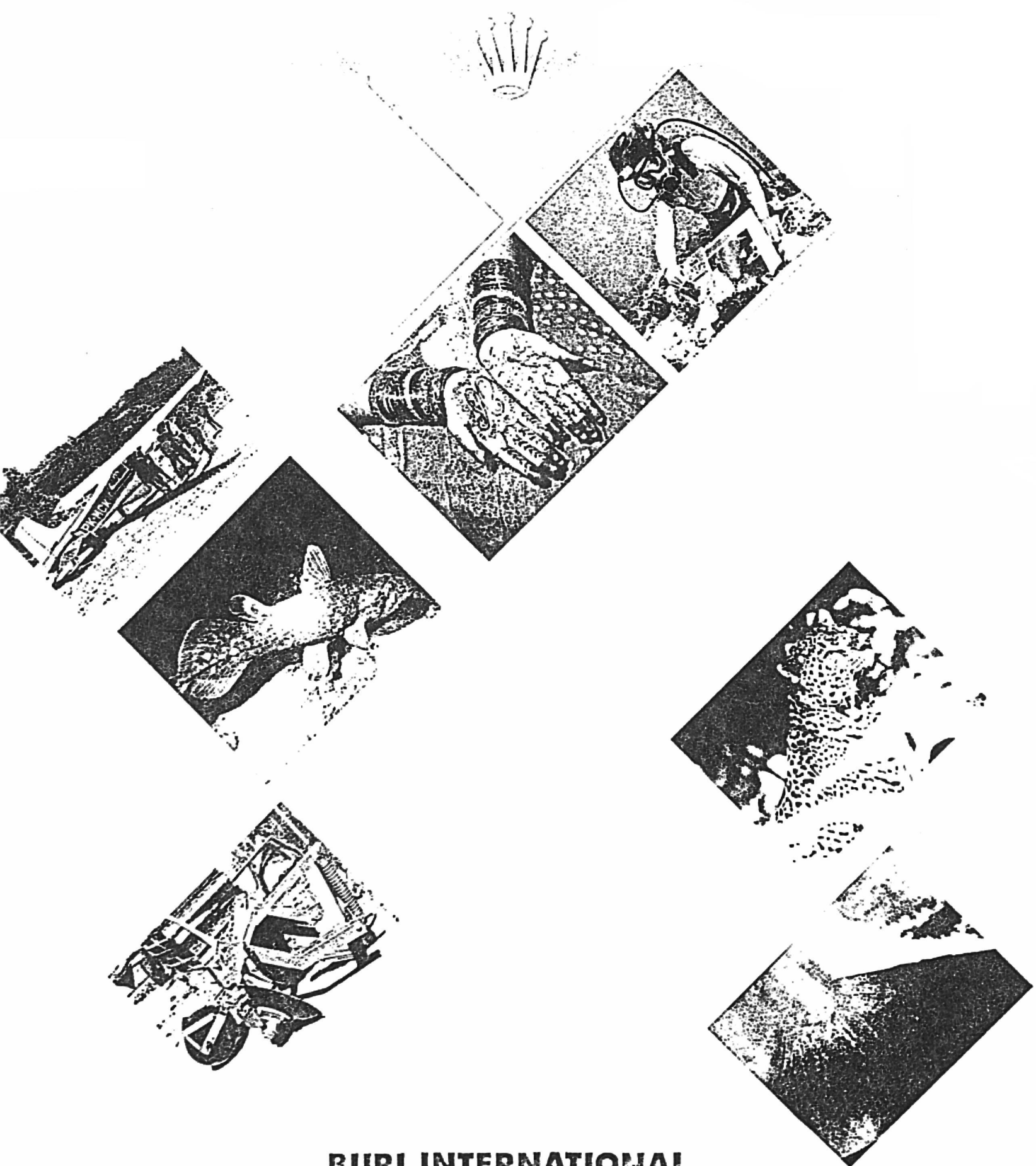


# SPIRIT OF ENTERPRISE

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## THE 1990 ROLEX AWARDS

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**BURI INTERNATIONAL**



# **SPIRIT OF ENTERPRISE**

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**The Rolex Awards for Enterprise were conceived in 1976 to provide help and encouragement in breaking new ground in the fields of Applied Sciences and Invention, Exploration and Discovery, and The Environment.**

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**This book describes the projects of the five Laureates, the thirty five Honourable Mentions and a further 227 individuals selected from the many hundreds of entries submitted for the 1990 Awards.**

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# Spirit of Enterprise

## The 1990 Rolex Awards

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# Technology for village manufacture of a nutritionally improved cookie

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It has been shown that, in the Central American area as well as in other parts of the world, substantial numbers of the population are suffering from protein-calorie malnutrition, as well as iron and vitamin-A deficiencies. Moreover, problems such as these are more evident in the rural than in the urban population groups. It has also been found that a high correlation exists between poverty and the degree of malnutrition. It would seem that the most pressing and most difficult to overcome of the various macro-nutrient problems is the caloric deficiency in the diet.

## **The need for nutritional supplements**

On the other hand, from the agricultural point of view, it has been found that it is possible to produce nutritionally desirable commodities (such as for example soybeans) even in the more nutritionally vulnerable rural communities of Central America. Nevertheless, soybeans do not form part of the dietetic habits of the population groups in question and, consequently, their cultivation is not a common practice. It was therefore decided that it would be of interest to attempt to develop an appropriate village-type of technology to introduce the use of these grains (e.g. soybean, velvet bean, and the like) – which are desirable from a nutritional point of view – into highly acceptable, stable and safe food products, suitable for feeding to infants (of six months of age and older), and to pre-school and school children. In addition, under ideal conditions, the food product(s) chosen for nutritional improvement with the grains mentioned above, would also represent a good vehicle for incorporating calories into the diet in a high caloric density form.



*Preparation of the nutritionally improved dough for the cookie manufactured by rural bakers.*

### **Development of an appropriate technology**

Based on previous knowledge of the protein complementation between cereals and legumes and on the acceptability of a high-calorie cookie-type product, it was decided to explore the possibility of developing a cookie based on a vegetable (cereal and legume) mixture. This alternative was supported by the fact that Central American rural populations consume preferentially a local, typical cookie-like "sweet"-type of bread and by previous experience that had been obtained on the degree of gelatinization needed in maize either for the manufacture of a typical "tortilla" or for pasta products production. Several limitations on the acceptability of nutritionally improved typical "tortillas" have been reported, and this is the reason why this alternative was dropped when intended for a village level. Also, most rural populations have an oven, and the technology for the wood-heated oven is widely known and practised.

After several trials, an adequate process was developed, tested and adopted. The process proved to be valid for use of either common maize, opaque-2 maize or sweet sorghum as cereals, and either soybeans, velvet beans, chick-peas or cow-peas as legumes. The use of soybeans was encouraged in view of the high caloric density of this legume. The chemical/nutritional characterization of the cookie product revealed the expected improvement in protein content and quality as well as in caloric density. The cost analysis demonstrated that the cookie would be a relatively low-cost product that could be produced in the rural area; it also proved to be highly acceptable to pre-school and school children as well as highly stable when stoved (up to six months at room temperature).



## Implementation of the technology

In the second semester of 1986 and the first six months of 1987, training courses on the preparation of the nutritionally improved cookie were given in various rural villages of Guatemala and met with considerable interest and success. Since the colour of the product proved to be critical in ensuring the high available-lysine content and the high protein quality that were to be expected of the finished product, a colour scale was developed so that the baker could easily and effectively maintain an accurate level of quality control.

The Guatemalan Ministry of Education has since displayed enthusiasm about the product, and has decided to incorporate the cookie into the school snack programme. Two contracts were subsequently drawn up between the Guatemalan Government and the local rural bakers. At present, a 28 g cookie is offered each day to 1,200,000 Guatemalan school children. This is improving local soy-bean production and income, accelerating the movement of money at a rural level and, hopefully, enhancing the nutrition of the rural school children through a high caloric density food of an improved protein quality. Honduras and Costa Rica are now interested in adopting a similar programme which, in addition, also extends imported wheat flour with locally produced grains which are then given an added value.



*Shaping the cookie on the trays provided by rural bakers.*