Optimization of cricket breeding production system for human food in Ratanakiri province (Cambodia)

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Introduction

Despite many natural resources, Cambodia is considered as a relatively poor country with a Gross National Income per capita averaging about 880 USD in 2012. Annâdya project in the Ratanakiri province (Cambodia) aims to improve the food security and nutrition of smallholder households by introducing and facilitating the adoption of productive and environmentally sustainable agricultural technologies. The main purpose of this work was to optimize a cheap breeding production system of crickets, *Teleogryllus testaceus* (Walker), for local farmers to contribute to the reduction of protein deficiency and to create new source of incomes.

Material and Method

The experimental insect breeding setup (Fig. 1) were build from 60-liter plastic containers with a top diameter of 41.5 cm, a bottom diameter of 35 cm and a height of 48 cm. Two openings were realized: the first, on the container lid, measuring 30 cm in diameter and a second one, at 10 cm of the container bottom, measuring 10 x 20 cm. Two millimeters wire mesh nets were added on the openings to keep insect inside the container and, consequently, predators outside. Breeding containers were placed on a 39 cm diameter plate, full of water (changed twice a week) to keep ants or other walking predators off. Cardboard egg cartons (29 x 29 cm) were horizontally placed inside the containers to increase insect living area and give them shelters. 30 crickets were placed in each container with one of the eight tested diets (Table 1) and were counted and weighted every weak from 20/03/13 to 17/04/13.

Fig. 1 Experimental insect breeding setup.

Diet	Composition	Diet	Composition
1	Taro aerial part flour	5	Young cassava leaves flour + brown rice flour (20% of the wet weight)
2	Young cassava leaves flour	6	Young cashew leaves flour + brown rice flour (20% of the wet weight)
3	Young cashew leaves flour	7	Young cassava leaves flour + brown rice flour (20% of the wet weight) + banana slices
4	Taro aerial part flour + brown rice flour (20% of the wet weight)	8	Control (native broiler finisher (1324)

Table 1 Composition of the eight tested diets

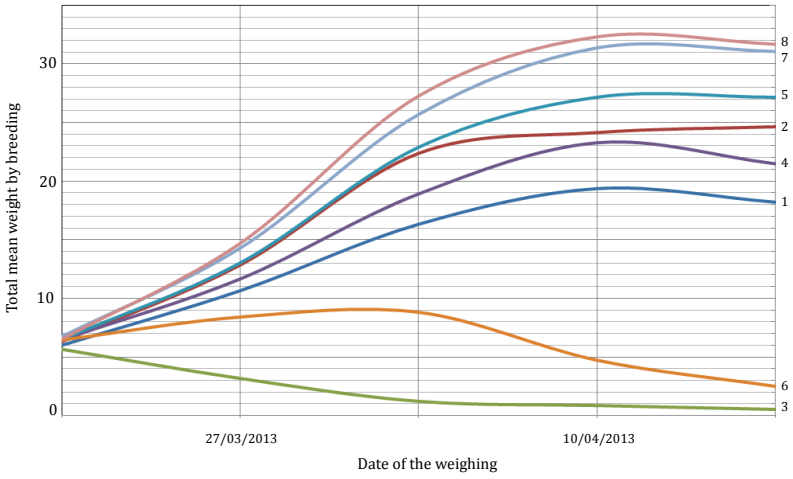

Fig. 2 Cricket total weight evolution based on eight different diets

Results and Discussion

The control diet and the diet 5 and 7 are the better diets for the cricket development but are actually expensive (Fig. 3). The nutritional analyzes of the seven diets shows that the ideal diet should contain 19% protein, 5-6% fat, and a percentage of carbohydrates as high as possible. While the cricket mass body gain seems to be proportional to the carbohydrate content of the diet, the use of older cassava leaves, more rich in carbohydrates than the younger ones, is an interesting solution to substitute relatively expensive brown rice and banana slices also consumed by local population. In the future, consideration should be given to the adjustment of cassava leave maturity in function of the cricket growth stage as it is already done with chicken feed in Thai cricket farms.