Growth performance of indigenous pigs fed with

*Stylosanthes guianensis CIAT 184* as replacement for rice bran

Chanphone Keoboualapheth and Choke Mikled *

*Livestock Research Centre, National Agriculture and Forestry Research Institute,*
*Ministry of Agriculture and Forestry, Lao PDR*
*
'Department of Animal Science, Faculty of Agriculture, Chiang Mai University,*
*Chiang Mai, Thailand*

**Abstract**

An experiment was carried out with two objectives: (a) to determine the optimum amount of *Stylo 184* as replacement for rice bran in diets for Laosian indigenous pigs; (b) to study the effects of *Stylo 184* on intake and growth performance of indigenous pigs. Sixteen indigenous pigs of 12±1.63 kg and 3 months of age from the upland area were used in the experiment. The experimental design was a completely randomized design (CRD) with 4 replications. The dietary treatments were: S0: 50% maize + 50% rice bran + 0% Stylo 184; S10: 50% maize + 40% rice bran + 10% *Stylo 184* fed separately; S20: 50% maize + 30% rice bran + 20% *Stylo 184* fed separately; S30: 50% maize + 20% rice bran + 30% *Stylo 184* fed separately.
Total DM intakes were 942, 1224, 1221 and 1309 g/day for S0, S10, S20 and S30, respectively, while DM intakes of *Stylo 184* were 49.2 g (4.1% of diet DM), 76.5 g (6.3% of diet DM) and 82.7 g (6.4% of diet DM) for S10, S20 and S30, respectively. The average daily live weight gains were 154, 221, 245 and 320 g for S10, S20 and S30, respectively. DM conversion rates were: 6.25, 5.50, 5.00 and 4.00.

It is concluded that Laotian indigenous pigs over the live weight range of 10 to 40 kg can consume *Stylo 184* foliage at up to 6.4% of the diet DM without any negative effects on health and with superior growth performance and a higher profit for the farmers.

*Key words:* Growth, indigenous pig, *Stylosanthes guianensis CIAT 184*

**Introduction**

Pig raising plays an important role in Laos in small-holder farming systems as a protein source, as a means of family capital accumulation, and for use in traditional ceremonies, especially for minority ethnic groups living in mountainous areas. Pigs are normally raised in a free-range system supplemented by rice bran, other household waste products and some wild tubers (Hansen 1997). In general, pig diets are made up of rice bran, coarsely ground maize and weeds that are available in fallow land. These diets are low in crude protein resulting in poor pig performance. Furthermore, the availability of rice bran fluctuates during the year and amounts depend also on rice production, which is often low in shifting cultivation farming systems. This results in slow growth and low performance and productivity of the pigs. The other problems that farmers encounter are the shortage of rice bran in the middle of the year (June to September).
To overcome these problems, many non-government organizations have introduced a wide range of technologies to farmers. Recently, the Forage and Livestock Systems Project (FLSP) has introduced some forages in Laos, including *Stylosanthes guianensis cv CIAT 184* (common name *Stylo 184*). Phonepaseuth Phengsavanh (1997) reported that *Stylo 184* grows well and is well-adapted to a wide range of environmental conditions. It was initially widely used mainly for ruminants. However, *Stylo 184* is now more commonly fed to the pigs rather than ruminants. Legumes can provide extra protein, as they have much higher levels of protein in their leaves than grasses. Legume leaves also provide essential minerals and vitamins for animal growth (Horne and Stür 2000). In some areas where there is a shortage of rice bran and it is expensive, *Stylo 184* can be another alternative protein resource for feeding pigs, especially during the rainy season.

The objective of this experiment was to investigate the effects of *Stylosanthes guianensis cv* CIAT 184 as replacement for rice bran on growth performance of indigenous pigs.

**Material and methods**

**Location and climate of study area**

The experiment was conducted at the Livestock Research Center, National Agriculture and Forestry Research Institute, Ministry of Agriculture and Forestry, Lao PDR from August through November 2002. The Center is located at an altitude of 175 m above sea level, 44 km north of Vientiane. The climate of this area is tropical monsoon with an average rainfall of 1600 mm per year. At the time of the experiment it was the wet season from May to October. The
mean daily maximum and minimum temperature is 32°C in April and about 15°C in December (MAF 2002).

Experimental design and treatments

The experiment was a completely randomized design (CRD) with 4 replications. The dietary treatments (DM basis) were:

- S0: 50% maize + 50% rice bran
- S10: 50% maize + 40% rice bran + 10% Stylo 184
- S20: 50% maize + 30% rice bran + 20% Stylo 184
- S30: 50% maize + 20% rice bran + 30% Stylo 184

Experimental animals

The pigs were selected and bought from Hmong villages in the northern upland area of Meuang Feuang district, which is 300 km from Vientiane. Sixteen indigenous pigs (8 females and 8 castrated males) with live weights of 11.0-13.4 kg of around 3 months of age were used. The pigs were vaccinated against swine fever and were treated with Ivomectin against external and internal parasites. At the beginning of the experiment, the pigs were weighed and randomly allocated into the four dietary treatments, distributed and housed individually in 1.5 x 1.8m pens following the experimental design. All the pigs were adapted to the conditions of the experiment for 15 days, especially to the experimental feeds and fresh chopped Stylo 184.

Experimental diets

The basal diets for the experimental pigs were based on locally available feed stuffs, including rice bran, ground maize, bone meal and salt (Table 1). Stylo 184 replaced rice bran in the basal diets. The rice bran, ground maize, bone meal and salt were mixed
together, according to the formulation for each experimental treatment and the control feed (Treatment S0). Each morning fresh *Stylo 184* at the age of 45 to 70 days was cut and carried daily from fields near the pig house, and chopped into 4-5 cm lengths before being offered in separate troughs to the pigs.

### Table 1. Analyzed chemical composition of feed stuffs

<table>
<thead>
<tr>
<th></th>
<th>Maize</th>
<th>Rice bran</th>
<th>Stylo 184</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM</td>
<td>88.2</td>
<td>90.4</td>
<td>22.3</td>
</tr>
<tr>
<td>As % of DM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP</td>
<td>10.7</td>
<td>10.2</td>
<td>19.3</td>
</tr>
<tr>
<td>CF</td>
<td>2.6</td>
<td>27.9</td>
<td>30.0</td>
</tr>
<tr>
<td>Ash</td>
<td>0.2</td>
<td>10.8</td>
<td>5.1</td>
</tr>
<tr>
<td>Ca</td>
<td>0.2</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>P</td>
<td>0.5</td>
<td>0.7</td>
<td>0.4</td>
</tr>
</tbody>
</table>

DM : dry matter, CP : crude protein, CF : crude fibre, Ca : calcium, P : phosphorus

### Animal management

The pigs were fed twice daily *ad libitum* in two equal meals, in the morning at 07:00 h, and in the evening at 17:00 h. Clean water was supplied *ad libitum* at all times throughout the experiment. On each occasion before feeding, the offered feeds were recorded and weighed by using a 5 kg capacity portable weighing scale. The basal feed and fresh chopped *Stylo 184* were given separately to the pigs at the same time. The daily allowances were based on the
nutritive requirements of the pigs according to live weight. The feeding trial lasted 91 days.

Data collection

The weight of the experimental pigs was recorded at the beginning of the experiment and every two weeks, before feeding the pigs in the morning. The feed offered and refused, and refusals of *Stylo 184* were weighed and recorded daily.

Sample analysis

Samples of fresh *Stylo 184* were collected daily and were placed in a refrigerator immediately and then were pooled and sent for analysis of DM at the end of the week. Every two weeks the dried sub-samples of *Stylo 184* were pooled and mixed together. In total 6 samples of *Stylo 184*, 2 samples of maize and 5 samples of rice bran were collected and analyzed for DM, CP, CF, ash, Ca and P, by standard methods (AOAC 1988).

Statistical analysis

The data were subjected to the analyses of variance (ANOVA) procedure for a completely randomized design experiment using the general linear models (GLM) in MINITAB 12.21 program (1998). Treatment means were compared using Duncan's New Multiple Range Test.

Results and Discussion

Replacing rice bran with *Stylo 184* led to significant increases in DM intake and live weight gain and improvements in feed conversion
(Table 2). The pigs were not able to consume all the Stylo that was offered, especially at the higher levels, thus the actual intakes as percentage of total diet DM were: 10.5, 10.9, 11.1 and 11.2%, compared with intended levels of 10, 20 and 30% for treatments S10, S20 and S30, respectively.

**Table 2.** Mean values for feed intake, live weight gain and feed conversion of Laosian indigenous pigs fed *Stylo 184* foliage as supplement to maize and rice bran

<table>
<thead>
<tr>
<th>Dietary treatment</th>
<th>S0</th>
<th>S10</th>
<th>S20</th>
<th>S30</th>
<th>SEM</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed intake, g/day Maize</td>
<td>471</td>
<td>653 a</td>
<td>715 a</td>
<td>876 b</td>
<td>58.6</td>
<td></td>
</tr>
<tr>
<td>Rice bran</td>
<td>471</td>
<td>522 a</td>
<td>429 b</td>
<td>350 c</td>
<td>35.1</td>
<td></td>
</tr>
<tr>
<td>Stylo</td>
<td>0</td>
<td>49.2 a</td>
<td>76.5 b</td>
<td>82.7 b</td>
<td>6.3</td>
<td></td>
</tr>
<tr>
<td>Total DM</td>
<td>942 a</td>
<td>1224 b</td>
<td>1221 b</td>
<td>1309 b</td>
<td>22.7</td>
<td>0.001</td>
</tr>
<tr>
<td>Total crude protein</td>
<td>99 a</td>
<td>133 b</td>
<td>135 b</td>
<td>146 c</td>
<td>2.44</td>
<td>0.001</td>
</tr>
<tr>
<td>Live weight, kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>11.9</td>
<td>11.8</td>
<td>12.6</td>
<td>12.6</td>
<td>0.331</td>
<td>0.244</td>
</tr>
<tr>
<td>Final</td>
<td>25.9 a</td>
<td>31.9 b</td>
<td>34.9 c</td>
<td>41.7 d</td>
<td>0.525</td>
<td>0.001</td>
</tr>
<tr>
<td>Daily gain, g</td>
<td>139 a</td>
<td>233 b</td>
<td>275 b</td>
<td>340 c</td>
<td>9.48</td>
<td>0.001</td>
</tr>
<tr>
<td>DM conversion</td>
<td>6.25 a</td>
<td>5.50 b</td>
<td>5.00 b</td>
<td>4.00 c</td>
<td>0.171</td>
<td>0.001</td>
</tr>
</tbody>
</table>

*abcd Means in rows without common superscript are different at P<0.05*
The low DM intake on the control (S0) treatment probably reflected the high crude fibre content of the local rice bran (27.9%) which is almost three times the level of 8.5% reported for rice bran in Vietnam (Anon 1995). The *Stylo 184* intake was lower than was expected also perhaps because of the high fibre content (30% in DM). Nevertheless, there were obvious benefits from feeding the Stylo foliage as the rate of live weight gain was almost three times greater on the S30 diet compared with the control, and feed conversion improved from 6:1 to 4:1, presumably due to the improvement in the protein status attributable to the higher concentration and better quality of the protein in the Stylo foliage. For farmers able to grow the Stylo there would be obvious economic advantages from using it to replace rice bran in pig diets.

Conclusions
• Growing and processing (chopping) Stylo 184 foliage is a simple technique, and the product is cheap and suited to the conditions of small-holder farmers in the upland areas of Laos.
• Feed intake of a maize / rice bran diet was increased and rate of live weight gain almost tripled with increasing levels of Stylo 184 foliage in the diet.
• Laosian indigenous pigs over the live weight range of 10 to 40 kg can consume Stylo 184 foliage at up to 6.4% of the diet DM without any negative effects on health and with superior growth performance and a higher profit for the farmers.

References

Anon 1995 Composition and nutritive value of Animal feeds in Vietnam. Agricultural publishing house, Hanoi
Hansen K P 1997  Shifting Cultivation Development in Northern Laos. Upland Farming Systems In The Lao PDR-Problems and Opportunities for Livestock. ACIAR Proceedings No. 87 page 39
Horne M P and Stür W W 2000  Developing forage technologies with smallholder farmers. How to select the best varieties to offer farmers in Southeast Asia. (Published by ACIAR and CIAT). ACIAR Monograph No 62.
MAF 2002 Agricultural Census in Lao PDR
Phonepaseuth Phengsavanh 1997 Environmental adaptation of forages in Lao PDR. Livestock Development Division, DLF, MAF, Lao PDR.

Received 15 May 2003: Accepted 14 August 2003