NUTRITIONAL VALUE OF LEUCAENA (LEUCOCEPHALA) LEAF MEAL FOR THE GROWING RAT.

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Leucaena Leucocephala is a native legume of the Yucatán Península. This forage, because of its high protein level, could be used as a dietary protein source for farm animals. The use for monogastrics is limited by the crude fiber level (around 20% of the dry matter) and the content of the toxic amino acid mimosine. The toxicity produces a decrease in the growth rate and a nervous syndrome. It could be prevented by the addition of ferrous sulphate which is linked with the mimosine and it becomes an indigestible quelate (El Harit, Schart and Termeulen, 1979).

Working with growing pigs, Malynicz (1974) used as much as 40% Leucaena Leaf Meal (LLM) in the diet with good results. Rivas et al (1978) could only reach 20% in the diet using ferrous sulphate as a bending product. These reports may differ probably because of a variable content of mimosine in the LLM. The analysis was not reported by the atthors.

The objective of the experiments reported here was to study the chemical composition and nutritional value of the LLM grown in the Yucatán Península, for the growing rat.

Leucaena was harvested in the Eastern part of the State of Yucatán, México. The leaf and short stems were dried and ground to a particle size of 1 mm with a willey mill.

The chemical composition of the LLM was (dry matter basis): 20.2% crude fiber, 31.4% crude protein (CP) (32.1% of the CP was estimated in the neutral detergent fiber and 87% of the CP was true protein) and 0.26% mimosin. The aminogram showed that methionine (0.338%), glutamic acid (2.31%), valine (0.854%), histidine (0.473%) and lysine (1.182%) were the first five limiting aminoacids for the growing rat.

Four experiments with rats were conducted with wistar rats.

Experiments 1.: 40 rats were assigned, on a randomized block design according to the body weight, to 5 diets. Control diet consisted of: 12.3% casein, 64.4% wheat flour, 10% sugar, 5.1% alpha cellulose, 4.1% corn oil, 1.7% KH_2PO_4, 1.2% $CaCO_3$, 0.7% minerals and 0.5% vitamins. In the other four diets casein and wheat flour were partially replaced by LLM (7.1, 14.3, 21.6 and 28.8% which represented a percentage of 11.7, 23.5, 35.7 and 48.0% of the CP of the diet) The experiment lasted for 3 weeks. The increasing levels of LLM with diet decreased the final body weight of the animals. There wasn't any statistical difference ($P > 0.05$) between the control diet and the diets with 7.1 and 14.3% of LLM there was an increasing hair loos when LLM was increased in the diet. The brains of two animals per treatment were submitted to histopatological analysis. It didn't reveal any kind of disorder. The digestibility of the CP was estimated, using the regression method (Rodríguez, 1980), at 73.4%.

Experiment 2.: 28 rats were distributed in a completely randomized desing to 4 treatments to determine the influence of the suplementation with methionine or lysine to a control diet of LLM. The control diet consisted of: 37.3% LLM, 46.3% corn starch, 2.9% corn oil, 10.0% sugar, 2.47% H_3PO_4, 0.6 minerals and 0.4% vitamins. Each one of the other diets was supplemented with 0.35% D-L methionine, 0.44% L-lysine and 0.35% methionine + 0.44% lysine. All diets provided 10% CP. The supplementation with methionine increased the final body weight ($P < 0.05$) in relation to the control diet. There was no effect found with the use of lysine.

Experiment 3.: 35 rats were assigned, in a randomized block design, according to body weight, to 5 diets. The diets had different supplementary methionine levels 0.15%, 0.25%, 0.35%, 0.45% and 0.55%. No effect of the level of supplementation on the final body weight was found ($P > 0.05$).

Experiment 4.: Net protein utilization of the LLM was carried out using the modified of the method suggested by Sotelo and Lucas (1978). 30 rats were assigned to 3 diets: control free of protein, control + casein and control + LLM. The net protein utilization of casein was 63.2 and of LLM 40.5.

Conclusions:

A limiting factor in the utilization of LLM in the diet of the growing rat is the low protein availability. It can be used providing 11.7% of CP. in the diet with no detrimental effects. The growth rate can be increased with the inclusion of D-L methionine as 0.15% of the diet.

Selected references: El Harit, E.A., Schart Y and Termeulen, U., Prod. Anim. Trop. 1979, (4) : 163; Malynicz, G. Papua New - Guinea Agric. J. 1974, (25) : 12; Rivas, E.T., Argañosa, V.G., López, P.L. and oliveros, B.A.: The Phillippine Agriculturist. 1978; Sotelo Angela and Lucas, B.J. Nutr. 1978 (108) : 61.

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