

Consideration on animal nutrition in West Africa

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Abstract

In West African countries, the animal diet is poor because of the high price of major dietary ingredients such as corn and soya. However, these countries present a great biodiversity. The use of local plants not employed in human nutrition, available, free or very cheap in animal diets is a way to lower the price of the diet and to limit importations. We have used several plants first to give healthy meat and eggs (enriched by omega 3 fatty acids) with *Euphorbia heterophylla* supplemented diets in several poultry species, rabbit and guinea pig. Another experiment has shown that Heveabrsiliensis seeds meal can be used in pig and guinea fowl diets to replace soya without negative effect on performance. More research must be carried out to find plants as Heveabrsiliensis which can replace at least partly soyabean meal in animal diets to assure sustainability of small farms.

Food security and the fight against poverty have become major concerns for most African countries [1]. There is a crucial need of animal protein in developing countries which population is growing very fast. In Ivory Coast, farmers produce poultry and pigs from pure breeds imported from France but farmers have not enough money to feed the animals according to their physiological needs and genetic potentials. Consequently the agriculture stagnates; for example Ivorian farmers get a pig of 70 kg in 13 months when French farmers using the same breed sell their pigs at 5.5 months for a live weight of 110kg (personal communication). The climate is not well adapted to animal production and on top of that the feed quality used by Ivorian farmers is very poor in Ivory Coast and in particular the soya price is much too high to be included in the animal diets; solutions exist such as the use of local plants not employed in human nutrition, available, free or at a very low price to partially replace soya bean meal or local plants that can enrich animal products (meat, egg) in healthy substances as omega 3 fatty acids.

The first plant that we have used is *Euphorbia heterophylla*, a weed that occurs in Africa and Asia. It is considered as a toxic plant for humans. In West Africa (Ivory Coast, Ghana, southern to go, southern Nigeria), it is a serious problem because it can grow among many cultivations. In the Ivory Coast, it is found in 70% of cotton fields [2]. The duration of *Euphorbia heterophylla* life is about 45 to 50 days and consequently it can have many reproductive cycles per year. The nutritional value of *Euphorbia heterophylla* was determined in 1985 by the Laboratory Central of Nutrition and Food in Abidjan (Ivory Coast) and Bindelle et al., [3] showed that it has a good crude protein content (16% to 27% of DM), a high fat content (7.7% of DM) and a low fiber content (22% of DM). In our laboratory we found that *Euphorbia heterophylla* has a very high content of omega 3 fatty acids. We used *Euphorbia heterophylla* supplemented diets in guinea pig [4], rabbit [5], laying hens [6], and quail [7]. We demonstrated that *Euphorbia heterophylla* supplemented led to enrichment in omega 3 fatty acids of the meat and the eggs with a concomitant decrease of the cholesterol proportion in the meat but also in the eggs of laying hens and guinea fowls. So, this plant can allow the producers to ask for a higher price for

their products (meat or eggs) enriched by omega 3 fatty acids, which have a positive impact on consumer health.

Our second aim was to decrease the soya proportion in the feed by replacement total or partial of soya bean meal by local products. An experiment was conducted with guinea fowl, which is a bird originating from Africa. Guinea fowl production is increasing in developing countries which have shown increasing demand for this particular meat [8]. We used diets supplemented by detoxified hevea (*Heveabrsiliensis*) seed meal (very abundant in the Ivory Coast for free or at a very low price), or cashew nut (*Anacardium occidentale*) meal available at a very low price. The detoxified hevea seed meal is already considered potential diet ingredients in pigs [9,10], cockerels [11] or laying hens. The cashew nut meal has also been already used in pig and in pullet diets [12,13]. These two meals have never been used in guinea fowl diet. We demonstrated that guinea fowl exhibited good performance with both supplemented diets, despite the high temperatures. Hevea seed meal, with fairly high contents of essential amino acids and n-3 polyunsaturated fatty acids appeared to be able to replace the soybean meal and to enrich the meats of guinea fowl with omega 3 fatty acids, thereby improving significantly their nutritional value. Detoxified hevea (*Heveabrsiliensis*) seed meal was also used in diets of breeding guinea fowls and has been shown to improve the egg production, as well as egg nutritional quality by omega 3 fatty acids enrichment.

We also tested three plants in the pig. We gave supplemented diets to pregnant gilts. The diets were either not supplemented (control), or supplemented at 7.5 or 15% by cashew nut meal (*Anacardium occidentale*), detoxified hevea seed meal (*Heveabrsiliensis*) and detoxified jatropha meal (*Jatropha curcas*). No significant difference was observed on the average litter size. The daily average gain of weaned piglets forms fed a diet supplemented by hevea seed meal whatever the proportion was the highest. We can conclude that it is possible to supplement diets of gilts with 15% of hevea seed meal; however, jatropha meal gave poor performance and the gilts fed the jatropha supplemented diet were sick and suffered from diarrhea, probably due to toxicity of jatropha despite the process of detoxification that we used.

The Ivory Coast presents a great diversity of plants. Several surveys in Ivorian National Parks showed a great biodiversity even if agricultural activity and armed conflicts threaten this biodiversity [14,15]. However, only a small part of these plants and fruit are used for human or animal nutrition. More research must be carried out to find plants as *Hevea brasiliensis* which can replace at least partly soyabean meal in animal diets to assure cheaper feed and independency from the importations of soja.

References

1. Yolou, M., I. Anizehou, R. Dossou-Yovo, A. Akoegninnou, J. D. Zongo, J. Zoundjhekpou 2015 Etat des Lieux de la Reproduction Sexuée des Igbames Africaines *Dioscoreacayensis-Dioscorearotundata* Cultivées au Bénin. *International Journal of Biological and Chemical Sciences* 9:737-750.
2. Ipou, I. J., P. Marmotte, G. A. Kadio, S. Ake, and Y. Toure 2004 Influence de quelques facteurs environnementaux sur la germination d'*Euphorbiaheterophylla* L. (Euphorbiaceae). *Tropicultura* 22: 176-179.
3. Bindelle, J., Y. Ilunga, M. Delacollette, M. MulandKayij, J. Umba di M'Balu, E. Eindele, et al 2007 Voluntary intake, chemical composition and in vitro digestibility of fresh forages fed to Guinea pigs in periurban rearing systems of Kinshasa (Democratic Republic of Congo). *Tropical Animal Health and Production* 39: 419-426.
4. Kouakou, N. D. V., J.-F. Grongnet, N. E. Assidjo, E. Thys, P.-G. Marnet, D. Catheline, P. Legrand, and M. Kouba. 2013 Effect of a supplementation of *Euphorbia heterophylla* on nutritional meat quality of Guinea pig (*Cavia Porcellus* L.). *Meat science* 93: 821-826.
5. Kouakou, N. D. V., S. B. M. Coulibaly, C. E. M. Angbo, E. Thys, N. E. Assidjo, and Kouba M., 2016a Réduction des coûts alimentaires des lapins (*Oryctolagus cuniculus* L.) par la distribution de l'herbe de lait (*Euphorbiaheterophylla* (L.) associée à l'herbe de Guinée (*Panicum maximum* Jacq.) en élevage semi-intensif. *Journal of Applied Biosciences* 99: 9373- 9381.
6. Kouakou, N. D. V., G. C. M. Traoré, C. E. M. Angbo, J.-F. Grongnet, and M. Kouba. 2016b Effect of feeding *Euphorbiaheterophylla* seeds on egg production, egg quality, lipid composition and sensory evaluation of eggs. *Journal of Animal and Plant Sciences* 31; 2: 5000-5009.
7. Kouakou, N. D. V., F. K. Kouadio, C. E. M. Angbo-Kouakou, G. A. Kone, G. F. Kouassi, E. A. Kouakou, and M. Kouba. 2017 Enrichissement en acides gras polyinsaturés oméga 3 du jaune d'œuf de cailles (*Coturnixcoturnixjaponica*) par les graines d'*Euphorbiaheterophylla*. *Revue d'élevage et de médecine vétérinaire des pays tropicaux du CIRAD* 70; 3: 99-103.
8. Madzimure, J., H. Saina, and G. P. K. Ngorora. 2011. Market Potential for Guinea Fowl (*Numidia meleagris*) Products. *Tropical Animal Health and Production* 43:1509-1515. Ocho, L. A., O. Atcho, B. Kouakou, and J. Keli. 2008 La Graine d'Hévéa Appauvrie en Acide Cyanhydrique par la Méthode de Triple Séchage Offre un Tourteau Propre à la Consommation de la Poule Pondeuse. *Revue Africaine de Santé et de Productions Animales* 6: 195-198.
9. Madubuiké, F. N., B. U. Ekenyem, and T. K. O. Obih. 2006 Performance and Cost Evaluation of Substituting Rubber Seed Cake for Groundnut Cake in Diets of Growing Pigs. *Pakistan Journal of Nutrition* 5: 59-61.
10. Koné, G. A., N. D. V. Kouakou, C. E. M. Angbo-Kouakou, K. B. Kouamé, F. P. Yeboué, and M. Kouba; 2016. Etude préliminaire de la valorisation des tourteaux d'hévéa, d'anacarde et de pourghère chez les porcs durant la gestation et la lactation. *European Scientific Journal* 12; 30: 11-22.
11. Ravindran, V., A. S. B. Rajaguru, and C. De Silva 1987 Evaluation of Rubber (*Heveabrasiliensis* Muell-Arg.) Seed Meal in White Leghorn Cockerel Diets. *The Journal of Agricultural Science* 108: 505-508.
12. Yao, K. S. A., M. Kimsé, D. Soro, and A. Fantodji. 2013 Effet de l'Incorporation de la Noix de Cajou dans les Rations Alimentaires sur les Performances de Croissance des Porcs: Phases Post-Sevrage et de Croissance. *International Journal of Biological and Chemical Sciences* 7: 479-488.
13. Odunsi, A. A. 2002 Effect of Feeding Reject Cashew Kernel Meal on Pre and Early-laying Performance of Pullet. *Archivos de Zootecnia* 51: 423-429.
14. Kolongo S. D., G. Decocq, Y. Adou, E. C. Blom, and R. Van Rampaey 2006 Plant species diversity in the southern part of the Taï National Park (Côte d'Ivoire). *Biodiversity and conservation* 15; 7: 2123-2142.
15. Barima, Y. S. S., K. A. Kouakou, A. T. M. Kouakou, and Y. C. Sangne. 2016 A survey of the forestic diversity of the National Park of Marahoué after the armed conflicts in Ivory Coast. *Open Journal of Forestry* 6: 259-268.