Chemical composition of *Achatina fulica.*

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Summary

Proximate composition and mineral content were determined in snail without and with shell and shell alone from Achatina fulica.
This snail has high protein (above 40%), low fat (less than 3%) and is a relatively good source of macrominerals, including calcium, phosphorus, magnesium, potassium and sodium. Achatina fulica *is an excellent source of iron but is poor in copper, zinc and manganese.*
The snail is very rich in calcium but very poor in phosphorus, potassium and magnesium.

Résumé

*La composition chimique et la teneur en éléments minéraux de la chair et de la coquille d'*Achatina fulica *ont été analysées.*
La teneur en protéines de l'escargot est élevée (supérieure à 40%), faible en lipide (moins de 3%) et représente une source relativement excellente de macroéléments, calcium, phosphore, magnésium, potassium et sodium. Achatina fulica *constitue une bonne source de fer mais est très pauvre en cuivre, zinc et manganèse.*
La coquille est très riche en calcium mais très pauvre en phosphore, potassium et magnésium.

1. Introduction

Recent interest in the nutritional values of giant African snails in Ivory Coast has initiated new investigations on the composition of the molluscs. Indeed, *Achatina achatina* Linné is regarded as an important source of animal protein in the diets of several West African populations, especially those inhabiting the forest belt (2). The giant snail occurs in the wild and is gathered by villagers for consumption and for sale (4). But from the observations of Graham (3), Ogbeide (6), Oyenuga (8), Oracca and Tetteh (7), Mead and Kemmerer (5), little appears to have been written on the chemical analysis of snails. Thus, additional information is needed to better understand the nutrients of snails present in Africa.

It is the purpose of the present study to compare the proximate and mineral composition of snail with of without the shell found in Ivory Coast. Data were generated in a manner designed to provide useful information for consumers and dieteticians.

Material and methods

Material

Achatina sp is widespread in Ivory Coast during the rains and has been used for this experiment. The snails were picked up on the hedge of Ivorian Technological Research Centre (CIRT) where this experiment was done. The species concerned has been identified as *Achatina fulica* (Aouti, personal communication and Fouabi, personal communication), although the species is supposed to be absent from West Africa but is explained by the escape some years ago of many snails from experimental lots of introduced *A. fulica*, now rather abundant in Ivory Coast.

Sampling

The shell of three washed living snails has been broken with a small pestle. Extreme care was exerciced to separate by hand flesch portion from shells. Three samples of shell and flesh were ground in a laboratory mill and a homogeneous mixture of each sample was obtained. All the samples were stored at −20°C until analyzed.
All the analyses were made in three replicates.

Proximate analyses

Snails with or without the shell were submitted to proximate analysis according to AOAC methods (1).
Homogeneous mixtures of each sample (2-3 g) were dried at 90°C for three hours to constant weight for moisture determination. Crude protein was obtained from macrokjeldahl using a digestor «Büchi 430 N2 mineralisation unit» and a «Büchi 320 N2 distillation apparatus». Crude protein was calculated from the nitrogen content using the usual 6.25 conversion factor.
Total fat was obtained from each sample using a «Soxtec system HT» apparatus. Samples for ash were dried according to standardized AOAC methods (1), using a muffle furnace at 550°C to constant weight.

Mineral analyses

The mineral content was assayed on solution of each sample in 5N HCl. All the minerals were analyzed with a Perkin-Elmer atomic absorption spectrophotometer, Model 380 and a flame photometry method using the Eppendorf Geratebaü 077853-83 photometer.

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Results and discussion

Proximate composition data (table 1) showed that the moisture content was higher in the snail without or with the shell than in the shell alone.

Table 1. Proximate composition of shell, snail without or with shell expressed in percentages (N = 3).

	Moisture*	Ash**	Protein**	Fat**
Shell	**0,18** 0,15 - 0,20	**92,8** 92,6 - 93	**1,81** 1,60 - 2,01	**0,12** 0,10 - 0,14
Snail without shell	**69,5** 68 - 71	**7,64** 7,42 - 7,85	**72,1** 71,2 - 73	**2,10** 2,05 - 2,15
Snail with shell	**46,5** 45,4 - 47,5	**43,7** 43,4 - 44	**39,5** 38,5 - 40,5	**1,62** 1,60 - 1,64

* Expressed in percentage on a fresh weight basis.
** Expressed in percentage on a dry weight basis.

The percentages of ash or total mineral matter were higher in shell alone and snail with shell than in snail without shell. The proximate analyses of samples indicated that the snail with or without shell were good sources of protein and were significantly lower in fat. The protein value was considerably lower for the shell.

The contents of several inorganic elements, essential to the human, are summarized in table 2. The snail without or with shell was especially rich in the macroelements whereas the calcium value of shell was very higher. The shell was poorer in phosphorus, potassium, magnesium and sodium.

The trace or micronutrients content is listed in table 2. The shell and the snail with shell had very much higher concentrations for iron but all the samples had considerably lower values for copper, zinc and manganese.

Table 2. Mineral contents of shell, snail, without or with shell expressed in percentages (mg/100g)* N = 3.

	Ca	P	K	Mg	Na	Fe	Cu	Zn	Mn
Shell	**36855** 36780-36930	**50** 50 - 50	**30** 30 30	**5** 4 - 6	45 40 - 50	**80,9** 74,7 - 87	**0,60** 0,48 - 0,72	**1,11** 1,10 - 1,21	**1,01** 1,01 - 1,0
Snail without shell	**1060** 1050 - 1070	**500** 500 - 500	**565** 550 - 580	**342,5** 340 - 345	**27,5** 25 - 30	**12,8** 12,0 - 13,5	**1,04** 1,03 - 1,05	**4,70** 5 - 4,39	**1,72** 1,54 - 1,9
Snail with shell	**21650** 21500-21800	**225** 210 - 240	**240** 230 - 250	**145** 143 - 147	**27,5** 26 - 29	**35,7** 35,4 36	**0,65** 0,50 - 0,80	**2,48** 2,46 - 2,50	**1,27** 1,24 - 1,30

* Expressed in percentage on a dry weight basis.

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