

Multielemental characterization of biological samples in human and animal nutrition by neutron activation analysis

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Keywords: neutron activation analysis; foodstuffs; diet; forage; minerals; essential and toxic elements.

Inorganic elements are involved in a large number of biological processes in the human and animal bodies. There are several studies in the literature indicating the association of many disorders with mineral deficiencies or excess.

In contribution to studies in human and animal nutrition, Neutron Activation Analysis has been applied to determine essential and toxic elements in the following studies:

- **Assessment of mineral and trace elements in diet samples from different regions of Brazil**

Estimates of essential and other trace element intake by the daily diets of different population groups are being carried out periodically by the Neutron Activation Analysis Laboratory-CRPQ of IPEN/CNEN in collaboration with the Department of Food and Experimental Nutrition of the University of São Paulo. In this period, diets have been evaluated regarding nutritional status of mineral and trace elements in: the elderly (São Paulo State), pre-school children (Amazon region) and patients with chronic renal failure – CRF (São Paulo city).

Another study is being performed in collaboration with Adolfo Lutz Institute (IAL-SP), Food and Technology Institute (ITAL-Campinas) and Isotopic and Chemical Characterization Division at IPEN/CNEN-SP. In this study, workers' diet samples are being evaluated by different analytical methodologies such as NAA, ICP-AES, WD-XRFS, AAS-flame and graphite furnace and voltametry to determine mineral, essential and toxic trace elements. The diets of 26 workers from the steel industry were collected by duplicate portion technique. The diets represented 3-day food consumption.

- **Determination of mineral, toxic and trace elements in foodstuffs by instrumental neutron activation analysis**

The purpose of this study was to establish the chemical composition of different foodstuffs (mineral and trace elements) by using INAA:

a) typical fruits and vegetables from Amazon region. This work is being carried out with cooperation of Dr Lucia K. Yuyama from INPA (Instituto de Pesquisas da Amazônia);

b) milk and dairy products – ICP-AES technique is also being applied to determine inorganic content in these samples.

c) Multimistura samples – these samples are composed of mixture of eggshells, rice and wheat skin flour, sunflower and pumpkin seeds and manioc leaves. Both multimistura and its components individually are being analyzed. This work is being carried out in collaboration with Dr Gilson T. Boaventura from Universidade Federal Fluminense (RJ).

- **Analysis of different species of tropical forages cultivated on three soil types (dry and rainy seasons) by INAA**

The forages are the main source of feeding for the ruminant group in grazing management. That is why, it is important to determine the chemical composition of the vegetal species, including some toxic elements to avoid their accumulation in cattle and in the environment. This work is being carried out with EMBRAPA- São Carlos.

- **Analysis of two varieties of pigeonpea (*Cajanus cajan* (L.) Millsp) submitted to different doses of fertilizers, by INAA**

Pigeonpea, an easy cultivation legume species, adapted to Brazilian conditions, is an excellent supplement of protein for the ruminant group, due to its large potential of forage production and its high nutrition value. The plants studied were grown on dark red latosol and submitted to doses of fertilizers containing the elements B, Co, Cu, Fe, Mn, Mo, V and Zn. In this study, the chemical composition of these plants are being established by using INAA.

- **Multielemental analysis in horse's hair samples by INAA**

Hair samples collected from horses that were supplemented with mineral chelated amino acid (glycina) were evaluated by INAA. This procedure is commonly used in horses that take part in competitions. The purpose of this work was to assess the supplementation effect on the animal's health. These animals belong to the Police of São Paulo State.