Trace element deficiencies in the Azores archipelago: an animal and human health issue

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The Azores archipelago is an autonomous Portuguese region which comprises nine islands located in the North Atlantic within latitudes 36º and 43º N and longitudes 25º and 31º W, respectively. Dairy cattle production represents the main industry in the archipelago and is responsible for 27% (4.5 x 105 tonnes) of all Portuguese milk production. Cattle are reared all year-round on intensive grazing systems. Soils are of volcanic origin with some natural trace element (TE) deficiencies, which in turn could lead to nutritional diseases in cattle. In addition, since 99.6% of the Azores are covered by rural areas, human food intake is highly dependent on local resources, such as fruits and vegetables. For this reason, and since a proportion of prostate cancers could be related to oxidative stress phenomena, there is value in questioning the effect that such an environmental scenario could have on the incidence of prostate cancer in Azorean men.

In order to identify TE deficiencies in cattle (Zn, Cu, Se, I and Co) an investigation of TE in 481 blood samples from cattle were analyzed from 70 herds, several of them with problems such as: infertility, abortions, premature calving, weak calves, enzootic haematuria and high somatic cell counts. The majority (91%) of the analyses were performed in Holstein-Friesian (HF) cattle, of which 284 were milking cows (MC), 129 heifers (H), 13 calves (C), 43 bullfight cattle (BF) and 12 beef cattle (B).

The results of the TE determination indicate that 92% of the animals had both low levels of plasmatic iodine and thyroxin (T4) and 84% of the herds had at least one animal with Co deficiency. About 31% of the MC had low levels of serum Se and Cu, and 38% showed low serum Zn. The most severe deficiencies were identified in the heifers group.

To complement these data, seven clinical trials were conducted using HF reared on pasture grazing systems. In each trial there were two randomly constituted groups: a control group and a group fed with extra supplements. Different supplementation protocols and products were implemented in each trial.

Results indicate that TE-supplemented yearlings had

significantly higher productive output and improved hematological parameters compared with the controls. The least laborious, most consistent and reliable supplementation system studied was obtained with the intra-ruminal slow-release bolus from Alltrace® Agrimin (UK). However, similar results were also obtained when Se and I were added to drinking water.

At present, relative risks (standardized rate ratios) of developing cancer in the Azores, when compared with the Portuguese mainland, are the only way for the assessment of risk factors of hypothetical environmental factors such as: anti-oxidant (e.g. selenium) deficiencies in local fruits and vegetables. Data from the Azores Cancer Registry indicate a 20% increased risk of prostate cancer as compared with other Portuguese men (99% CI 1.2-1.2).

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