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A universal molecular and bioinformatics pipeline for meat species identification using next generation sequencing data

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Background: Processed meat products are usually targets of adulteration by fraudulent traders as a means of economic gain. This study demonstrates a universal and bioinformatics diagnostic pipeline using NGS data targeted for the 16S rRNA mitochondrial gene.

Methods: A total of 161 processed meat products, namely, minced meat (n=55), biltong (n=28), burger patties (n=35) and sausages (n=43) were collected from retail outlets, butcheries and processing plants across South Africa. The MSR software managed to classify species up to the genus level.

Results: The results revealed that 90% minced meat samples were predominantly *Bos* genus and 9% mince samples contained species from mixed sources like *Bos*, *Sus* and *Ovis*. About 92% of the biltong samples were predominantly *Bos* genus and 7% of the samples showed traces of *Sus* and *Ovis* genus, although they were labelled as 'beef biltong'. 80% of the burger patties were predominantly *Bos* genus, 20% were mixed samples carrying the *Bos*, *Sus* and *Ovis* genus, however, 5 of these samples were labelled as 'beef patties'. For the sausage samples 48% were predominantly *Bos* genus, 51% of the samples were mixed with traces of *Bos*, *Sus* and *Ovis* genus and of these 34% were labelled as 'beef sausages'.

Conclusion: Overall, sausages had the highest occurrence of adulteration, constituting of species from more than one source in a sample.

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Evaluation of fruit and vegetable consumption as phytonutrient potential in Lebanon

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Fruits and vegetables (FV) are known to contain considerable amounts of vitamins and minerals in addition to phytonutrients and bioactive compounds having many positive health effects in the prevention of diseases such as cardiovascular illnesses, cancer, etc. Therefore, it is crucial to evaluate the FV consumption as sources of phytonutrients of the Lebanese population. A cross sectional analysis of 390 Lebanese individuals aged between 20 and 65 years old located in six Mohafazat (Beirut, Mount Lebanon, North, South, Nabatieh and Bekaa), was conducted. Sociodemographic, lifestyle, eating behaviour, food frequency questionnaire (FFQ) and awareness information were collected through a questionnaire specifically adapted for the purpose of the study. Statistical analysis was carried out and multivariate models were used in order to evaluate the association between fruits and vegetables consumption and different independent factors. The FV consumption among the Lebanese population was acceptable compared to the international recommendations. Regarding vegetables, 38.5% of the Lebanese respondents, showed a high level of consumption versus 37.98% having a low level of consumption. Related to fruit consumption, 38.08% Lebanese respondents consuming high levels of fruits compared to 36.54% of the Lebanese respondents, showing a low fruits intake. Furthermore, it was observed that the majority of the study population was highly aware of the importance of phytonutrients in FV and were willing to consume these food items more and more, 49.23% of the Lebanese population. The FV consumption was most associated with the area of residence, age, education level, work, salary ranges, weight loss diet, physical activity, smoking, supplement intake, monthly amount of money spent on food and consumptions of starch, dairy products, meat, herbs and juices. The findings stated that the consumption of FV in Lebanon is acceptable, even though it is affected by several sociodemographic and lifestyle factors. Future governmental or national programs and interventions could be settled to encourage and increase the FV consumption among all the population age levels and areas of residence.

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