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# Structural and functional properties of (Balanites Eaqpytiaca. L) aduwa protein meals, protein concentrate and isolate

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**Background:** The study was to examined the structural and functional properties of (Balanites aeqyptiaca) meals, concentrate and the isolate. Aduwa (Balanites aeqyptiaca) was processed to obtain whole Aduwa meal (APM), defatted Aduwa meal (DAM), Aduwa protein concentrate (APC) and Aduwa protein isolate (API). The sample was evaluated for SDS-PAGE, Fourier transform infrared (FTIR) and functional properties. The results from SDS-PAGE analysis revealed that samples were characterised by the appearance of band above 180 kDa in the non-reducing condition and this was reduced to 140 kDa . The FTIR revealed functional groups such as esters (C-H) carboxylic acids (C-H2), polyhydroxyl groups(N-C), primary amines,isothiocyanate (C=N), triglycerides (C=O),aliphatic compouds( C-O-C) and amino acids (N-H) bonds and of various intensities. The results of the protein solubility showed that about 60.73 % of the whole meal was soluble at pH 3.0, but not at 50.50 % for protein isolate. Similarly, the protein concentrate was least soluble at pH 3.0. The results of the foam properties revealed that the foaming capacity of the protein isolate was highest at 60 mg/ml, which suggest that increase in the sample concentration enhanced the foam formation of the protein isolate. The results of emulsion properties showed that sample concentration of 10 mg/ml is the threshold concentration for the samples to create enough interfacial tensions to stabilize the emulsion formed by the samples, especially at pH 9.0. The study concluded that Aduwa meals and proteins have potentials for expanded utilization at homes, food and pharmaceutical industries.

**Methodology:** The study was to examined the structural and functional properties of (Balanites aeqyptiaca) meals, concentrate and the isolate. Aduwa (Balanites aeqyptiaca) was processed to obtain whole Aduwa meal (APM), defatted Aduwa meal (DAM), Aduwa protein concentrate (APC) and Aduwa protein isolate (API). The sample was evaluated for SDS-PAGE, Fourier transform infrared (FTIR) and functional properties. The results from SDS-PAGE analysis revealed that samples were characterised by the appearance of band above 180 kDa in the non-reducing condition and this was reduced to 140 kDa . The FTIR revealed functional groups such as esters (C-H) carboxylic acids (C-H2), polyhydroxyl groups(N-C), primary amines,isothiocyanate (C=N), triglycerides (C=O),aliphatic compouds( C-O-C) and amino acids (N-H) bonds and of various intensities. The results of the protein solubility showed that about 60.73 % of the whole meal was soluble at pH 3.0, but not at 50.50 % for protein isolate. Similarly, the protein concentrate was least soluble at pH 3.0. The results of the foam properties revealed that the foaming capacity of the protein isolate was highest at 60 mg/ml, which suggest that increase in the sample concentration enhanced the foam formation of the protein isolate. The results of emulsion properties showed that sample concentration of 10 mg/ml is the threshold concentration for the samples to create enough interfacial tensions to stabilize the emulsion formed by the samples, especially at pH 9.0. The study concluded that Aduwa meals and proteins have potentials for expanded utilization at homes, food and pharmaceutical industries.

**Practical applications:** The result of the analysis on the protein products revealed that the Aduwa protein meal (APM), defatted Protein meal (DAM) ,Aduwa concentrate (APC) and the isolated (API) demonstrated potentials that it can applied as a functional ingredients in food materials and also increase the access of low resource income populace economic privilege also to consume plant rich proteins, where the animal proteins are out of reach. An Aduwa protein meal (APM) has resolved potential peptides fractions which has good nutritional profile and protein solubility. The result demonstrated the benefits of the protein meals and resolved protein materials as potential healthy functional food ingredients which could be applied and developed to a novel bioactive foods and nutraceuticals.