Determination of chemical composition and metabolizable energy of wastes of spaghetti, pasta, biscuit, crisp, chickpea pre-cleaning and chickpea screening plants

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Introduction Based on the official statistics of industries and mines organization about 1000 ton wastes of spaghetti, pasta, biscuit, crisp, and about 7500 ton waste of chick pea pre-cleaning plants are produced annually in East Azerbaijan province of Iran. In our country there is little researches on wastes. In one study, ileal amino- acid digestibility of wheat, autoclaved wheat and spaghetti by-products for broiler chicks was determined (Zaghari 2006). The aim of the present study was to determine metabolizable energy and chemical composition of wastes of spaghetti, pasta, biscuit, crisp, chickpea pre-cleaning and chickpea screening plants.

Materials and methods After classified random sampling from 10% of spaghetti, pasta, biscuit, crisp, chickpea pre-cleaning and chickpea screening plants, the samples were ground and mixed. 24 adult laying-type cockerels (Hy-Line W36, 35-week-old) with mean body weight of 2000 g ± 100 were randomly grouped into six groups of four replicates. All birds were kept in individual battery cages (25 cm × 35 cm × 50 cm in dimension) and fed commercial diets prior to the experiment. The wastes of spaghetti, soup pasta, rice pasta, crisp, biscuit, pre-cleaning chickpea, and chickpea screening were mixed in the ratio of 15% to basal diet. Then, in order to determine metabolizable energy (TME, TMEn) of waste, 30 grams of mixed feed were force-fed to 4 adult Leghorn-type roosters, according to the method described by Sibbald (1986). Excreta voided from each bird following the feeding procedure was collected quantitatively, for 48 h. Birds had free access to water, and when not on experiment, to a commercial diet. All the birds remained healthy and survived the experimental procedure. The chemical analysis of wastes and collected samples of excreta was carried out according to the standard methods of analysis (AOAC,1990). Gross energy of wastes and individual samples of excreta was measured by a bomb calorimetry.

Results Summarized in table1, are data showing chemical composition of studied wastes. Maximal crude protein, ash and crude fiber value was obtained with chickpea pre-cleaning.

Table 1 Chemical composition (g/kg fresh weight) of wastes

wastes	Dry Matter	Ash	Crude Protein	Crude Fat	Crude Fiber	NFE	NDF	ADF	Gross Energy (MJ/kg)
spaghetti	915	12	127	24	2	805	17	1	18.79
pasta	909	7	141	65	2	755	14	3	18.74
biscuit	948	20	90	170	51	649	111	17	20.37
crisp	935	15	92	42	5	826	131	3	18.23
chickpea pre-cleaning	923	73	302	87	178	320	323	224	19.38
chickpea screening	919	60	300	78	78	450	351	96	19.79

Table 2 Metabolizable energy of experimental wastes (MJ/kg)

wastes	AME	AMEn	TME	TMEn
spaghetti	14.41^{d}±0.17	14.8^{c}±0.18	15.77^{d}±0.17	15.23^{c}±0.18
pasta	15.69^{c}±0.19	16.24^{b}±0.25	17.06^{c}±0.19	16.67^{b}±0.25
biscuit	16.26^{a}±0.09	16.78^{a}±0.26	17.26^{a}±0.09	17.22^{a}±0.22
crisp	15.98^{b}±0.13	16.25^{b}±0.20	17.34^{b}±0.13	16.69^{b}±0.20
chickpea pre-cleaning	10.89^{e}±0.13	10.34^{f}±0.16	10.96^{f}±0.22	11.64^{d}±0.17
chickpea screening	9.6^{f}±0.22	10.34^{f}±0.16	10.96^{f}±0.22	10.77^{f}±0.16
SEM	0.088	0.098	0.088	0.098

Among the wastes, biscuit had the highest ME, presumably related to its highest fat content. Statistical analysis showed that there were significant differences ($p<0.05$) between ME types of wastes.

Conclusions These results show that experimental wastes especially chickpea, biscuit and spaghetti are rich sources of protein and energy with some values even exceeding those in corn and wheat. Further work is required to test their suitability in diets for poultry.

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