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USAGE OF APPLESAUCE (*Malus pumila*) FOR PREPARING A LOW FAT BOLOGNA

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Some nutritional studies indicate that in the Sonoran diet (Ballesteros, 1989; Hoyos, 1991) people consume high quantities of animal products in contrast with the low consumption of vegetable products. This pattern was similar with those of developed countries. In this manner the consumption of dietary fiber is reduced, and fat consumption is increased. Today, it is recommended to increase dietary fiber consumption and decrease calories, fats and salt. It is important to design low fat meat products that include dietary fiber. Lately, applesauce has been considered as an important raw material for the developing of some products because of its potential as an ingredient (Unifruit, 1988). To lower fat in meat products ingredients like carrageenan, soy protein, modified starch, plasma hydrolysates, tapioca starch, sodium alginate, among others, are used (Giese, 1992). Besides, high levels of water are used. Dried and rehydrated apple have been used in pork meat products to increase flavor (Marriot et al., 1986, 1988).

The objective of this study was to elaborate a bologna-type product with 15% applesauce from *Anna* and *Dorsett Golden*, to evaluate chemical and physical quality aspects as a function of apple variety.

MATERIAL AND METHODS

Elaboration of applesauce.- Applesauce was made from two varieties, *Ann* and *Dorsett Golden*, harvested in Coast of Hermosillo, Sonora, México. Apples were washed, scalded at 90°C for 30 min, and pulped. Ascorbic acid was added (0.5%) to eliminate browning. Applesauce was hermetically sealed in plastic containers and frozen at -20°C until used.

Elaboration of bologna.- Control and the two 15% added applesauce were made accordingly to Rust, 1977. All products included 30% mechanically deboned turkey meat (MDTM), and 30% pork picnics. Ten percent of scalded fat was added to products with applesauce, while 20% regular fat was added to the control. Ten percent of water was added to the former and 13% to control.

Chemical and physicochemical analysis.- °Brix, malic acid, water, protein, fat and ashes were performed accordingly to AOAC (1990). Total Dietary fiber content and soluble and insoluble dietary fiber were done the procedures from Prosky et al. (1985, 1988). Warner-Bratzler and texture profile analysis were assayed by an Instron Machine, Model 1132, (Bourne, 1978). Color (L, a, b and Hue angle) was measured by Hunter Lab Colorimeter D25.

RESULTS AND DISCUSSION

Apple variety affected °Brix (Table 1), applesauce from *Anna* had lower ($P<0.05$) °Brix than *Dorsett Golden*, 12.35 and 13.23, respectively. pH and titulable acidity were not affected ($P>0.05$). The ratio °Brix/acidity was not different ($P>0.05$) between varieties. This ratio was much lower, 18.0, than those from *Gravenstein* variety, 46-52, reported by Luh and Kamber (1963). Water content was different ($P<0.05$) between varieties, 86.6 and 85.3 for *Anna* and *Dorsett Golden*, respectively. This was higher than that from fresh apples (Soto and Trejo, 1986), because of the water cooking effect (Matthee and Appledorf, 1978). There were no differences in composition between varieties for protein, fat, fiber and ash. Only soluble dietary fiber was different, 0.18 and 0.28 for *Anna* and *Dorsett Golden*, respectively.

There was an effect in water content in the bologna-type product (Table 2). This was higher, 63%, in product with applesauce than for control, 56%. This exceeded the established limit by the Mexican Norm (DGN, 1971). Fat content was 25% lower in the product with applesauce than for the control. Adding applesauce had no effect on protein, ash, and pH. pH of the product with applesauce was within the limits found for these type of products (Koniecko, 1979). Protein content was lower than the minimum, 14%, required in the Mexican Norm. Ash content was higher for all products because MDTM (30%) was used in the formula. There were no effects on texture parameters (Table 3) due to applesauce addition. There was a lowering effect ($P<0.05$) in "L" value for color by applesauce addition.

CONCLUSION

Apple variety had an effect on °Brix, water and soluble dietary fiber content in applesauce. Addition of applesauce to the formulation had no effect on cook yield after thermal processing, it was 99%. Also, there was no effect on texture parameters. However, water, fat and protein content and color were affected by applesauce addition.

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Table 1. Physicochemical parameters and chemical composition of applesauce made of *Anna* & *Dorsett Golden* Varieties.

Variety	° Brix	Tit. A.*	° Brix/Tit. A	pH	% Water	% Protein	% Fat	% Ash	% IDF	% SDF	% TDF
Anna	12.35 a	0.68 a	18.26 a	3.45 a	86.64 a	0.36 a	0.90 a	0.31 a	1.96 a	0.18 a	2.15 a
Dorsett Golden	13.23 b	0.69 a	18.93 a	3.50 a	85.30 b	0.69 a	0.32 a	0.32 a	2.14 a	0.28 b	2.41 a

* Tit A. = Titulable Acidity. It´s expressed as % Malic Acid.

IDF= Insoluble dietary fiber. SDF= Soluble dietary fiber. TDF= Total dietary fiber.

Different letters within the same column are significantly different ($p < 0.05$).

Table 2. Chemical composition and pH of Bologna type product.

	Control	*Anna*	*Dorsett G.*	Standards
Water (%)	56.26 b	63.28 a	62.56 a	60.0 max
Fat (%)	25.08 b	18.94 a	19.29 a	25.0 max
Protein (%)	11.75 a	10.48 a	10.66 a	14.0 min
Ash (%)	3.65 a	3.65 a	3.72 a	3.0 max
TDF (%)		0.25 a	0.31a	
pH	6.59 a	6.37a	6.39 a	6.21 - 6.67

Different letters within the same row are significantly different ($p < 0.05$).

Table 3. Texture and Color of Bologna type product.

	Control	*Anna*	*Dorsett G.*
Hard (Kgf)	3.08 a	2.50 a	2.61 a
Elasticity (mm)	4.03 a	3.89 a	3.86 a
Cohesivity	0.34 a	0.30 a	0.27 a
W-B (Kgf)	0.37 a	0.27 a	0.30 a
L	57.53 b	56.43 ab	55.85 a
a	5.70 a	5.79 a	5.96 a
b	11.28 a	11.66 a	11.55 a
Hue Angle	63.59 a	63.59 a	62.00 a

Different letters within the same row are significantly different ($p < 0.05$).