EFFECT OF DATE PALM PULP UPON COLOR, REFLECTANCE SPECTRA AND PHYSICOCHEMICAL PROPERTIES IN A HEALTHY PAPRIKA-ADDED DRY-CURED MEAT SNACK MODEL SYSTEM

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I. INTRODUCTION

One of the biggest problems in the development of healthy paprika-added dry-cured meat snacks is related to their colour formation and stability during processing and storage. Potential functional ingredients generate colour changes in these types of products; thus it is important to establish a model system in which these new ingredients can be evaluated easily for technological and industrial suitability. Dates are a good source of dietary fiber, minerals, sugars, antioxidants, antimicrobials, etc. that could be very useful for the meat industry [1]. Dates coproducts can be processed to obtain date pulp, date flour, or date water. Dry-cured meat snacks increased their popularity during the COVID pandemic and are still growing, but consumer demands that these products become “healthier”. Thus, this study aimed to evaluate the feasibility of using date palm pulp in and dry-cured meat snack model system and to study its effect on its technological and physiochemical properties.

II. MATERIALS AND METHODS

Date palm pulp from date fruits (AGROALNEXT cv) was obtained. The dry-cured snack formulation was based on a “Longaniza de Pascua” sausage added with paprika (4.5 %). Two treatments (control 0 %; DPP with 3 % date pulp) were elaborated (3 batches for each one/60 snacks for batch). Industrial processing conditions (16-22 ºC; 80-90 %RH) were followed for 4 days. Weight loss (as an industrial parameter), pH, Aw, CIELAB (1976) colour parameters, reflectance spectra (360-740nm), residual nitrite level, moisture, and lipid oxidation-TBARS were analyzed. All data were statistically studied using one-way ANOVA and Tukey test, considering differences at $P< 0.05$.

III. RESULTS AND DISCUSSION

From an industrial point of view, all treatments reached adequate industrial weight losses to be commercialized (>30%) (Control: 33.75% vs DPP: 37.03%) after 3 days ($P<0.05$) of processing. Table 1 shows the physicochemical properties of meat snacks at the end of the processing. There were not pH differences ($P>0.05$) between treatments (control: 5.59±0.02 *vs* DPP: 5.58±0.02). DPP showed higher Aw values than control ($P<0.05$) but both could be considered as intermediate moisture food (Aw<0.090). DPP snacks showed higher moisture ($P<0.05$) than control, which may be related to the water-holding capacity of the date pulp. DPP showed TBA values higher ($P<0.05$) than control, this could be due to the fact that during DPP processing, samples suffer air dehydration (60ºC) that increased *per se* its value. Related to residual nitrite levels, DPP showed the lowest value, which could be due to polyphenols associated with dietary fibers in date pulp.

Table 1 Physicochemical parameters in meat snacks [Control and added with date palm pulp (DPP: 3%)] at the end of the elaboration process (4 days).

Treatment	pH	Aw	Moisture (%)	TBARS (mg MA/kg)	Residual Nitrite Level (mg $NaNO_2$/kg)
Control	5.69	0.84	36.0	0.99	58.4
DPP	5.38	0.86	45.0	1.46	39.1
SEM	0.004	0.001	0.107	0.045	0.042
P value	P<0.001	P<0.01	P<0.001	P<0.01	P<0.001

Table 2 shows the evolution of the colour parameters during processing time for both snacks. The evolution of all colour parameters along processing time is similar in both formulations corresponding to a traditional paprika dry-cured sausage. The addition of date pulp did not affect the *a**, *b**, *C**, and *h** parameters (P >0.05) when the snacks were ready for commercialization. This is also confirmed by the fact that both meat snacks had isosbestic wavelengths from 580-740 nm (yellow-orange-red colours) with control sausages. The only difference between treatments was that DPP sausages were darker (P<0.05) than the control.

Table 2. Evolution of the CIELAB colour parameters of meat snacks [Control and added with date palm pulp (DPP: 3%)], during the elaboration process (4 days).

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Time (t)	Treatment (T)	Lightness (*L**)	Redness (*a**)	Yellowness (*b**)	Chroma (*C**)	Hue (*h**)
day 0	Control	38.4 ^{aA}	20.1 ^{aA}	16.9 ^{aA}	26.2 ^{aA}	40.0 ^{aA}
	DPP	36.6 ^{bA}	13.8 ^{bA}	12.7 ^{bA}	18.8 ^{bA}	42.7 ^{bA}
day 1	Control	33.2 ^{aB}	15.3 ^{aB}	12.3 ^{aB}	19.6 ^{aB}	38.7 ^{aA}
	DPP	32.7 ^{aB}	12.5 ^{bA}	11.5 ^{bB}	15.1 ^{bB}	34.0 ^{bB}
day 2	Control	41.4 ^{aC}	19.8 ^{aA}	20.2 ^{aC}	28.3 ^{aA}	45.7 ^{aB}
	DPP	39.5 ^{aC}	14.3 ^{aA}	12.7 ^{bC}	26.9 ^{aC}	44.0 ^{aA}
day 3	Control	37.1 ^{aD}	16.1 ^{aB}	14.5 ^{aD}	21.7 ^{aC}	42.1 ^{aC}
	DPP	38.2 ^{aC}	13.1 ^{bA}	12.2 ^{bA}	17.9 ^{bA}	42.8 ^{aA}
day 4	Control	31.7 ^{aE}	15.3 ^{aB}	13.1 ^{aE}	20.9 ^{aC}	39.2 ^{aD}
	DPP	28.4 ^{bD}	14.9 ^{aB}	13.1 ^{aA}	19.7 ^{aA}	41.4 ^{aA}
	RMSE	0.496	0.156	0.196	0.581	0.643
	P value (T/t)	<0.05 / <0.01	<0.05 / <0.05	<0.05 / <0.01	<0.05 / <0.01	<0.05 / <0.01

In the same row, different superscripts $^{A-E}$ letters for the same treatment indicate significant differences between time (P < 0.05); different superscripts $^{a-b}$ letters for the same time indicate significant differences between treatment (P < 0.05).

IV. CONCLUSION

The use of date pulp in the development of paprika-added dry-cured meat snacks is a feasible option, reaching the end of the elaboration process, with characteristics of an intermediate moisture meat product. In terms of colour, there are isosbestic points between 580-740nm for both treatments.

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