Plasma Helps Standardize Canned Pet Food Quality

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The use of spray-dried plasma (SDP) as a superior binder in wet pet food is well recognized and commonly used in the industry. SDP is characterized by its well balanced technological properties highly appreciated in canned pet food products. Manufacturers can rely on SDP for higher gelling, water retention and emulsion capacities compared to other binders.

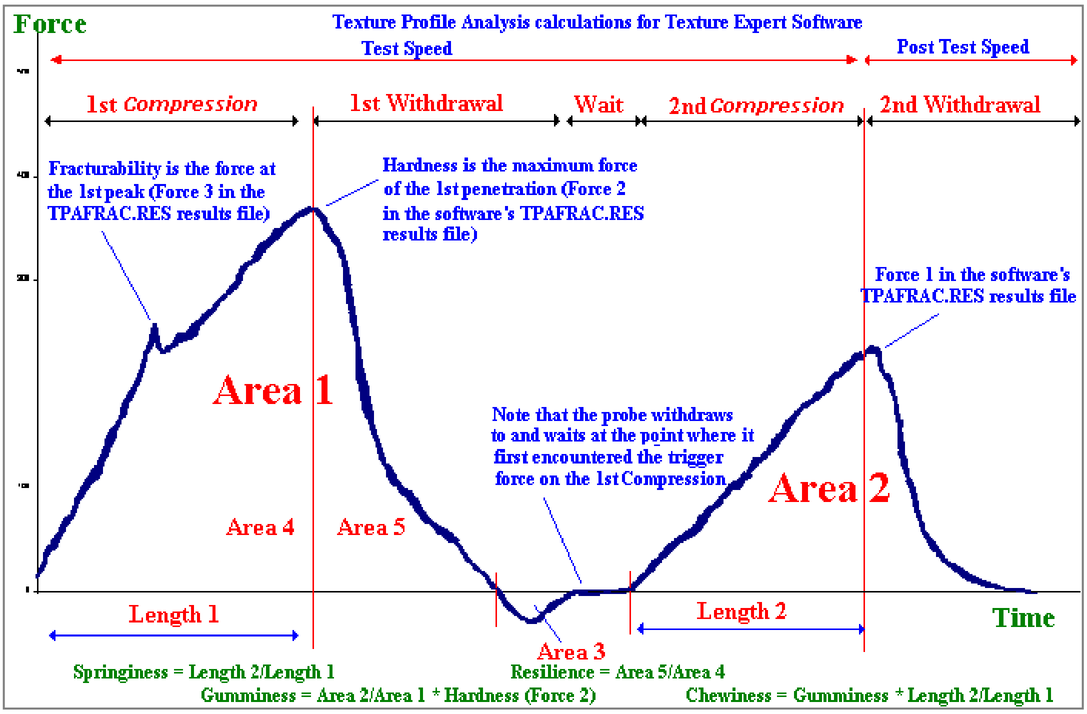
Wet pet food manufacturers are now also recognizing that plasma improves the standardization of the quality of the final cooked product, by efficiently absorbing quality differences between batches of the meat by-products raw material. In order to prove the capacity of plasma to homogenize differences on quality between the different raw meat ingredients, APC conducted a trial working with two different raw poultry carcass qualities testing the effect in the technological properties of cooked chunks in gravy.

To analyze differences in technological properties of cooked chunks we used the Texture Profile Analysis (TPA) that has been shown to have a good correlation with the texture of food. Instrumental Texture Profile Analysis was developed about 30 years ago, constituting an interesting way of analyzing several textural parameters in only one assay. Since then, much work has been done and new tools have been developed. TPA via interpretation of stress-strain curves is, and will continue to be, extremely useful for the evaluation of the textural quality of foods, particularly when parameters can be correlated with sensory assessments.

TPA measures parameters as hardness, adhesiveness, chewiness, gumminess, cohesiveness, resilience and springiness. These tests not only quantify the texture of the food, but also evaluate the consistency of the manufacturing processes.

Study Summary

In this study, two different poultry carcass qualities were received from a Spanish supplier of raw material to different European wet pet food producers. The carcass called “CH” is considered high-medium quality carcass and the carcass called “CL” is considered medium-low quality carcass. As observed, the carcass CH had a better texture and lower water



Hardness
The peak force of the first compression of the product and it provides information about the force needed to produce a distortion in the product.

Adhesiveness
The area under the profile line that represents the necessary work to remove the probe of measurement from the product, so it measures the attraction forces between the surfaces of the product with other surfaces.

Springiness or Elasticity
How well a product physically springs back after it has been deformed during the first compression. The spring back is measured at the down stroke of the second compression.

Cohesiveness
Reflects the resistance of the internal unions of the product and how well the product maintains its integrity during compression avoiding the fracture. It is calculated dividing the area of work during the second compression by the area of work during the first compression (Area 2/Area1).

Gumminess
Calculated by multiplying Hardness and Cohesiveness but only applies to semi-solid products with low hardness.

Chewiness (for solid products)
Correlates Hardness, Cohesiveness and Springiness, represents the energy required to disintegrate a solid food until a consistency adequate to be swallowed.

Resilience
Defines how well a product "fights to regain its original position". It is like an “instant springiness” since resilience is measured on the withdrawal of the first penetration, before the waiting period is started.

losses compared with the carcass CL indicating that effectively the carcass CH had higher quality (Table 1).

Table 1. Main characteristics of both poultry carcass used in this study.

	% Solids	% Proteins	%Ashes	Texture (g)	Water Losses (g)
Poultry Carcass (CL)	36.89	15.51	2.93	503±12	21.9±0.6
Poultry Carcass (CH)	41.14	15.05	3.37	601±22***	17.1±0.8***

***Values significantly different by Student *t*-test ($P<0.001$)

Both carcasses were used in the recipe indicated in Table 2. Two binders, SDP (AP820 from APC EUROPE, S.A) or WG (Viten, Roquette Laisa España S.A., Valencia, Spain) included at 2% in the recipe were compared to a control diet without binder.

Table 2. Chunk recipe used in the study (g/Kg)

	Control	SDP	WG
Poultry carcass	711.9	691.9	691.9
Wheat flour	70	70	70
Binder protein	---	20	20
Locus bean gum	5	5	5
Common salt	5	5	5
Sodium poly-phosphate	5	5	5
Sodium bicarbonate	2	2	2
Ascorbic acid	1	1	1
Sodium nitrite	0.1	0.1	0.1
Water	200	200	200

We prepared cans with chunks of similar size and shape, produced with a special device and included in gravy containing 0.8% chicken broth, 0.733% guar gum, 0.38% dextrose, 0.05% STPP and 98.037% water in a ratio 1:1 between chunks and gravy to measure the TPA parameters. The cans were sterilized in a laboratory autoclave at 121ºC for 1 h and left to cool to room temperature for 2 days before performing the analyses.

The texture properties were determined over a number of 15 chunks of 35x17x30 mm^3. The chunks were submitted to two cycles of compression separated by 2 seconds, both at the same constant speed of 0.5mm/s and 50% of strain.
The test was performed with a texture analyzer TA-XT2i (Stable Micro Systems). Values in the same column with different superscript are significantly different by One-Way ANOVA (*P*=0.05). No significant differences were observed on physic-chemical parameters (dry matter, protein, ash) between the two different poultry carcass qualities and/or the inclusion of SDP or WG as binders in the cooked chunks (data not shown).

Table 3. TPA parameters obtained with the two different poultry carcass qualities with and without binders in the recipe

Quality carcass	Hardness (g)	Adhesiveness (g.s)	Springiness mm	Cohesiveness	Chewiness g.mm	Resilience mm
CL Carcass						
No binder	2477±68.0 ^{a}	-156±13.1 ^{cd}	0805±0.008 ^{a}	0.543±0.014 ^{b}	1115±60.9 ^{a}	0.254±0.009 ^{b}
AP820	4912±89.5 ^{d}	-133±15.7 ^{d}	0.874±0.003 ^{c}	0.711±0.002 ^{c}	3061±60.6 ^{d}	0.382±0.002 ^{c}
Wheat gluten	3366±106 ^{c}	-229±206 ^{ab}	0.832±0.005 ^{b}	0.560±0.009 ^{b}	1609±78 ^{c}	0.270±0.006 ^{b}
CH Carcass						
No binder	2992±40.4 ^{b}	-248±15.5 ^{a}	0.837±0.005 ^{b}	0.554±0.010 ^{b}	1400±43.0 ^{b}	0.264±0.006 ^{b}
AP820	5178±87.6 ^{e}	-172±17.6 ^{cd}	0.876±0.003 ^{c}	0.706±0.004 ^{c}	3219±74.2 ^{d}	0.376±0.004 ^{c}
Wheat gluten	3046±51.4 ^{b}	-183±17.9 ^{bc}	0.811±0.005 ^{b}	0.496±0.012 ^{a}	1240±45.6 ^{ab}	0.233±0.008 ^{a}

With respect to TPA parameters, we found that in general, from the carcass point of view, the carcass CH shows better TPA results compared with the carcass CL, indicating that effectively, the carcass CH has a higher quality than the CL as the producer already suggested (see data in the table 3 comparing the chunks without binder). Independently of the poultry carcass tested, the use of SDP improves all the textural parameters analyzed compared with the other two conditions (control and WG).

Regarding the ability of the binders to reduce the quality differences of the two poultry carcasses used, we found significant differences in almost all the TPA parameters from the Control and WG recipes according to the quality of the carcass, but not for the recipe containing SDP (Table 3). Results may be interpreted as SDP is better able to homogenize differences on quality between carcasses.

The animal by-products suppliers should consider the recommendation of using SDP in wet pet food recipes to avoid daily natural variations on their ingredients raw materials and also to avoid differences on product performance between fresh and frozen meat ingredients for wet pet food. Pet food producers should also consider the addition of a binder like SDP that could be regarded as “safety belt” to warrantee similar quality of their canned pet food on a regular basis.

References available upon request.