TEXTURA; CAPACIDAD DE RETENCIÓN DE AGUA (CRA)

JUGO LIBERADO POR PRESIÓN

JUGO LIBERADO POR GOTEO

PÉRDIDAS DE JUGO POR COCCIÓN
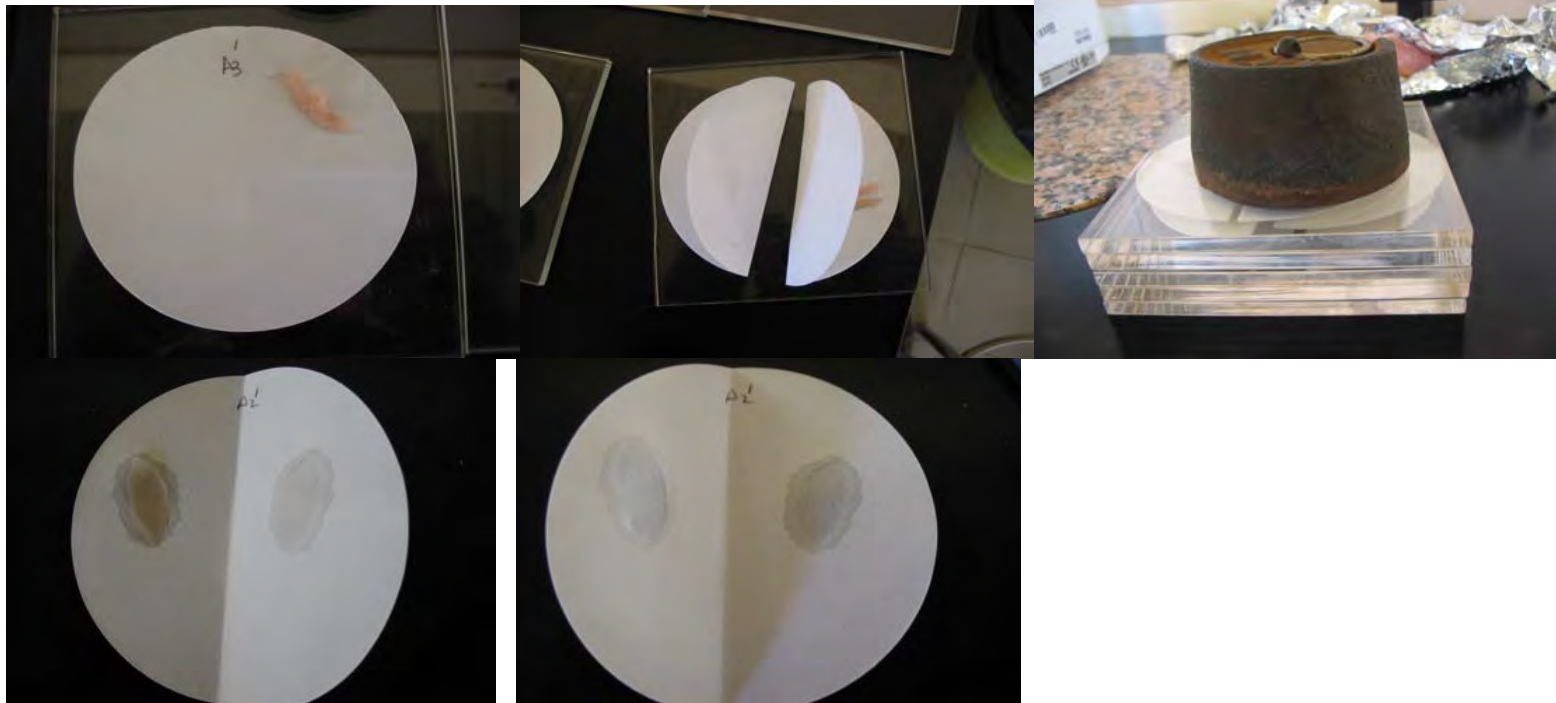
TEXTURA; CAPACIDAD DE RETENCIÓN DE AGUA (CRA)

% JUGO LIBERADO POR PRESIÓN

Poner aproximadamente 0.3 g de carne (M. semitendinosus) en papel de filtro doble.

Presionar con un peso de 1 kg durante 15 min.

Cuantificar el jugo expelido.

TEXTURA; CAPACIDAD DE RETENCIÓN DE AGUA (CRA)

Peso papel vacío (1)

Peso papel con carne (2)
(y jugo expelido)

Peso papel con jugo (3)
(sin carne)

% JUGO LIBERADO POR PRESIÓN

	1 Peso papel (s)	2 Peso papel carne	3 Peso papel sin con jugo
A_1	0'5273	0,6776	0,5705
A_1'	0'5304	0,7067	0,5916
A_2	0'5444	0,8158	0,6299
A_2'	0'5245	0,6465	0,5675
A_3	0'5321	0,6973	0,5991
A_3'	0'5495	0,8121	0,6296
B_1	0'5246	0'7967	0'6123
B_1'	0'5222	0'9000	0'6642
B_2	0'5207	0'7232	0'5911
B_2'	0'5298	0'7381	0'6006
B_3	0'5432	0'7797	0'6148
B_3'	0'5237	0'7647	0'6017

TEXTURA; CAPACIDAD DE RETENCIÓN DE AGUA (CRA)

% JUGO LIBERADO POR GOTEO
(24, 48 h, a refrigeración, envase hermético)

No realizado

TEXTURA; CAPACIDAD DE RETENCIÓN DE AGUA (CRA)

% PÉRDIDAS DE JUGO POR COCCIÓN
(M. semitendinosus, agua 70 ºC, 40 min, en papel aluminio)

	Pérdidas Cocció Antes cocer (g)	Después cocer
A₁	19'89	12,7
A₂	26'73	18,4
A₃	26'96	16,1
B₁	21'78	13,2
B₂	19'11	10,8
B₃	16'92	9,7

TEXTURA; DUREZA con sonda WARNER-BRAZTLER. Fuerza de corte o cizalla.

Metodología

Prismas de 1 x 1 x 3 cm, longitud paralela a la dirección de las fibras, músculo semimembranosus, texturómetro equipado con sonda Warner-Braztler (tiene forma de muela con los bordes romos), registro de fuerza máxima y trabajo total requeridos para cortar el prisma por el centro.
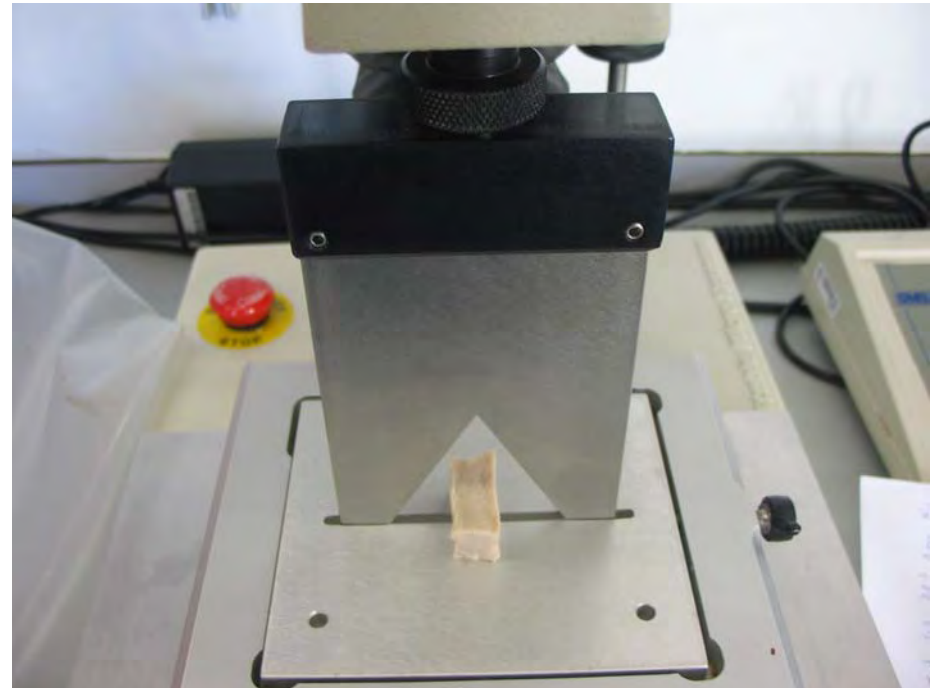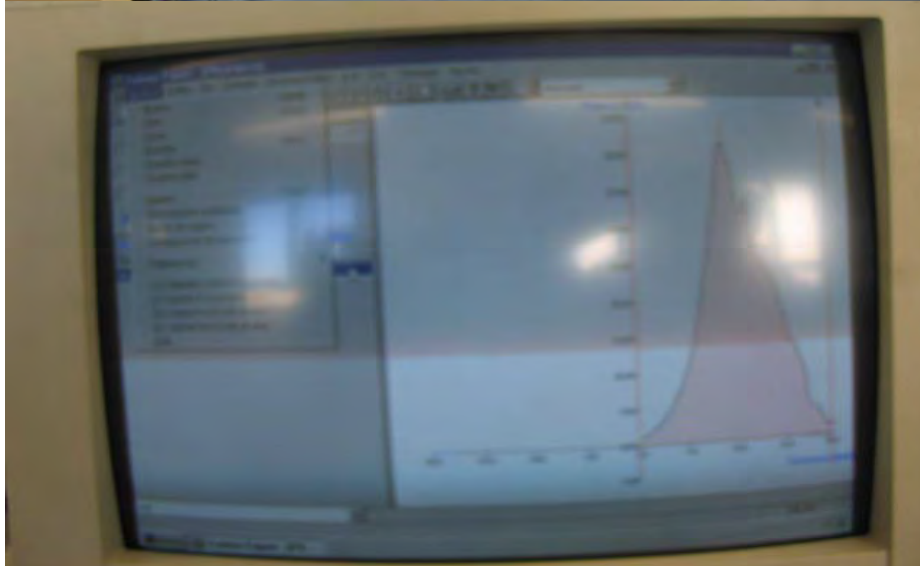
TEXTURA; DUREZA con sonda WARNER-BRAZTLER. Fuerza de corte o cizalla.

Metodología y resultados

N mm	Fmax	Area
A_1	52,26	422,7 Nmm
A_1'	73,29	641,1
A_2	41,75	335,2
A_2'	29,43	251,9
A_3	59,6	527,7
A_3'	60,8	532,8
B_1	21,13	189
B_1'	9,96	90,1
B_2	18,39	155,5
B_2'	14,38	115,3
B_3	20,6	207,8
B_3'	19,9	186,7

TEXTURA; Perfil de textura (TPA): fuerza de deformación –dureza-, elasticidad, masticabilidad, cohesividad.
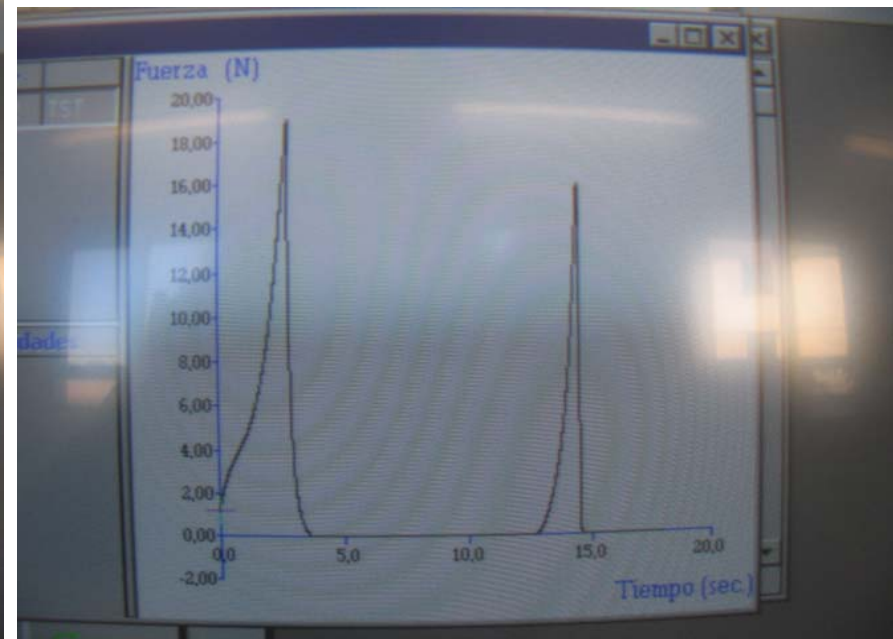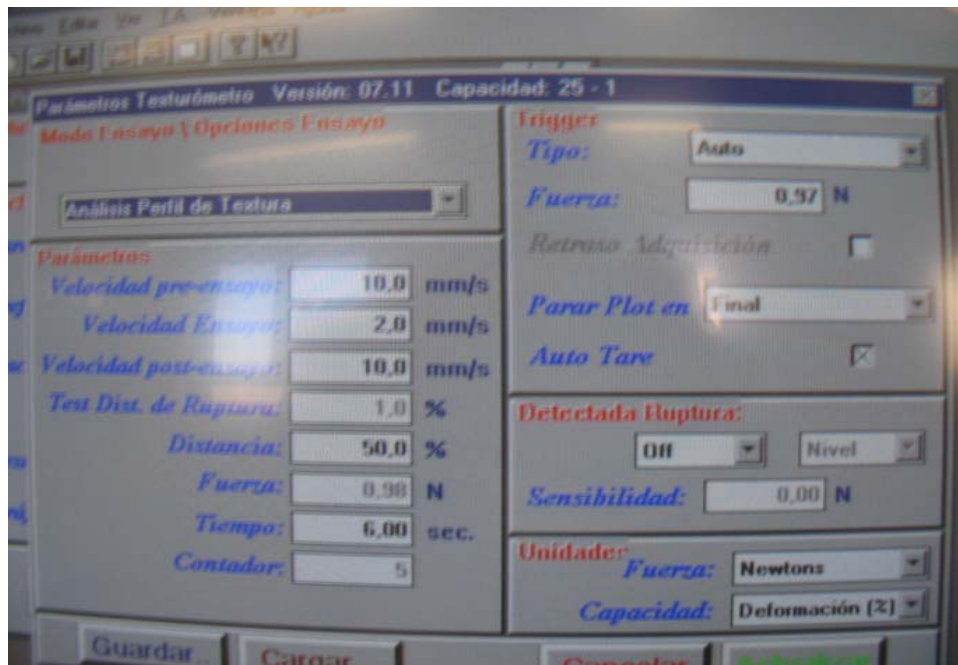
Metodología

Cubos de 1 cm de lado, músculo semimembranosus, texturómetro equipado con sonda cilíndrica que realiza dos ciclos de compresión. Registro de fuerza máxima, áreas, tiempos de uno o de los dos ciclos.

TEXTURA; Perfil de textura (TPA): fuerza de deformación –dureza-, elasticidad, masticabilidad, cohesividad, resilencia.

Metodología y resultados

Conceptos TPA

Parámetros TA
pre ensayo 2.00 mm/s
ensayo 1.00 mm/s
post " 2.00 mm/s
(ST) Ensayo de Ruptura 40 mm
Distancia 10.0 mm
Fuerza 0.98 N
Tiempo 5

Celula carga 50 kg
TC refrigerada
Tipper auto 0.05
Detear prof. final
Ruptura Desactiva
Anal. 0.4

Stable Micro Systems

TPA

Texture profile analysis (TPA) is an objective method of sensory analysis pioneered in 1963 by Szczesniak [1] who defined the textural parameters first used in this method of analysis. Later in 1978 Bourne [2] adapted the Instron to perform TPA by compressing standard-sized samples of food twice.

TPA is based on the recognition of texture as a multi-parameter attribute. For research purposes, a texture profile in terms of several parameters determined on a small homogeneous sample may be desirable.

The test consists of compressing a bite-size piece of food two times in a reciprocating motion that imitates the action of the jaw (see figure 1 below for animation) and extracting from the resulting force-time curve a number of textural parameters that correlate well with sensory evaluation of those parameters [3].

The mechanical textural characteristics of foods that govern, to a large extent, the selection of a rheological procedure and instrument can be divided into the primary parameters of hardness, cohesiveness, springiness (elasticity), and adhesiveness, and into the secondary (or derived) parameters of fracturability (brittleness), chewiness and gumminess [4].
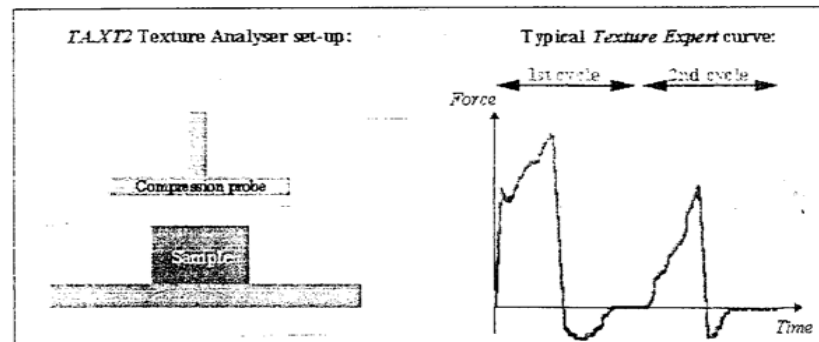

Figure 1. A typical TPA curve (to activate this animation click anywhere on the figure)

Since its development TPA has been well received and used extensively in research of textural properties of foods. However, it has on few occasions been critically examined and several modifications have been proposed. Terminology changes have not been universally adopted as they may not be entirely satisfactory due to differences in individual opinions and in traditions. There are 2 ways to attempt to satisfy such criticisms:
1) Change the definition of the parameter to fit the name;
2) Change the name of the parameter to fit the definition.
Texture Expert Exceed provides total flexibility by providing not only the *Fracture TPA* macro,
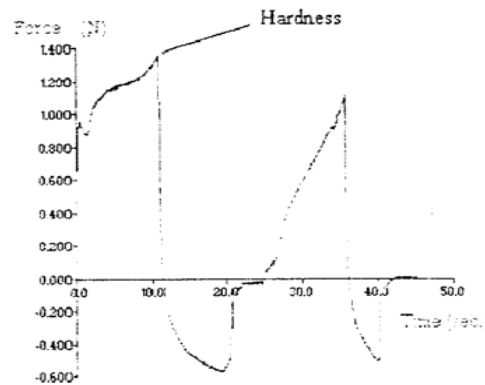
Conceptos TPA

Stable Micro Systems

Hardness

Hardness is defined as the maximum peak force during the first compression cycle (first bite) and has often been substituted by the term firmness.

Within Texture Expert Exceed the *TPA* macro will collect this parameter and display the value as *Force 2*. Units are kg, g or N.

Typical Texture Expert Exceed TPA plot highlighting source of Hardness parameter only:
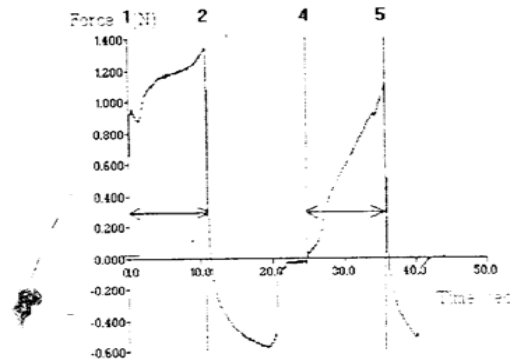
Conceptos TPA

Springiness

Springiness (originally called elasticity) is related to the height that the food recovers during the time that elapses between the end of the first bite and the start of the second bite.

Within Texture Expert Exceed the *TPA* macro will collect this parameter and calculate the value as *Time diff 4:5 / Time diff 1:2*. There are no units for this parameter.

Typical Texture Expert TPA plot highlighting source of Springiness parameter only:

anclaje inicio pico y maximo
de pico para ambos picos
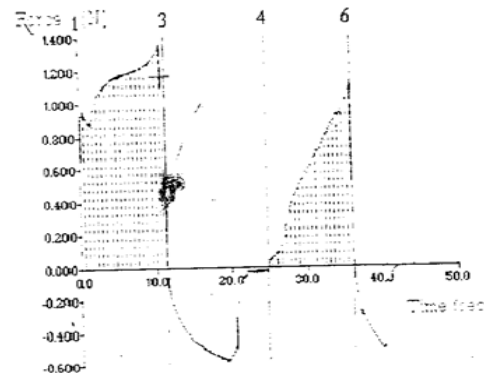
Conceptos TPA

Stable Micro Systems

Cohesiveness

Cohesiveness is defined as the ratio of the positive force area during the second compression to that during the first compression.

Cohesiveness may be measured as the rate at which the material disintegrates under mechanical action. Tensile strength is a manifestation of cohesiveness. If adhesiveness is low compared with cohesiveness then the probe is likely to remain clean as the product has the ability to hold together. Cohesiveness is usually tested in terms of the secondary parameters brittleness, chewiness and gumminess.

Within Texture Expert Exceed the *TPA* macro will collect this parameter and calculate the value as *Area 4:6 / Area 1:3*. There are no units for this parameter.

Typical Texture Expert Exceed TPA plot highlighting source of Cohesiveness parameter only:

anclaje
- inimicia al final y al inicio del primer
y segundo pico

7 y 8   9 y 10

Conceptos TPA

Stable Micro Systems

Chewiness

Chewiness is defined as the product of gumminess x springiness (which equals hardness x cohesiveness x springiness) and is therefore influenced by the change of any one of these parameters.

Chewiness, tenderness and toughness are measured in terms of the energy required to masticate a solid food. They are the characteristics most difficult to measure precisely, because mastication involves compressing, shearing, piercing, grinding, tearing and cutting, along with adequate lubrication by saliva at body temperatures.

It should be understood that the same product cannot exhibit both chewiness and gumminess, unless as a solid it becomes a semisolid during sensory mastication. Such a transition is practically never accomplished during instrumental TPA evaluation. Thus, it is incorrect to quantify and report chewiness and gumminess in TPA of solid or semisolid products. Chewiness should be reported for solids and gumminess for semisolids.

Within Texture Expert Exceed the *TPA* macro will collect this parameter and calculate the value as *Force 2 x (Area 4:6 / Area 1:3) x (Time diff 4:5 / Time diff 1:2)*. There are no units for this parameter.
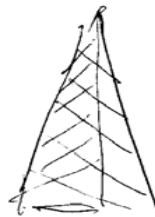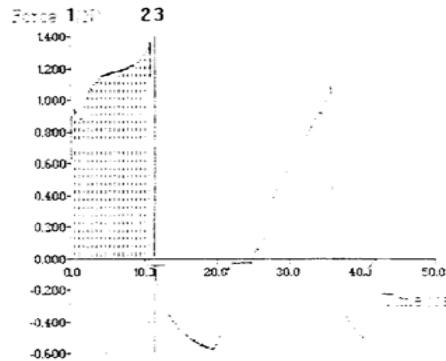
Conceptos TPA

Stable Micro Systems

Resilience

Resilience is a measurement of how the sample recovers from deformation both in terms of speed and forces derived. It is taken as the ratio of areas from the first probe reversal point to the crossing of the x-axis and the area produced from the first compression cycle. It is not a parameter from the original Texture Profile Analysis work but instead has developed from looking more closely at the elastic recovery of the sample.

In order to obtain a meaningful value of this parameter one should choose a relatively slow test speed to allow the sample to recover, if indeed the sample possesses this property.

Within Texture Expert Exceed the *TPA* macro will collect this parameter and calculate the value as *Area 2:3 / Area 1:2*. There are no units for this parameter.

CÁLCULO DE RESULTADOS DEL TPA

Fuerza máxima del primer ciclo (dureza): F (N)

Elasticidad, cociente entre el tiempo del segundo ciclo y el del primero: tp/tg

Cohesividad, cociente entre el área total del segundo ciclo y la del primero: Ap/Ag

Masticabilidad: dureza x elasticidad x cohesividad.

Resilencia (capacidad de recuperación tras la deformación): Am/Ap

○ Medidas ○

	F (N)	$A_g^{(Ns)}$	$A_m^{(Ns)}$	$A_p^{(Ns)}$	t_g s	t_p s	Dt s	Area Ns
A1	32'5 ~~0'816~~	35'88	26'59	16'2	2,57	1'68	8'59	No hay
A1'	~~19 total~~	22'76	19'39	8'96	2'81	1'53	8'95	No hay
A2	38'24	45'14	31'86	18'59	2'81	1'62	8'99	No hay
A2'	33'73	51'42 ~~4'68~~ 26'83 43'68	21'65 ~~5060~~	21'63 5020	3'15	2'1	8'58	No hay
A3	22'46	35'68	29'58	15'62	3'38	2'32	9'08	No hay
A3'	22'76	35'68	29'58	15'61	3'38	2'32	9'08	No hay
B1	22'08	24'2	22'65	12'56	2'77	1'92	8'75	No hay
B1'	23'87	25'58	21'11	12'39	2'81	1'84	8'63	No hay
B2	12'03	14'91	13'08	5'29	2'68	1'52	8'92	No hay
B2'	12'49	14'92	12'14	5'84	2'72	1'95	8'92	No hay
B3 (calcsb)	21'55	33'24	21'36	14'29	3'13	2'41	8'59	No hay
B3 (calcb3c)	40'94	55'34 46'82	24'56	3'21	2'1	8'75	No hay