



Evaluation of a packaging system for Ca and Fe added milk



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Milk is frequently sold in UHT boxes, or polyethylene sachets at low temperature (aprox.4° C).

The aseptic packaging system tested in this work (EVOH barriers), showed that milk shelf-life can be extended for five months at room temperature in a more economic way. Sensory, physicochemical, and microbiological evaluation was done on two kind of milk samples, Ca added milk (300 mg/200ml) and Fe added milk (2.1 mg/200ml).

These samples were maintained at 20 °C and 65% HR during the study.

Sensory evaluation was carried out by using a hedonic rating method with a 50 naive respondent's panel.

For physicochemical evaluation, pH, acidity and ethanol stability were tested.

For microbiological evaluation, Stability test and further Total Aerobic Plate Count (30 °C) were done.

In both cases, physicochemical and microbiological results showed that the samples were in proper conditions for consumption for five months and even more.

The sensory evaluation showed a little decay (from 7 to 6 in the nine-point hedonic scale) at the second month, but maintained the same level over all the period of this study.

Key words: milk, packaging, shelf - life

MATERIALS

MILK SAMPLES	Ca		Fe	
	Portion 200 ml		Portion 200 ml	
calories	89 kcal	116 kcal		
carbohydrates	9,4 g	9,4 g		
protein	6,2 g	6,2 g		
total fat	3,0 g	6,0 g		
saturated fat	1,8 g	3,8 g		
Na	100 mg	100 mg		
VIT A	144 ug	184 mg		
VIT D	0,8 ug	0,8 ug		
VIT E	5 mg	5 mg		
Ca	300 mg	240 mg		
Fe	*****	2,1 mg		

RESULTS

	STORAGE TIME days	pH	ethanol stability	lactic acidity (g/100 ml)	stability test	aerobios mesofilos
						UFC/mg
Ca	5	6,69	stable	0,116	w.o	<10#
	60	6,56	stable	0,119	w.o	<10#
	90	6,62	stable	0,115	w.o	<10#
	105	6,70	stable	0,095	w.o	<10#
	120	6,59	stable	0,120	w.o	<10#
	135	6,54	stable	0,124	w.o	<10#
Fe	5	6,62	stable	0,099	w.o	<10#
	60	6,66	stable	0,103	w.o	<10#
	90	6,54	stable	0,106	w.o	<10#
	105	6,54	stable	0,122	w.o	<10#
	120	6,58	stable	0,109	w.o	<10#
	135	6,54	stable	0,124	w.o	<10#

PACKAGING SYSTEM

The packaging system is a low density film, co-extruded in seven layers. The layer in the middle is the EVOH barrier (ethylene vinyl alcohol).

The packages and the milk samples were supplied by CONAPAC S.A. (URUGUAY).

METHODS

The samples were maintained at 20°C + 2°C and 65% RH + 5% during the study.

Physicochemical methods:

pH: APHA 16th p.31 Dairy Products
 ethanol stability: FIL 48:1969
 acidity: FIL 86:1981

Microbiological method

Stability test: APHA "Compendium of methods for the Microbiological Examination of Foods" 4th Ed. 2001.

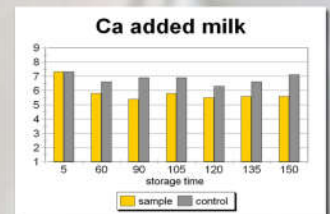
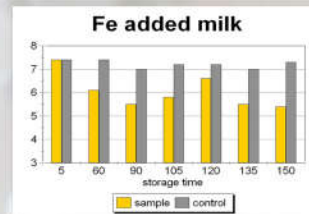
Total Aerobic Plate Count (30°): APHA "Compendium of methods for the Microbiological Examination of Foods" 4th Ed. 2001.

Sensory method

Hedonic rating: 9 points scale, with 50 naive respondent's panel.
 Statistical analysis: t-student at a level p<0.05.

SENSORY RESULTS

STORAGE TIME days	Fe SAMPLE		Ca SAMPLE	
	CONTROL	CONTROL	CONTROL	CONTROL
5	7,4	7,4	7,3	7,3
60	6,1	7,4	5,8	6,6
90	5,5	7,0	5,4	6,9
105	5,8	7,2	5,8	6,9
120	6,6	7,2	5,5	6,3
135	5,5	7,0	5,6	6,6
150	5,4	7,3	5,6	7,1



SHELF - LIFE

Polyethylene sachets
 3 - 5 days
 at 4°C



Boxes (UHT milk)
 6 months
 at room
 temperature



Sachet with EVOH barrier (ultra pasteurized milk) in this study
 5 months
 at room
 temperature



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