



## EFFECT OF SYMBIOTIC ICE CREAM SUPPLEMENTATION ON IMMUNE RESPONSE, GENERAL HEALTH, SLEEPINESS AND MOOD OF MILITARY IN FIELD TRAINING.

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### Abstract

The aim of this study was to evaluate the effect of symbiotic ice cream supplementation on immune response, mood and health parameters of military volunteers from the "Escola Preparatória de Cadetes" (Army Preparatory School) from Campinas during field training. This evaluation was done through the collection of saliva for the evaluation of IgA and through the application of questionnaires in three phases: after the washout period ( $t = 0$ ), after supplementation in the period prior to field training ( $t = 1$ ) and after field training ( $t = 2$ ). It was possible to observe that after training there was a significant decrease in salivary IgA for both symbiotic and placebo group. In addition, the symbiotic group had significantly increased tranquility and reduced tension after training while the placebo group did not show changes in both states after training. These results demonstrate the importance of investigating the effects of probiotics associated with prebiotics on gut - brain axis.

### Key words:

Probiotic, prebiotic, supplementation.

### Introduction

Simulation of acute survival - a common practice among military - may impair the immune system and can result in some health problems, and can also negatively influence the mood and well-being of these individuals (EDWARDS et al., 2013; LIEBERMAN et al., 2005). Probiotics have been suggested as health promoters by reducing the symptoms above mentioned (FLOCH et al., 2008). The aim of this project was to observe the effects of symbiotic ice cream consumption in health-related events of military volunteers after the field training period.

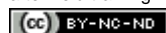
### Results and Discussion

This was a randomized double-blind study, with 65 students (male and female) divided into two groups (symbiotic and placebo) which received 60g of ice cream during 30 days produced by our group at *Instituto de Tecnologia de Alimentos* (Food Technology Institute) from Campinas. Each consumption portion of the symbiotic ice cream had 2,5g of prebiotic (inulin),  $1.2 \times 10^{10}$  and  $1.2 \times 10^{11}$  CFU of the probiotics *L. acidophilus* LA5 and *B. animalis* BB12, respectively. The placebo ice cream had no pre and probiotic addition, but was incorporated of 0,1% of CMC (carboxymethyl cellulose) to mimic the texture of the symbiotic product. The present study was approved by the Ethics Committee (n 90850718.8.0000.5404). The immune system status was evaluated through salivary IgA values, and the state of mood and well-being, general health and sleepiness were evaluated through questionnaires application. Regarding salivary IgA (values expressed at Table 1) there was a significant reduction for both groups, being placebo  $p < 0.01$  and supplemented  $p < 0.001$ . However the consumption of symbiotic ice cream did not preserve salivary IgA values after the field training period.

Table 1. Salivary IgA analysis

Group		Mean	Std. D.	p
Placebo	pre	24,87	34,60	<0,01
	post	9,90	8,76	
Symbiotic	pre	23,53	17,17	<0,001
	post	10,13	6,19	

$p < 0.05$  indicates statistical difference. Pre and post - before and after field training.



Regarding the state of humor and well-being, the results are expressed at Table 2. It was observed that before and after the training both groups had an increase in the happiness state after the field training period, and the placebo group maintained the state of sleepiness.

While the placebo group did not have a significant change in the state of tranquility and tension after the training period, the symbiotic group has demonstrated elevation of the state of tranquility and reduction of the state of tension, and both differences were statistically significant.

This indicates that probiotics associated with prebiotics have the potential to modulate mood and well-being through their action on the gut-brain axis.

Table 2. Mood and well-being analysis

Variable	Placebo Group			Symbiotic Group		
	Mean	Std. D	p	Mean	Std. D	p
Happy	pre	7,95	2,33	0,002	7,99	2,21
	post	8,98	1,43		8,69	1,97
Tranquil	pre	6,47	2,81	0,44	6,78	2,42
	post	6,86	2,63		7,7	2,36
Tense	pre	2,89	2,56	0,77	2,85	2,5
	post	3,02	2,89		1,41	2,03
Sleepy	pre	4,89	2,34	0,06	3,79	2,33
	post	5,8	3,02		6,6	2,87

$p < 0.05$  indicates statistical difference Pre and post - before and after field training.

### Conclusions

Although symbiotic ice cream was not effective in maintaining salivary IgA levels after field training period, the supplementation was effective influencing the gut-brain axis, with some positive consequences on mood and well-being states, such as the reduction of tension and increased tranquility. Thus, other effects related to the gut-brain axis need further studies, expanding the target public for supplementation.

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