

Full Length Research Paper

Testing the sensory acceptability of biltong formulated with different spices

Flávia Edite J. M. Dzimba, José de Assis F. Faria* and Eduardo Henrique M. Walter.

Department of Food Technology, Faculty of Food Engineering, CP 6121, State University of Campinas – UNICAMP, 13083-862 Campinas-SP, Brazil.

Accepted 24 September, 2007

Biltong is a traditional meat product widely consumed in South Africa and other countries. In this work different formulations of biltong were prepared, using either traditional South African or Brazilian (salt, sugar, nitrite, pepper, allspice, aniseed, garlic, onion, coriander and, or, pineapple juice) spices and sensory evaluated. The appearance acceptability of the alternative formulations was judged as being more accepted than the traditional one, possibly due their lighter colour. There were no statistical differences ($P \leq 0.05$) among them with respect to flavour. Some consumers cited that the tenderness of formulation with pineapple juice was softer. In fact, 77% of the consumers reported liking this formulation slightly or more. The main reason cited by consumers for liking the flavour of biltong was their pleasant seasoning. The product, in general, was described as being hard, but readily softened by the saliva when chewed. Overall, the results suggested that, with a little adaptation of its original formula, it would be possible to introduce biltong as an acceptable snack or delicatessen in Brazil and different South American markets.

Key words: Biltong, sensory acceptability, spices, pineapple.

INTRODUCTION

Biltong is a well known uncooked dried meat product widely consumed in South Africa and many other countries (van der Riet, 1982; Attwell, 2003). In Brazil three ethnic products derived from beef are widely consumed: *Carne-de-sol*, *Charque*, and Jerked Beef (Carvalho Jr, 2003). Although produced using the same principles of preservation used in South American's dried meat products, lowering of its water activity by salting and dehydration, there are differences in the formulation and method of preparation of biltong that make it quite peculiar and unique. Unlike South American's dried meat products, biltong does not need re-hydration or cooking treatment prior to consumption. It is a ready-to-eat meat product and seems to be a potential snack in several popular diets, where consumption of increasing amounts of proteins and less carbohydrates are encouraged.

Biltong can be prepared from beef or other similar meat

source. It is flavoured with spices such as aniseed, coriander, allspice or garlic. The condiments can be mixed with pepper and added to the salt, but other optional ingredients are nitrite, sugar, and saltpetre, which promote a red colour to the product (Thomas, 1975; Osterhoff and Leistner, 1984; Prior, 1984). Many of these formulations are passed from generation to generation. The product is microbial stable at the barrier combination of water activity 0.77 and pH 5.5 (Osterhoff and Leistner, 1984), although many consumers prefer "moist" biltong (Attwell, 2003) with a *Aw* usually ranging from 0.85 to 0.93 (Osterhoff and Leistner, 1984).

Besides many African countries, biltong has found markets in Australia, Portugal, United Kingdom, and United States of America (Attwell, 2003). In spite of the fact that South American food habits are strongly influenced by African culture, this product is completely unknown in South America. Growth of meat consumption in South America is strongly related to the emerging middle class of urban populations. For these consumers, traditional methods of meat preservation, such as salting and drying, play an important role in the meat marketing

*Corresponding author. E-mail: assis@fea.unicamp.br. Phone: 55 19 3521-4016. Fax: 55 19 3289-3617.

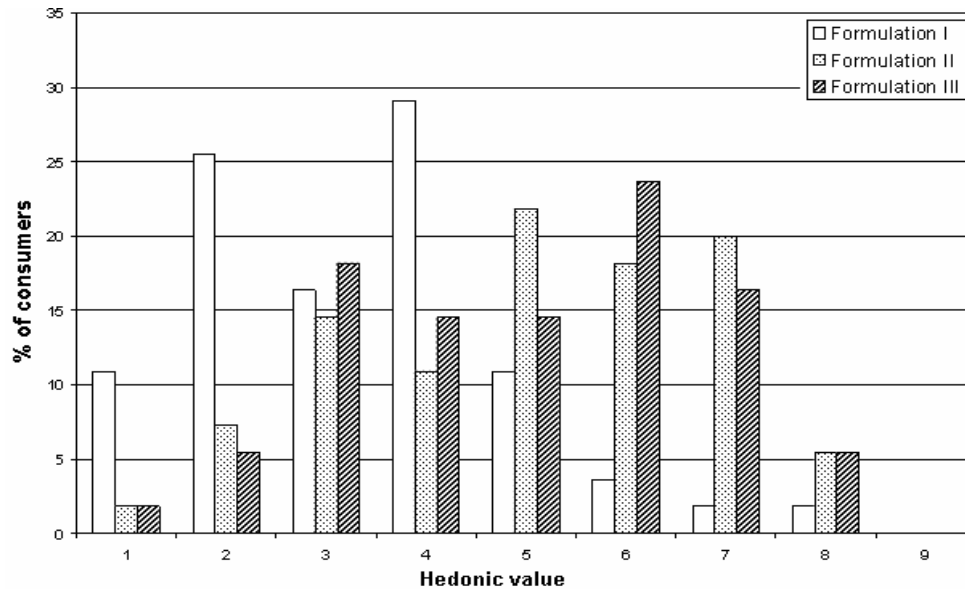


Figure 1. Acceptability of biltong appearance.

structure, nowadays considered a delicacy food type.

The success or failure of new food products depends on many factors, but one interesting aspect is the cultural elements. Cultural elements such as food habits, cooking techniques, and health concepts, strongly influence the acceptability of a new product among consumers. However, of all the variables influencing food acceptability, the sensory attributes of the product are the most important. Therefore the objective of this work was to evaluate the sensory acceptability of biltong formulated with the traditional South African spices and compared with typical Brazilian spices.

MATERIALS AND METHODS

Processing of biltong

The manufacture of biltong was carried out following the Prior (1984) methodology. Hindquarter beef muscles were cut into strips of approximately 15 - 20 x 2 x 1.5 cm along the grain of the muscle. Three different formulations were used for the biltong manufacture.

Formulation I - Biltong was prepared with spices from South Africa, Safari Biltong *Seasoning*[®] (Crown National, Chempet, South Africa). In this formulation, the cuts were sprinkled on both sides with seasoning and laid on a tray. Every 30 min, the cuts were turned over, and after 4h they were hung to dry at 35 ± 3 °C for 36 h in a drying cabinet.

Formulation II - Biltong was processed using typical South American spices. The formula was adapted to local flavour expectations by using the following ingredients: salt (3%); sugar (0.72%); nitrite (150 mg per kg meat); pepper, allspice, aniseed, garlic, and onion (0.024%) and coriander (0.50%). The meat was dry salted and left overnight under refrigeration (10 ± 2 °C) to allow the salt to penetrate. The meat was then dried in a drying cabinet at 35 ± 3 °C for 36 h.

Formulation III - Biltong was prepared as described in Formulation II, but with added pineapple juice as a source of the enzyme bromelain. The first step of the process consisted of immersing the meat in the pineapple juice (*Ananas comosus* L. Merr) for 15 min at 5 °C. The meat was then dry salted with the mixed spices as in Formulation II, left overnight and dried.

Sensory evaluation

A panel of 55 untrained judges of both sexes was recruited among students and staff of the Faculty. Each panellist was selected according to his potential as a consumer of the product. Initially panellists were asked to evaluate the appearance of the samples and then decide if they would like to taste them or not. They were requested to justify their option. For panellists who decided to taste the samples, the three Formulations were served in random order. Panellists evaluated the samples seated in individual booths equipped with red lights to mask colour differences. Panellists used a 9-point hedonic scale (9 = like extremely; 1 = dislike extremely) to grade how much they liked or disliked each sample (Stone and Sidel, 1993).

Statistical analysis

The statistic of the data was done by analysis of variance (ANOVA) and Tukey Test, using SAS[®] software (SAS 1985). A significance level of 5% was used for all comparisons.

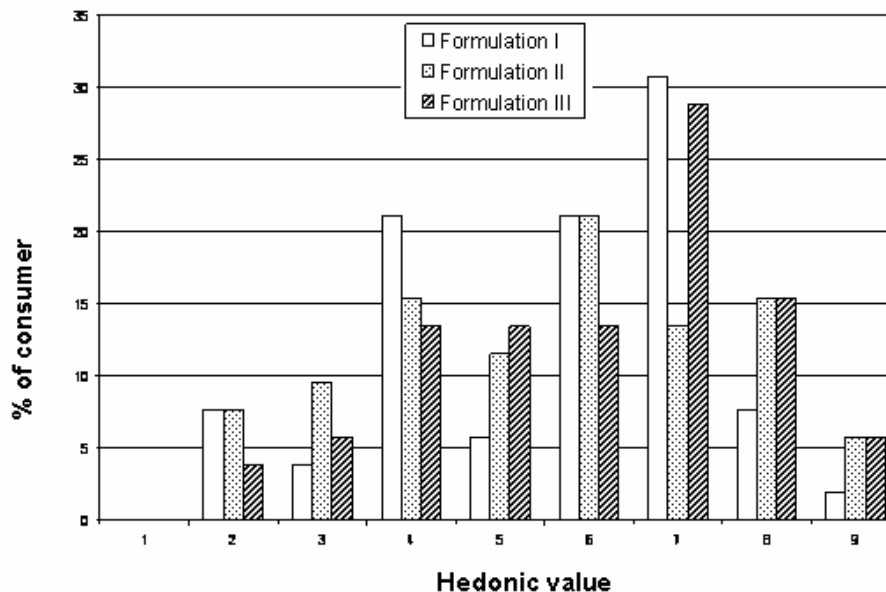
RESULTS

Figure 1 shows the acceptability by consumers based on the appearance of tested biltong. It can be seen that while 18% of the consumers liked Formulation I, nearly 65% liked Formulation II and 60% liked Formulation III, with a grade of 6 (liked slightly) or higher on the hedonic scale.

Table 1. Acceptability means of biltong appearance and flavour.

Acceptance	Formulation I	Formulation II	Formulation III
Appearance	3,31 ^b	5,05 ^a	4,98 ^a
Flavour	5,62 ^a	5,60 ^a	6,02 ^a

* Means are based on 9-point intensity scale (1=dislike extremely; 5=neither like nor disliked; 9=like extremely). In the same line formulations with common letter (s) did not differ significantly ($p \leq 0.05$) among them.

**Figure 2.** Acceptability of biltong flavour.

Means for appearance acceptability of the samples and results of the Tukey test are presented in Table 1. In fact, Formulation I was judged as being statistically different ($p \leq 0.05$) from Formulations II and III, being the least accepted among them. There were no statistical different ($p \leq 0.05$) between Formulations II and III, and they showed mean acceptability close to the term “neither like nor dislike” on the hedonic scale.

Figure 2 shows the results of flavour acceptability for the three Formulations. Nearly 67% of the consumers liked the flavour of Formulations I and II. Formulation III was more acceptable showing 77% consumer acceptability. None judge attributed the value 1 (dislike extremely) to the flavour of any Formulation and nearly 2% of them liked Formulation I extremely, while 6% liked Formulations II and III extremely. Formulations II, III, and I were not statistically different ($p \leq 0.05$) among them with respect to flavour acceptability.

DISCUSSION

The majority of the consumers invited to evaluate biltong liked to taste it. They referred to curiosity as the reason to

taste biltong. The appearance acceptability of the alternative formulations II and III was judged as being more accepted than the traditional formulation I, possibly due to their lighter colour.

The main reason cited by consumers for liking the flavour of biltong was their pleasant seasoning. The product, in general, was described as being hard, but readily softened by the saliva when chewed. Some consumers cited that the tenderness of Formulation III was softer. It is possible that the pineapple protease, the bromelain, was successful in improving meat tenderness. It is known that pineapple enzymes is one of the most commonly used meat tenderizers for food processing in home cooking and industrial processes (Lizuka and Aishima, 1999).

This work has shown that, even though biltong is a product completely unknown to South American consumers, the sensory characteristics of the product are acceptable among them. An alternative biltong formulation, using both pineapple juice to soften the meat, and popular South American spices instead of typical South African condiments better fulfilled the consumers expectations towards the snack sensory attributes; obtaining the best acceptability values.

This study clearly indicated that, with some further limited improvements in the biltong formulation, it would be possible to introduce this meat product as an acceptable snack or a premium delicacy in Brazil and others markets.

ACKNOWLEDGEMENTS

The authors thank the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) of Brazil, which provided the scholarship for the first author. Appreciation is extended to Council for Scientific and Industrial Research (CSIR) - Republic of South Africa, for their permission to use their facilities for this research, and Crown National, for the Safari biltong seasoning.

REFERENCES

- Attwell E (2003). Biltong wakes up. *Food Rev.* 30:11-13.
- Carvalho Jr. BC (2003). The ethnical origin of the main meat processed products of Brazil. In: 49th International Conference of Meat Science and Technology held at Campinas, Brazil, pp. 121-127.
- Lizuka K, Aishima T (1999). Tenderization of beef with pineapple juice monitored by fourier transform infrared spectroscopy and chemometric analysis. *J. Food Sci.* 64:973-977.
- Osterhoff DR, Leistner L (1984). South African biltong - another close look. *J. S. Afr. Vet. Assoc.* 55:201-202.
- Prior BA (1984). Role of micro-organisms in biltong flavour development. *J. Appl. Bacteriol.* 56:41-45.
- SAS (1985). SAS/STAT User's Guide Version 5.0. Cary, North Carolina, USA: SAS Institute Inc.
- Stone HS, Sidel JL (1993). Sensory evaluation practices, 2nd Ed., Academic Press, San Diego, CA, USA.
- Thomas PL (1975). Dried meat products. *CSIRO Food Res. Quarterly.* 35:73-78.
- van der Riet WB (1982). Biltong a South African dried meat product. *Fleischwirtschaft.* 62:1000-1001.