VITAMIN CONTENT OF PARMA HAM

Giovanna Saccani[1], Giovanni Parolari[1] and Laura Gabba[2]

1. Experimental Station for the Food Processing Industry, Parma- Italy
2. C.R.P.A. Research Centre of Animal Production

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Background:
In industrialized countries, meat is a major source of nutrients. Pork muscle is typically low in fat and rich in protein, iron and water-soluble B vitamins, which are essential for metabolism regulation and cardiovascular and central nervous activity. One of the objectives of modern meat technology is to address processing techniques minimally affecting or even improving the meat nutritional value. Studies have evidenced that dry-curing can improve the meat nutritional value, as occurs with dry cured hams, where large amounts of free amino acids result from the endogenous enzymatic activity taking place during maturation. (1-4). However, little is known about the fate of the vitamins in dried hams.

Objectives:
The aim of this study was to characterize Italian dry-cured ham (Parma ham) in terms of B vitamins (thiamine, riboflavin, pyridoxine and niacin) and folate contents. A major objective of this work was to evaluate changes of vitamin content at several stages of processing.

Methods:
Samples (n=65) were purchased from three Parma ham manufacturers and were representative of hams at various phases of the process (green state, end of salting, end of resting , half maturing, 12-months aged, 15-months aged and 18-months aged). By regulation, dried hams can be sold as Parma hams when at least 12-months old.

A 3-cm. thick middle section was obtained from each ham and submitted to proximate composition, thiamine, riboflavin, pyridoxine, niacin and folate analyses. (5)

Results and discussion:
Contents of B-group vitamins and folate in raw meat and matured (12 months) Parma hams were as shown in table 1. According to the RDA set approved by the European Union Council in 1997 (6), raw pork appears to provide
≥ 15% of recommended intake for all the vitamins investigated, except folate; in particular, 100 g of pork provide about 30% of niacin and 80% of thiamine requirement. Parma ham also is a valuable source of B-group vitamins as 100 g of Parma ham supply about 70% of thiamine and pyridoxine and 40% of niacin.

Table 1: Vitamin content of raw pork meat and dry cured Parma ham (mean value ± std. dev.)

Vitamin		units	Fresh pork meat	Parma ham
Thiamine	B1	mg/100 g	0.93 ± 0.06	0.85 ± 0.41
Riboflavin	B2	mg/100 g	0.18 ± 0.02	0.21 ± 0.06
Niacin	PP	mg/100 g	4.74 ± 0.27	6.75 ± 3.20
Pyridoxine	B6	mg/100 g	0.62 ± 0.06	1.00 ± 0.27
Folate		µg/100 g	8.9 ± 0.5	12.3 ± 1.6

In table 2 the vitamin content of ham samples are grouped according to their age (processing stage). Contents are referred to dry matter so that comparison between stages (ANOVA) can be made. Data show that during the process there was no significant depletion of the vitamins except thiamine, whose content seems to be affected early in production, exhibiting major losses after resting (fig. 1). In contrast, all the other B vitamins were unaffected, as shown by the stacked graph reporting the total amount of B-group vitamins (fig. 2), whose sum is stable even after prolonged (>15 months) ageing.

Table 2 : B vitamins and folate (mg or µg/100g dry matter ± std.dev.) in hams at several processing phases.

Ageing phase	thiamine [mg/100g dry matter]	riboflavin [mg/100g dry matter]	pyridoxine [mg/100g dry matter]	niacin [mg/100g dry matter]
fresh leg	3.35 ± 0.25*[a]	0.63 ± 0.08* [a]	2.23 ± 0.23	17.16 ± 1.34
resting phase	2.55 ± 0.57*[b]	0.40 ± 0.07* [b]	2.36 ± 0.49	12.24 ± 2.13
half ageing	1.60 ± 0.40*[c]	0.42 ± 0.15 * [b]	2.00 ± 0.80	12.45 ± 7.33
12 months	1.97 ± 0.97*[c]	0.45 ± 0.12* [b]	2.41 ± 0.85	14.53 ± 3.59
15 months	1.92 ± 1.30*[c]	0.52 ± 0.20* [b]	1.98 ± 0.33	14.76 ± 4.58
18 months	2.07 ± 0.59*[c]	0.51 ± 0.07* [b]	2.59 ± 0.53	17.74 ± 11.7

Different superscripts along columns denote significant difference * = $p < 0.05$

Conclusions:

Despite a very long ageing process, dried hams can be regarded as a main source of B-group vitamins, as they can provide a major quote of total daily requirement. The 'mild' technology as adopted in Parma ham manufacturing, relying on no additives, limited salt addition, extended cold storage and maturation under controlled temperature and RH conditions, may be a means to preservation of most nutritional properties of raw muscle.

References:

1. Virgili R, Parolari G, Schivazappa C, Soresi Bordini C, Borri M (1995) Sensory and texture quality of dry-cured ham affected by endogenous cathepsin B activity and muscle composition. *Journal Food Science* **60**, 1183-1186.
2. Barbieri G, Bolzoni L, Parolari G, Virgili R, Buttini R, Careri M, Mangia A (1992) Flavour compounds of dry cured ham. *Journal Agricultural and Food Chemistry* **40**, 2389-2392.
3. Parolari G (1996) Review: achievements, needs and perspectives in dry cured ham technology: the example of Parma ham. *Food Science and Technology International* **2**,69-78.
4. Garcia C, Bertaguè J. L, Antequera T, Lopez-Bote C, Cordoba J.J, Ventanas J (1991) Volatile components of dry cured Iberian ham. *Food Chemistry* **41**,23-32.
5. Mallozzi S. (2001) Caratteristiche nutrizionali del prosciutto di Parma: aggiornamento del contenuto vitaminico. Dissertation Thesis.
6. EUC (1990) Council directive on nutrition labelling for foodstuff (90/496) *Official Journal European Communities* **L 276**, 40-44.

Fig 1. Thiamine content in hams at main processing phases.

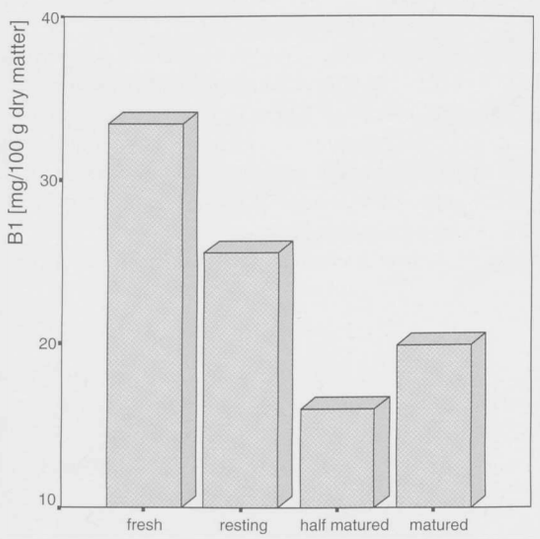

Fig 2: B-group vitamin (sum) content in hams at main processing phases and after prolonged ageing.