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Original Article

The nutrient composition of South African lamb (A2 grade)

S.M. van Heerden[a,*], H.C. Schönfeldt[b], R. Kruger[b], M.F. Smit[c]

[a]*ARC-LBD: Animal Production, ARC-IRENE, Private Bag X2, Irene 0062, South Africa*
[b]*Department of Business Economics, University of Pretoria, Pretoria 0002, South Africa*
[c]*ARC–Biometry Unit, Private Bag X519, Silverton 0127, South Africa*

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Abstract

Dorper and Merino lamb carcasses of the A age group with a fat code 2 (±7% SCF) from three main production areas in South Africa were used for this study. The right sides of the carcasses were used to determine the raw nutrient and physical (carcass) composition of each cut as well as for the whole carcass by calculation. Three cuts (shoulder, loin and leg) from the left side were cooked in order to determine the nutrient composition thereof. Nutrients showing the greatest differences between raw and cooked treatments, were protein, total fat, C16:0 saturated fatty acid (SFA) and C18:1n9c monounsaturated fatty acid (MUFA). Moisture losses due to cooking resulted in an increase in the protein and cholesterol concentrations of the cooked cuts. Iron content was lower in the cooked loin cut but increased in the cooked leg cut when compared to the corresponding raw cuts. The vitamin B content of all three cooked lamb cuts was lower, although not significantly so, than that of the corresponding raw cuts. Lamb is a good source of protein, iron and the B vitamins, especially vitamin B_{12} when cooked.

Keywords: Nutrient composition: South African lamb; Leg; Loin; Shoulder cuts

A knowledge of the chemical composition of foods is the first essential in dietary treatment of disease or in any quantitative study of human nutrition (McCance and Widdowson, 1940).

1. Introduction

As in many other countries, South Africa is actively involved in analysing foods for the compilation of food composition data. Currently, only 41% of all South African food values in the Medical Research Council's (MRC) tables are derived from South African foodstuffs (South African Food Composition Data (SAFCoD), 2000). The current data on mutton (lamb and sheep) that appears in the MRC's food composition tables of 1999, are derived from the United States Department of Agriculture (USDA) database (Sayed et al., 1998). These data are not directly applicable and therefore it is appropriate that South Africa compiles sound scientific nutrient data for South African lamb and mutton.

It is important that different countries have their own food composition tables for meat cuts (and products) such as lamb, mutton, beef and pork. The reason being, that different techniques are used to cut carcasses into primal cuts. Different age groups and fat codes of the animals in various countries make the interpretation of the results difficult (Schönfeldt, 1998) as the composition of the carcasses has a direct influence on the nutrient content thereof. The difference in climate, soil content and water composition of the various regions furthermore affects the nutrient content (specifically the minerals and vitamins) of the animal feed, as well as the production of vitamin D in the meat itself (Greenfield and Southgate, 2003). Table 1 provides a comparison and variation of macro- and micro-nutrients when different databases are used, and illustrates that the use of different food composition tables may cause conflicting interpretation of dietary intake data. For instance, the iron content suggests that South African

*Corresponding author. Tel.: +27 12 672 6212; fax: +27 12 665 1551.
E-mail address: ina@arc.agric.za (S.M. van Heerden).

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Table 1
Nutrient values in lean lamb, expressed per 100 g cooked edible portion, for selected countries

Nutrients	Unit	South Africa[a]	USA[b]	UK[c]	Australia[d]	New Zealand[e]
		Cooked leg and shank	Cooked leg roasted, lean and fat	Cooked lamb roast	Cooked fresh leg and shank half	Cooked leg (shank and sirloin)
		Lean (±7% SCF)	Lean and fat	90% meat	Trimmed to $\frac{1}{8}$ in fat	12% separable fat
		100 g	3 oz/85 g	100 g	100 g	100 g
Proximate analysis						
Moisture	g	66.03	57	58.70	59.2	63.92
Protein ($N \times 6.25$)	g	24.46	22	24.30	29.3	27.68
Fat	g	7.67	14	13.30	11.9	7.01
Ash	g	1.05	—	—	1.10	1.52
Food energy (calculated)	kJ	722	931	905	937	757
Minerals						
Magnesium (Mg)	mg	23	—	24	19	21
Potassium (K)	mg	303	266	350	290	183
Sodium (Na)	mg	62	56	61	66	45
Zinc (Zn)	mg	1.71	—	4.5	4.5	4.04
Iron (Fe)	mg	1.20	1.7	1.9	2.4	2.24
Vitamins						
Thiamin (B_1)	mg	0.06	—	0.15	0.06	0.12
Riboflavin (B_2)	mg	0.05	0.23	0.27	0.25	0.50
Niacin (B_3)	mg	1.63	5.6	4.5	4.5	7.51
Pyridoxine (B_6)	mg	0.10	—	0.22	—	0.14
Cyanocobalamin (B_{12})	µg	1.06	—	4	—	2.63
Lipids						
SFA	g	4.07	5.9	6.1	6.1	3.05
MUFA	g	3.16	5.9	5.3	4.3	2.75
PUFA	g	0.29	1.0	0.7	0.2	0.41
Cholesterol	mg	92	79	98	109	10063

SCF: subcutaneous fat; SFA: saturated fatty acids; MUFA: monounsaturated fatty acids; PUFA: polyunsaturated fatty acids; —:unreliable values omitted, currently being re-analysed.
[a]Data from this study.
[b]Gebhardt and Thomas (2002).
[c]Chan et al. (1996).
[d]Lewis et al. (1995, vol. 1).
[e]United Stated Department of Agriculture (1989).

lamb is, on average slaughtered at a younger age than that of the United States of America's and British values and substantially younger than that of the Australian and New Zealand's. Iron content of meat is positively correlated with the age of the animal (Lawrie, 1998).

Another aspect of nutrition is food choices, which have a direct impact on a person's health status. These choices are repeated over a long period (years or decades) and have major positive or negative health effects (Kruger et al., 2003). Therefore, in order to evaluate a person's food intake, according to the Recommended Dietary Allowance (RDA), the nutritional composition of the diet is calculated by making use of food composition databases, either in computerised software or printed form. This information provides the average nutrient content for a given amount of food, based on the chemical analysis of a number of food samples. Information on the nutrient content of a particular food can also be used as a standard reference to determine nutrients obtained from the foodstuff consumed throughout a country (Latham, 1997).

In developing countries, such as in South Africa, one of the major health concerns is the poor nutrient content, specifically micronutrients, of the diet. Iron deficiency resulting in anaemia, is the most common deficiency in the world that causes ill health. Data from the South African National Food Consumption Survey (Steyn et al., 2000) showed that children aged 1–9 years had low mean intakes of iron, protein, B-vitamins and minerals such as zinc and iodine. Consequently, nutrient deficiencies are widespread in all societies in South Africa.

Certain segments of our population are consuming significant amounts of lamb, and yet there is a lack of comprehensive, South African nutrient composition data on lamb. Following the need for data on the composition of South African lamb and mutton, as identified by the SAFCoD, the Animal Nutrition and Animal Products