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Cholesterol and fat contents of animal adipose tissues

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Adipose tissues dissected from camel, lamb and beef carcasses were analysed for total lipids and cholesterol contents in order to provide information to consumers and health care professionals. Differences were observed between the adipose tissues in term of lipids and cholesterol contents. The adipose tissues contained an average of 80·22% of lipids with individual samples ranging from 71·25% to 92·17%, while cholesterol values ranged from about 135 mg up to 184 mg per 100 g adipose tissues. This range of values, therefore, reflects natural levels. Camel adipose tissues tended to have lower levels of cholesterol than beef and lamb adipose tissues. The adipose tissue of kidneys has the highest concentration of cholesterol (greater than hump fat, tail fat and subcutaneous fat). Minor differences were observed in subcutaneous fat cholesterol levels between high and low energy feeds, and castrated and non-castrated beef at similar animal ages. Some beef adipose tissues contained higher amounts of cholesterol than literature values.

INTRODUCTION

Consumers presently are very conscious of the lipid content of foods as this is related to their health. In this connection, dietary cholesterol level has become an important issue since several publications have recommended a reduction in cholesterol consumption as a means of preventing heart disease. Dietary cholesterol, total quantity and saturation of the fat are the major areas of interest (Weir & Clifford, 1982). The food and nutrition board's committee on diet and health recommended that the fat content of the US diet should not exceed 30% of caloric intake, that less than 10% of calories should be provided from saturated fatty acids, and that dietary cholesterol should be less than 300 mg/day (NRC, 1989).

Fats from adipose tissues could have commercial applications as hardening agents, shortening, butter substitutes, and cooking oils (Bussey *et al.*, 1981; Defouw, 1981).

Feeley *et al.* (1972) reported that cholesterol may be avoided by selecting meat with little or no marbling and by trimming away separable fat. Total cholesterol intake from red meat must be reduced by trimming off the separable fat, especially subcutaneous or external fat (Rhee *et al.*, 1982*b*). However, the benefit of removing the separable fat is to reduce triglyceride intake rather than cholesterol intake since triglyceride is the starting material for the synthesis of cholesterol in the body.

On the other hand, Hoelscher *et al.* (1988) studied the subcellular distribution of cholesterol within muscle and adipose tissues of raw and cooked loin steaks from cattle of different USDA quality grades and subcutaneous adipose tissue trim levels. They indicated that trim levels had little effect on the subcellular distribution of cholesterol in adipose tissue. Consequently, meat with some marbling shrinks less during cooking and remains juicier. Subcutaneous fat also minimizes drying and moisture loss during dry heat roasting (Forrest *et al.*, 1975). The range of cholesterol values that are available for meat is wide and often affected by dietary factors, age, sex and analytical method used (Kunsman *et al.*, 1981). In a review of the cholesterol content of foods, beef fat ranged from 76 to 131 mg per 100 g of tissue (Sweeney & Weihrauch, 1976).

Ryan & Gray (1984) reported that beef tallow was found to contain 0·14% cholesterol by weight. Eichhorn *et al.* (1986) studied cholesterol content (mg per 100 g wet weight) of muscle and adipose tissue from bulls and steers. They found that sampling site effects were highly significant with subcutaneous adipose tissue (101·7) and perinephric adipose tissue (89·7) containing the most cholesterol, and longissimus muscle (58·3) containing the least. The use of young intact males, rather than castrates, for beef production can increase the percentage of polyunsaturated fatty acids in beef

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