Chapter 15
Lipids in Ruminant Nutrition and Its Effect on Human Health

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ABSTRACT

Scientific evidence and nutritional guidelines recommend a reduction in total fat intake, particularly of saturated fatty acids, which are associated with an increased risk of obesity, hypercholesterolemia, and cancer. Nutritionists recommend a higher intake of polyunsaturated fatty acids (PUFA), especially n-3 PUFA at the expense of n-6 PUFA. Besides the beneficial effects of n-3 fatty acids on human health, the conjugated linoleic acid (CLA) isomers have attracted increased attention as a result of their health promoting biological properties. As milk and meat are the main sources of CLA for human consumption, increasing such important nutrient in animal products is strongly recommended. Fat supplementation is one of the methods of increasing PUFA content in ruminant products, and it has been shown that PUFA can be increased in milk by supplementation with vegetable oils and oil seeds. Vegetable oils as equivalent to oilseeds show similar effects on CLA content in ruminant products.

INTRODUCTION

An adequate supply of good-quality food is essential for human health and well-being. Ruminant's products represent important sources of nutrients in human diets, providing a nearly ideal pattern of amino acids and energy. In addition, meat and milk contain several compounds of anti-carcinogenic properties. Conjugated linoleic acid (CLA) as one of these components has numerous potential benefits for human health, including potent cancer-fighting properties. This is especially interesting considering that most of natural anti-carcinogens are of plant origin.

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On the other hand, nutritional quality has an important consideration in food choices because of the growing consumer awareness of the link between diet and health. The goal of increasing the efficiency of animal production has been, and continues to be, an important consideration in producing animal-derived food products. There is also increasing recognition that foods can be contributing factors in the prevention and development of some disease conditions. Many foods contain micro-components that have many effects beyond those associated with their traditional nutrient content, and these are often referred to as ''functional food'' components. "Functional foods" is a generic term used to describe food components that have beneficial effects on human health above those expected on the basis of their nutritive value. In other words, "functional foods" must have a relevant effect on well-being and health or cause a reduction of disease risk. Polyunsaturated fatty acids (PUFA), and especially of n-3 or ώ-3 fatty acids represent one of these microcomponents in animal products.

In times of growing world populations, climate change, and with the damage to critical resources, it is important to take action to develop and sustain the capacity of agricultural and systems of manufacturing to continue to provide food for human. Functional foods" is a generic term used to describe food components that have beneficial effects on human health above those expected on the basis of their nutritive value. It represents an important category for the economic growth of different countries of the world. Concerns about health risks are growing; therefore, increased attention must be given to providing functional food in a sustainable manner to control these concerns. This chapter contends that it is substantial to finds ways to estimate the effects of innovation in this division.

The present chapter focused on:Fat chemistry that related to fatty acid composition of feeds and animal products and its functions. The different polyunsaturated fatty acids and its isomers and the importance of CLA. Factors affecting meat and milk fat content of CLA including the different dietary and animal factors. How to increase CLA content in animal product dietary manipulation and production system. Dietary lipids and human health.

FATTY ACIDS CHEMISTRY

Types of Fatty Acids

Fatty acids are classified as saturated or unsaturated fatty acids. They differ in length and often categorized as short, medium, or long chain fatty acids. Unsaturated fatty acids have one or more double bonds between carbon atoms. The two carbon atoms in the chain that are bound next to either side of the double bond can occur in a *cis* or *trans* configuration.

A *cis* configuration means that adjacent hydrogen atoms are on the same side of the double bond. A *trans* configuration, by contrast, means that the next two hydrogen atoms are bound to opposite sides of the double bond. As a result, they do not cause the chain to bend much, and their shape is similar to straight saturated fatty acids (SFA) **(Fig. 1).** In most naturally occurring unsaturated fatty acids, each double bond has three *n* carbon atoms after it, and all are cis bonds (Bhalla*et al*., 2009).