

Mayank Tandon. 2004. Studies on the Effect of Bypassing Dietary Fats from Bio Hydrogenation on Serum Fatty Acids Profile, Growth & Nutrient Utilization in Young Growing Heifers. **M. Sc.** Thesis Submitted to **G. B. Pant Univ. Ag. & Tech., Pantnagar**, U. S. Nagar, Uttaranchal, India.
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CHAPTER 1

INTRODUCTION

The primary importance of ruminants for people is a source of both food and mechanical work. Animal food (milk, meat and its products) have an important fraction of the diet in most of the civilized societies and with increasing affluence, human-beings tended to increase the fraction of the diet provided by animal foods, especially from ruminants.

Concerns regarding human consumption of ruminant products have been raised in the last few years. Ruminant fat especially has been criticized; because it contains more saturated fatty acids (SFAs) and less polyunsaturated fatty acids (PUFAs) than vegetable or fish oil. Evidences had been accumulating to indicate that the intake of saturated fatty acids linked to increase heart attack, cardio vascular and other lifestyle diseases, while the long chain PUFAs are effective in reducing the risk of coronary heart diseases as they are antiarrhythmic and antithrombotic (Department of Health, 1994; Barlow *et al.*, 1990). Beneficial effect have been reported for other mono and polyunsaturated fatty acids, such as oleic (18:1), linoleic (C18:2), linolenic (C18:3) (McDonald *et al.*, 1989). Recently conjugated linoleic acid (CLA) [mixture of positional and geometrical isomers of (C18:2) which contains conjugated unsaturated double bond] has been found to have many health benefits, anticarcinogenic in nature and also helps in inhibition of atherosclerosis (Kewalramani *et al.*, 2003).

These concerns provided a stimulus to produce husbandry tactics leading to the modification of the composition of ruminant fats. Such recent developments in ruminant nutrition had renewed interest in the use of fats as sources of energy and of increasing animal efficiency by means of diets with high energy density and low heat increment. Also, attention had been drawn to the possibility of protecting poly unsaturated fatty acids (PUFAs) that were susceptible to bio-hydrogenation in rumen. As a consequence, nutritionists all over the world have taken it as a challenge to ameliorate ruminant fatty acid composition, with elevated linoleic acid and high ratio of PUFAs to saturated fatty acids (P/S ratio) suggested by Grande *et al.*, (1972) to make it feasible for nearly all persons to design a satisfying diet that met the desiderata of clinical advisors.

Feeding protected PUFAs (Kenelly, 1996) or by-passing (Raman Rao and Petit, 2000) against ruminal bio-hydrogenation, would be a good strategy to improve ruminant productivity according to guidelines for human health by Food and Agriculture Organization (FAO) and World Health Organization (WHO).

However, the most common treatments for protection of dietary fats were either chemical (e.g. formaldehyde; Ca-soaps of fatty acids) or physical (e.g. heating). The former would be difficult to be accepted by consumers who wish to buy safe and healthy products (FAO and WHO), while the later could increase the proportion of *trans* isomers in FAs and produce 'non-natural' milk. In fact, FAs with *trans* isomers are usually considered to be related to abnormalities (e.g. cardiovascular diseases and cancer).

It was, therefore imperative to find out ways of increasing poly unsaturated fatty acids (PUFAs) in milk without increasing the proportion of their *trans* isomers.

Bypassing dietary fats from bio-hydrogenation would be a good strategy to improve ruminant productivity.

Normal level of bio-hydrogen happened to be about 5 per cent of the total of rumen gases, a product of the binary fermentation (Van Soest, 1982; Bondi, 1987). An essential feature of anaerobic systems appeared to be application of the 'stoichiometric laws of chemical balance' and therefore all oxygen must be derived from feed and

water. The basic problem of anaerobic rumen metabolism happened to be the shortage of oxygen and excess of reduced enzymes, which are badly in need of 'SINKS' for utilization of bio-hydrogen. If these hydrogen sinks are provided by way of natural sources of high degree of unsaturated fatty acids, for utilization of bio-hydrogen of the rumen, the dietary fat would be bypassed without protection and

MORE DOLLARS FOR SAFETY

The Bush administration will propose an agricultural budget for the 2004 fiscal year that includes a 20 per cent increase in spending for food safety, said Ann M. Veneman, Secretary of the US Department of Agriculture (USDA), speaking at the 55 Annual International Poultry Exposition. In upcoming budget, the president will seek record levels of support for USDA's food safety programs as well as an increase in efforts to strengthen agriculture protection systems, Veneman said, USDA's food safety budget will increase to a record level of \$797 million in fiscal year 2004, under the president's proposal. That is an increase of \$42 million over the fiscal year 2003 request and represents, \$148 million or a 20 per cent increase in food safety program since this administration came into office.

The proposed \$42 million increase would support activities of the USDA's food safety and inspection service such as product inspectors; veterinarians' specialized training or inspectors; increases microbial specialized training or inspectors; increases microbial testing; strengthened foreign product surveillance system and new food safety public education efforts the Secretary said.

Source: Livestock & Feed Trends, June-July, 2003.

therefore, this could be an economical answer to improve the ruminant products with maximum poly unsaturated fatty acids.

Keeping in view the above facts, present study is proposed with the following objectives:

1. Preparation of edible fat capsules of vegetable oils with high degree of unsaturation.
2. To know the effect of feeding different vegetable oils containing unsaturated fatty acids.
 - (a) On degree of unsaturation of bypassed PUFAs in the blood on growing crossbred heifers.
 - (b) On the digestibility of different nutrients and growth in crossbred heifers.