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STUDIES ON FATS, OILS AND VANASPATIS

By

N. D. Kehar and Associates

Division of Animal Nutrition

Indian Veterinary Research Institute, Izatnagar



INDIAN COUNCIL OF AGRICULTURAL RESEARCH
NEW DELHI

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Contents

	Page
Preface	iii
Chapter I. Introduction	1
Chapter II. Chemical constants of pure <i>ghee</i>	5
Chapter III. Vitamin A and carotene content of fats and oils	13
Chapter IV. Chemical constants of vegetable oils, <i>vanaspatis</i> and lard	23
Chapter V. Digestibility of fats and oils	31
Chapter VI. PART I. Growth promoting value of fats and oils when incorporated in a synthetic diet.	37
Part II. The comparative growth promoting value of fats and oils when incorporated in Indian dietaries	57
Chapter VII. Effect of fats on reproduction and lactation	67
Chapter VIII. Blood picture of rats ingesting various fats and oils	75
Chapter IX. Effect of fats and oils on protein metabolism	79
Chapter X. Influence of fats on absorption of calcium and phosphorus	85
Chapter XI. Absorption of carotene and liver storage of vitamin A	91
Chapter XII. Effect of fats and oils on the requirements of B-vitamins	101
Summary and conclusions	107
References	112

PREFACE

Fat is an essential constituent of human dietary. An average Indian prefers *ghee* (clarified heated butter) to oil or any other type of fat. But during the second World War, most of the articles of human consumption were in short supply and so was *ghee*. The shortage of *ghee* and its high price had made it out of the reach of the bulk of the populace. Hydrogenated vegetable oils, commonly known as *vanaspati*, became popular in the early forties, as they resembled *ghee* and were cheaper.

In view of the divergent opinion of scientific workers on the nutritive value of different fats and oils and as hydrogenated vegetable oil was often sold in the market as 'vegetable *ghee*' it became imperative to study in detail, the nutritive value of 'vegetable *ghee*' in relation to the *ghee* prepared from butter.

The Indian Council of Agricultural Research appreciated the significance of this important problem both from the point of view of animal husbandry and public health and financed a broad based and extensive six-year scheme beginning from April 1944.

These investigations deal with the nutritive value of different oils and fats in relation to growth, reproduction and lactation, and their effect upon the absorption and utilization of vitamins (A and B), calcium, phosphorus and protein. They also provide information on the chemical constants of both heated and unheated *ghee* and raw, refined and hydrogenated oils.

The exploratory experiment of Part I of this project was initiated by my predecessor, Dr K. C. Sen in April, 1944. But, soon after, he was appointed Director, Indian Dairy Research Institute, Bangalore and left this Institute. I took over charge of this investigation in August 1944 and had been associated with it till it was completed in April, 1950. The staff engaged in this scheme had been undergoing frequent changes, and during the course of six years, four Research Officers and six Research Assistants had changed hands. Their names appear under the chapters with which their work is connected.

Though portions of the work, comprised in this project extending over a period of six years, could normally have been published earlier, it was considered desirable from the administrative point of view that investigations on all aspects of this important problem should be completed and considered *in toto* before releasing for publication.

I take this opportunity of expressing my gratitude and also of my associates, to the Indian Council of Agricultural Research for financing this investigation. I am especially indebted to Sir Datar Singh, Vice President, Indian Council of Agricultural Research and Shri P. N. Nanda, Animal Husbandry Commissioner with the Government of India for their keen interest in the development of this project.

To Dr S. Datta and Dr F. C. Minett, the present and former Directors, Indian Veterinary Research Institute, Izatnagar, I tender most sincere thanks for the sustained interest evinced by them in this work and for the kind support and encouragement extended during the period of this investigation.

I am also grateful to the Hindustan Vanaspati Manufacturing Company Ltd., Bombay and the Modi Vanaspati Manufacturing Company Ltd., Modinagar for supplying part of our requirements of hydrogenated fats, free of cost.

In the end, I express my grateful thanks to the Statistical Adviser, Indian Council of Agricultural Research, for analysing and interpreting these results and also to Mr. M. R. Mahajan, Assistant Animal Husbandry Commissioner, for his continued interest in the execution of this investigation and for constructive and helpful criticism in the presentation of these results.

*Indian Veterinary Research Institute,
Izatnagar, 1950*

N. D. KEHAR,
*Head of the Division of Animal
Nutrition*

decrease the efficiency of the oils for the hepatic storage of vitamin A. Hydrogenation too appeared to adversely affect the capacity of the parent oil to promote vitamin A storage in liver.

(v) *Vitamin B requirement*

It was observed that, at the sub-optimum level of thiamine intake of 5 γ daily per head, cow *ghee*-fed rats made significantly better gains than those fed on the corresponding oils and *vanaspatis*. At other levels of thiamine ingestion, when there were either losses or fairly good gains in body weight, there were no significant differences between the various fats. Refining or hydrogenation did not seem to have any significant effect on the thiamine sparing action of the oil.

A similar study carried out to compare the riboflavin requirement in the presence of different fats showed that, when the daily allowance of riboflavin was 4 γ or less per head, riboflavin-depleted rats getting cow *ghee* as the dietary fat showed significantly better growth than litter mates fed vegetable oils or 'Vanashpati'. The superiority of cow *ghee* disappeared when the average dose of riboflavin was increased to 8 γ per head daily. No differences between the oils and *vanaspatis* were observed at any of the levels of riboflavin intake.

Summing up, it would seem that, with the sub-adequate dietaries that are widely prevalent in most regions of this country, the replacement of cow *ghee* by vegetable oils—raw, refined or hydrogenated—over long periods, is likely to lead to adverse effects such as decreased growth, higher vitamin requirements, lower Ca and P absorption, etc. However, when the deficiencies of the dietaries are removed and the ration made adequate in all essential nutritional factors, the difference between cow *ghee* and the vegetable oils or *vanaspatis* tends to disappear and all of them seem to have about similar nutritive values. Between the different oils as also between the parent oil and its hydrogenated product, however, there seems to be no significant difference in most of these respects, under the conditions studied.

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