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Abstracts

Oils and Fats

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REPORT ON ETHER EXTRACT IN FISH. M. D. Voth (Food and Drug Admin., Boston, Mass.). *J. Assoc. Official Agr. Chem. 29,* 46-9 (1946). Collaborative work indicated that the fat content determined by digestion with HCl followed by extraction with ether agrees closely with that obtained by the Stansby and Lemon extractor.

SOUTH AFRICAN FISH PRODUCTS XX. MODE AND DEGREE OF FAT STORAGE IN THE CAPE JOHN DORY (ZEUS CAPENSIS C. AND V.) IN RELATION TO CHEMICAL COMPOSITIONS OF THE LIVER AND BODY FATS. M. M. Black, W. S. Rapson, H. M. Schwartz, and N. J. Van Rensburg. (Univ. Cape Town, So. Africa). *J. Soc. Chem. Ind. 65,* 13-15 (1946). Component acid analyses have been carried out on body and liver oils from the Cape John Dory (*Z. capensis* C. and V.) in fat or thin condition. In both liver and body, increase in fat content of the fish results in an increase in the content of the highly unsaturated C_{20}, C_{22}, and C_{24} acids in the oil, and a decrease in the degree of average unsaturation of the C_{18} and C_{20} acids. In the liver the latter effect is dominant and therefore the I value of the liver oil tends to decrease with increase in fat content of fish; in the body, however, the former effect prevails and increase in I value of the body oil results.

THE VITAMIN A AND CAROTENE CONTENT OF MARKET BUTTER PRODUCED IN KANSAS. D. B. Parrish, W. H. Martin, F. W. Atkeson, and J. S. Hughes (Kan. Agr. Exper. Sta., Manhattan). *J. Dairy Sci.* 29, 91-9 (1946). The 1944 mean annual vitamin A potency of Kansas butter was 15,100 I.U. per pound. The mean for the period December to April was 11,050 I.U. per pound, and from May to November, 17,700 I.U. per pound. In the above periods carotene accounted for 19.6%, 14.9%, and 21.4% of the total vitamin A potency of Kansas butter. The vitamin A and carotene content of butter produced in different areas of the state and during different months of the year varied with the pasture available. When little or no pasture existed the values for vitamin A and carotene dropped.

THE HIGHER FATTY ALCOHOL ESTERS OF GALLIC ACID. S. G. Morris and R. W. Riemenschneider (Eastern Regional Res. Lab.). *J. Am. Chem. Soc. 68,* 500-1 (1946). The normal hexyl, octyl, dodecyl, tetradecyl, hexadecyl, and octadecyl esters of gallic acid have been been prepared and characterized. They were obtained by first preparing the corresponding esters of 4,5,6-tris-(benzyloxy)-benzoic acid and then debenzylating them by catalytic hydrogenation.

THE NUTRITIVE VALUE OF TOBACCO-SEED OIL. K. E. Rapp, J. T. Skinner, and J. S. McHargue (Ky. Agr. Exper. Sta., Lexington). *J. Nutr. 31,* 273-82 (1946). When tobacco-seed oil was fed to rats at levels of 5, 15, and 30% of the respective rations it gave an average coefficient of digestibility of 97.9 as compared with 99.1 and 98.2 for cottonseed oil and butterfat, respectively. With paired feeding of refrigerated rations containing 30% of tobacco-seed oil and butterfat, respectively, growth rates of rats did not differ significantly. When fed *ad lib.* the difference in consumption of the 2 rations produced a greater rate of growth in rats fed butterfat. Of 6 rats fed refrigerated ration and 4 animals fed non-refrigerated ration containing 30% tobacco-seed oil for 5 weeks, during the period when growth is usually maximum, all proved to be fertile upon reaching maturity.

FATTY CONSTITUENTS OF TUBERCLE BACILLI AS GROWTH INHIBITORS OF THE SAME BACILLI. Buu-Hoi (École polytechnique, Paris). *Nature 156,* 392 (1945). A mixture of fat acids obtained from dead tubercle bacilli of a virulent strain of human origin was converted through the acid chlorides and amides into a mixture of primary amines. Although the initial material and the amides were practically inactive, the mixture of amines, as HCl salts, was bacteriostatic against tubercle bacilli growing on synthetic media in 1-10,000 dilution. Synthetic fat acid amines of the formula $R(R_2')C.\text{-}NR_2''$ were also found to be bacteriostatic against acid fast bacteria. (*Chem. Abs.* 40, 373.)

ENDOCRINE ASPECTS OF OBESITY. M. A. Goldzieher. (N. Y.) *Am. J. Dig. Diseases 13,* 40-54 (1946). A review.

CARCINOGENIC VALUE OF OXIDATED OILS. Sun-flower Oil. A. H. Roffo (Inst. Exptl. Med., Univ. Buenos Aires). *Am. J. Dig. Diseases 13,* 33-38 (1946). The carcinogenic process in oils is ascribed to the sterols they contain and which are oxidated by heating.

RESISTANCE TO EXTREME TEMPERATURE IN CONNECTION WITH DIFFERENT DIETS. L. P. Dugal (Univ. Mon-

treal), C. P. Leblond, and M. Thérien. *Can. J. Res. 23E,* 244-58 (1945). It has been found that a diet rich in fats is decidedly superior to one rich in carbohydrates (both diets being equicaloric and equivitaminic) for adaptation and resistance to cold on the drates and poor in fats is much more favorable than one rich in fats for conferring resistance to heat.

THE BUTTER-MARGARINE CONTROVERSY. H. J. Deuel Jr. (Univ. So. Calif.). *Science 103,* 183-7 (1946). The conclusions reached by several workers and organized committees are reaffirmed. Some of these follow. Human milk fat, in regard to its component acids has more resemblance to a typical margarine fat-blend than to butterfat (Hilditch and Meara). The Committee on Public Health Relations of the New York Academy of Medicine recommended that the manufacture, distribution, and utilization of oleomargarine be encouraged, it should be fortified with vitamin A at the uniform level of 9,000 U.S.P. units per lb., and that wide publicity, both by lay and professional groups be given the fact that oleomargarine, fortified by vitamin A, is nutritionally equal to butter. The Food and Nutrition Board of the National Research Council recorded that the present available scientific evidence indicates that when fortified margarine is used in place of butter as a source of fat in a mixed diet, no nutritional differences can be observed. Finally it is stated that we can scarcely view with concern the increased use of margarine in the diet if that means that larger amounts of whole milk become available at a reasonable cost for human consumption.

THE ABSORPTION OF TRIGLYCERIDE FAT FROM THE INTESTINE. A. C. Frazer (Univ. Birmingham, England). *Physiol. Revs. 26,* 103-19 (1946). The Lipolytic Hypothesis of fat absorption, in its present form, fails to explain an increasing number of observations in this field, and many of the assumptions upon which it is based are in need of reconsideration. This conception of the fat absorption mechanism maintains that fat is completely hydrolyzed in the intestinal lumen, that the intestinal cell has an outer pavement membrane, that paraffins are not absorbed, that the adrenal glands control phosphorylation of fat in the intestinal cell, and that no significant amount of fatty material passes up the portal vein during absorption. None of these points is satisfactorily supported by the available evidence. In addition, the Lipolytic Hypothesis provides no adequate explanation of the fine emulsification of fat in the intestinal lumen, the differentiation between neutral fat and fatty acid absorption, the effect of added or inhibited lipolysis, the difference between the absorption of tributyrin and long-chain triglycerides, and the improvement in fat absorption when adrenalectomized animals are adequately salt-treated. The Partition Theory has been put forward as an alternative working hypothesis upon which further investigation of the many outstanding problems of fat absorption might be based.

INFLUENCE OF HOMOGENIZATION OF FAT ON HAIRCOAT OF DAIRY CALVES. W. Bate, D. Espe, and C. Y. Cannon (Iowa State Coll., Ames). *J. Dairy Sci. 29,* 41-3 (1946). Calves fed skim milk and soybean oil soon after birth lost hair over perineal region and the skin remained free from hair until they began to eat hay or grain. No calf lost any hair prematurely when fed skim milk into which soybean oil was homogenized. The authors are unable to offer any explanation for the condition described. The alopecia described has never occurred with calves fed unhomogenized fats if the calves were already eating hay and grain.

RELATION OF FAT TO ECONOMY OF FOOD UTILIZATION. I. BY THE GROWING ALBINO RAT. E. B. Forbes, R. W. Swift, R. F. Elliott, and W. H. James (Pa. State Coll.). *J. Nutr. 31,* 203-12 (1946). A comparison was made of 4 diets containing 2, 5, 10, and 30% fat, respectively, these diets being so compounded and fed as to supply to each rat of a litter-four the same quantities of gross energy, protein, and vitamins. The gains in live weight, the digestibility of N, and the retention of N and energy were in the order of the increasing fat content of the diets; the superiority of the 5% over the 2% fat diet with respect to the utilization of both protein and energy being much greater than the superiority of the 30% as compared with the 5% diet. II. BY MATURE ALBINO RAT. *Ibid.* 213-27. In harmony with results of a growth experiment in which the same diets were fed, the digestibility and the retention of food N were highest when the diet containing 30% fat was used. The heat increments of the dietary supplements containing 2, 5, 10, 30% fat, respectively, were equivalent to 36, 31, 29, and 20%, respectively of their gross energy. The decreasing energy expense of utilization of the isocaloric diets, in the order of their increasing fat contents, was due to decreasing heat from the catabolism of carbohydrate and from fat synthesis.

GROWTH AND FOOD PREFERENCE OF RATS FED A LACTOSE-DRIED MILK RATION CONTAINING BUTTER FAT OR CORN OIL. D. B. Parrish, E. R. Shimer, and J. S. Hughes (Kan. Agr. Exper. Sta., Manhattan). *J. Nutr. 31,* 321-31 (1946). All groups of rats fed *ad lib.* on butter fat rations made greater average gains in weight than those fed corn oil rations. The results were significant in 4 of the 7 experiments. All groups of rats fed butter fat showed a greater average consumption of the ration than did those fed corn oil. The results were significant in 3 of the 7 experiments. The gain in weight made on either ration was related to the quantity of food the rat consumed. The average efficiency of conversion of the food to body tissue over a 6-week period was similar for both the butter fat ration and the corn oil ration. When given a choice, hungry rats previously fed corn oil exhibit no preference for the butter fat ration over the corn oil ration. The results in these experiments were not found to be consistent for the rats fed the butter fat ration. Rations of the same composition, made of ingredients from different sources, did not cause the same growth response when used in simultaneous feeding experiments.

INFLUENCE OF THE WATER-SOLUBLE ANTIOXYGEN OF LIVER ON THE OXIDATION OF ETHYL ESTERS OF FAT ACIDS. P. Dubouloz, C. Gasquet, and G. Sebille (Univ. Marseille). *Compt. rend. soc. biol. 138,* 670 (1944). Beef liver was ground with sand, pressed, and the juice discarded. The pulp was dried at 50° and extracted with MeOH. The MeOH solution was extracted several times with petroleum ether to remove lipides, and the lipide-free solution was evaporated to dryness. The residue was taken up in dilute aqueous Na_2CO_3, made slightly acid, and again extracted with petroleum ether which was discarded. The aqueous solution was evaporated to dryness and the antioxygen extracted with ether. The addition of a very small

amount of the antioxygen to the mixture of Et esters of palm oil acids markedly retarded oxidation by air at 100°. (*Chem. Abs. 40,* 1191.)

INFLUENCE OF CHOLINE, CYSTINE, AND α-TOCOPHEROL ON THE OCCURRENCE OF CEROID PIGMENT IN DIETARY CIRRHOSIS OF RATS. J. Victor and M. Pappenheimer (Columbia Univ.). *J. Exptl. Med. 82,* 375-83 (1945). *l*-Cystine (5%) in a stock or low-protein diet produced ceroid deposits in rat livers; this effect was much greater in low protein than in stock diets. Choline (1%) had an inhibiting effect on the deposition of liver ceroid resulting from a low-protein diet containing excess cystine. The occurrence of ceroid pigment in the livers of rats on a low-protein diet, with or without the addition of excess of *l*-cystine, was transiently inhibited by the administration of α-tocopherol; 5% cod-liver oil in the diet did not prevent this effect of α-tocopherol. On low-protein, vitamin E-deficient diets, a rapid and progressive weight loss occurred after 4 months; this did not happen when α-tocopherol was added to the diet. (*Chem. Abs. 40,* 1209.)

ACTION OF LIVER EXTRACTS ON FAT, STEROL, AND VITAMIN A CONTENTS OF LIVER. A. S. Albrieux and Maria L. Rodriguez (Lab. central ministerio salud publica, Montevideo). *Anales asoc. quim. farm Uruguay 47,* No. 1, 27-30 (1945). Young rats were given repeated injections of liver extracts such as used for treatment of pernicious anemia but containing no vitamin A or thiamine. Their livers showed increases in fat, sterols, and vitamin A, compared to controls. This is attributed to the influence of some of the members of the vitamin B complex present in the liver extract. Apparently some factor stimulates the absorption of carotene and its conversion to vitamin A. (*Chem. Abs. 40,* 1213.)

EXPERIMENTAL LIPEMIA AND HYPERCHOLESTEROLEMIA BY PROTEIN DEPLETION AND BY CHOLESTEROL FEEDING IN DOGS. Tsan-Wen Li and S. Freeman (Northwestern Univ. Med. School, Chicago). *Am. J. Physiol. 145,* 660-6 (1946). The dogs fed the high-fat (33%) control diet with 25% of casein had some increase in serum total fatty acids but not in cholesterol. An increase of total serum fatty acids and cholesterol resulted in dogs fed the high-fat control diet with added cholesterol and in dogs fed the high-fat protein-deficient diet with or without cholesterol. The increase of cholesterol was proportionally more than that of total fatty acids in all 3 groups as indicated by the elevation of the lipemic coefficient. Though lipemia, fatty liver, decrease of hepatic dye clearance, and increase of serum phosphatase were all accompaniments of protein-deficiency and cholesterol feeding, yet no definite correlation was demonstrated.

THE IMPORTANCE OF EXOGENOUS FAT IN FATTY INFILTRATION OF THE LIVER OF DOGS. Tsan-Wen Li and S. Freeman (Northwestern Univ. Med. School, Chicago). *Am. J. Physiol. 145,* 667-75 (1946). The fat which accumulates in the liver of a protein-deficient dog is largely exogenous in origin. The evidence for this statement is as follows: (a) Livers were uniformly higher in fat on the high-fat protein-deficient diet with or without cholesterol when bile salts were added to the ration. (b) The initial depression of hepatic dye clearance was more striking in the dogs with added cholesterol and bile salt than those fed only the cholesterol supplement. (c) The fat content of liver increased as the fat content of the protein-deficient diet was increased from 2-7-15 and to 33%. The increase of Rose Bengal clearance comes later and is less marked in the dogs on the low fat diet. Some increase of total serum fatty acids and cholesterol occurred in protein-deficient dogs on a diet poor in fat. The reduction of hepatic dye clearance that occurs during the first 1-2 weeks when a dog is fed a protein-deficient diet with cholesterol is largely due to an accumulation of lipids in the liver. Exogenous fat impairs liver function in the protein-deficient dog.

EFFECT OF PROTEIN DEFICIENCY AND CHOLESTEROL FEEDING ON THE LIVER OF DOGS. Tsan-Wen Li and S. Freeman (Northwestern Univ. Med. School, Chicago). *Am. J. Physiol. 145,* 646-59 (1946). Fatty liver was produced in dogs maintained on a 33% fat protein-deficient diet for 10-16 weeks. There was no fatty infiltration at the end of the first week on this diet. Added cholesterol caused a uniformly higher total lipid and cholesterol content of the liver of protein-deficient dog. Two g. of casein per pound body weight daily can prevent fatty infiltration of the liver in dogs on a high fat diet for 16 weeks, but this protein intake is not sufficient to prevent "cholesterol" fatty livers. Protein depletion impairs hepatic dye clearance and causes elevation of serum phosphatase in dogs. Adding cholesterol to the high-fat protein-deficient diet resulted in an abrupt drop in dye clearance at the beginning of the experiment, and a uniformly higher elevation of serum phosphatase than that caused by simple protein deficiency. There is generally an inverse relationship between serum phosphatase and Rose Bengal clearance, but initially there was a disproportionally sharp drop of dye clearance in the cholesterol-fed protein-deficient dogs. Irrespective of the diet or duration of the experiment, all the dogs with increased liver lipids or cholesterol had a reduced dye clearance. However, the degree of impairment in dye clearance was not necessarily proportional to the fattiness or cholesterol content of the liver.

THE SIGNIFICANCE OF FATTY INFILTRATION IN THE DEVELOPMENT OF HEPATIC CIRRHOSIS DUE TO CHOLINE DEFICIENCY. P. Handler and I. N. Dubin (Duke Univ. School of Med., Durham, N. C.). *J. Nutr. 31,* 141-59 (1946). Diets high in fat containing 4-5% casein with starch as the carbohydrate and supplemented with cystine and cholesterol proved most suitable for the production of choline deficiency liver necrosis and fibrosis in albino rats. Thiamine deficiency or restricted food consumption prevented the accumulation of excessive liver fat and also liver necrosis. N'-methylnicotinamide was found to exert no lipotropic activity alone or in combination with homocystine. Inclusion of excess nicotinamide in an 18% casein diet produced extensive fatty infiltration but only minimal necrosis of the liver. It is suggested that the hepatic necrosis and fibrosis of choline deficiency may be the result of chronic fatty infiltration. The ingestion of an adequate quantity of good protein protects the liver from the deleterious effects of chronic fatty infiltration but this protective capacity is not based upon lipotropic activity alone.

THE INFLUENCE OF CHOLINE AND OF TRYPAN BLUE UPON THE UTILIZATION OF CAROTENE AND VITAMIN A FOR LIVER STORAGE OF VITAMIN A. L. S. Bentley and A. F. Morgan (Univ. of Calif., Berkeley). *J. Nutr. 31,* 333-46 (1946). The deposition of vitamin A in

the livers of depleted rats fed fixed amounts of vitamin A along with high-fat low protein diets was not affected by the presence of excess liver fat or choline deficiency. With a low-fat low-protein basal diet the addition of choline increased the liver vitamin A. When carotene was fed with the high-fat diets the liver vitamin deposits were very small and were somewhat less in the fatty than in the normal livers. With the low-fat diet the carotene produced better vitamin deposition, which was little affected by the presence or absence of choline. The hepatic accumulation of vitamin A was much the same when the vitamin was fed with high-fat and low-fat diets, regardless of liver fat, except for a slight decrease on the lard diet. When carotene was fed there was a definite depression of vitamin A storage on the high-fat as compared with the low-fat diets. It is concluded that the mechanisms of utilization and storage of vitamin A and carotene are probably affected by different conditions and that the composition of the accompanying vitamin-deficient basal diets is an important factor in determining their efficiency.

PATENTS

DEHYDRATION OF OIL. S. W. Briggs, W. C. Bauer, W. J. Ewbank, and R. C. Porter (Briggs Clarifier Co.). *U. S. 2,393,965.* The invention provides an apparatus for removing the moisture content from oil which includes means for heating the oil under pressure, and means for flashing the moisture containing oil into an expansion chamber in which the moisture content of the oil is vaporized and the unvaporized oil particles are collected.

DEGREASING BONES. C. Mueller. *U. S. 2,395,900.* In a glue or gelatine making process the degreasing of moist bone material consists in subjecting the animal bone material to a temperature of about 90-175° F. in a closed container and further subjecting the animal bone material to a higher pressure inside than outside of the bone material, thereby removing grease from the bone material.

TALL OIL TREATMENT. A. L. Osterhof (Hercules Powder Co.). *U. S. 2,396,471.* The resin acids are decarboxylated by heat in the presence of an organic sulfonic acid, the fat acids are neutralized and separated.

VALUABLE SUBSTANCES FROM TALL OIL. R. G. Dressler, R. E. Vivian, and T. Hasselstrom. *U. S. 2,396,646.* Tall oil is separated into fat and resin acids by alkylating the fat acids, adding organic solvent, saponifying the resin acids with aqueous alkali, thus yielding 2 layers; the fat acid ester being in the organic solvent layer and the resin soaps in the aqueous layer.

SEPARATING CONSTITUENTS OF TALL OIL. T. Hasselstrom. *U. S. 2,396,651.* The process of separating resin acid and fatty acid fractions from dried tall oil containing abietic acid comprises alkylation of fat acids with methanol; heating the residue with about 0.6% I at about 185-230° for about one hour; effecting crystallization of stabilized resin acids, and removing the crystallized resin acids from the mother liquor containing fatty acid esters.

METHOD OF PROPORTIONING VITAMIN CARRYING MEDIUMS IN FOOD PRODUCTS. A. C. Richardson (California Packing Corp.). *U. S. 2,395,067.* Livestock feeds are fortified with vitamin oils by emulsifying the oils in water and spraying the emulsion on the feed.

STABILIZING VITAMIN-BEARING MATERIALS. L. O. Buxton (National Oil Products Co.). *U. S. 2,396,679.* Vitamin oils and concentrates from fish are mixed with more stable oils as crude soybean, crude wheat germ, etc., and are heated to reduce objectionable odors and flavors and to stabilize the oil.

NATURAL ANTIOXIDANTS. L. O. Buxton (National Oil Products Co.). *U. S. 2,396,680.* A process for obtaining antioxidants from natural antioxidant-containing vegetable oils comprises contacting a vegetable oil containing natural antioxidants with isopropanol containing at least 10% water, and separating the isopropanol solution containing a highly active antioxidant extract from the remainder of the oil, said antioxidant extract having an I value lower than that of the original oil.

PROCESS OF PRODUCING NATURAL ANTIOXIDANTS. L. O. Buxton (National Oil Products Co.). *U. S. 2,396,681.* A process for obtaining antioxidants from vegetable oils with which they are associated comprises contacting a crude vegetable oil containing natural antioxidants with ethanol, the ratio of ethanol to oil being greater than one, and separating the ethanol solution containing a highly active antioxidant extract from the remainder of the oil, said extract having an I value lower than that of the original oil.

ANTIOXIDANT. I. Gubelmann (E. I. duPont de Nemours & Co.). *U. S. 2,396,097.* Special sugar amine compounds are used as antioxidants for soap, fat, oils, rubber, etc.

LUBRICATING OIL. B. H. Lincoln and G. D. Byrkit (Socony-Vacuum Oil Co.). *U. S. 2,395,889.* A lubricant comprises in combination a major proportion of oil lubricating viscosity and a minor proportion of the Ca salt of sulphurized oleic acid, said oleic acid sulphurized by reaction with Na trisulfide.

DEMULSIFIER. M. DeGroote (Petrolite Corp.). *U. S. 2,395,400.* The condensation product or chemical compound that constitutes the invention is obtained by reaction between fat acid or its functional equivalent, and a polymerized polyamine derived from a hydroxylated polyamine containing at least 1 N atom not directly linked to a hydroxy hydrocarbon radical.

ADHESIVE AND PRESERVATIVE FOR LEATHER. A. Benischek (I. G. Farbenind. A.-G.). *Ger. 741,056 Cl. 28a.* A mixture of triaryl phosphates and fatty oils or fatty acids is used as leather preservative. (*Chem. Abs. 40,* 486.)