NON-FOOD USES OF MEAT FATS

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Large quantities of animal fats are produced each year which are not used for food purposes. These tallows and greases result from the rendering of the so-called inedible tissues, trimmings, and waste fats from slaughterhouses, processing plants, retail markets, restaurants, and any other places where meat is handled. The meat packing and rendering industry is now producing this fat at the rate of approximately 2,782,000,000 pounds per year.

In finding uses for tallow and grease, it is necessary to consider the whole fats and oils picture as regards supply and demand since there is considerable interchangeability in the fats and oils and they compete directly or indirectly for markets. For example, we import sizable quantities of coconut oil. If a substitute was developed from domestic sources, then coconut oil would compete in the world markets with our other fats which we export, particularly tallow and grease.

During the past twenty years, the United States has shifted dramatically from having been a major importer of fats to a present position as the world's largest exporter. Exports, however, cannot be counted upon to relieve our surplus in future years. A recent report (Feedstuffs, June 7, 1958, pp. 1 & 4) indicates that exports for the past 6 months have been 25 per cent lower than for the same period a year ago.

New and expanded uses for tallow and grease are essential. New uses stem solely from research and it is evident that we have not had enough research developing new uses for tallow and grease. One of the factors which has deterred expenditures of sizable sums for such research by the producers has been the fluctuating price in comparison to the price of our natural resources such as coal, natural gas and petroleum oil. There have been tremendous sums spent for research on the development of useful articles from these sources and, for every research worker developing uses for tallow and grease, there are literally hundreds working on coal, gas and oil. The universities have not and are not turning out enough scientists trained in fat and oil science and technology and the young scientists are not familiar with the tremendous possibilities for fascinating and productive work with these products.

The use of fat in feeds is an example of a new outlet for fat which has grown rapidly during the past few years. Just a few years ago, the amount of fat used in feeds was extremely small. Now, estimates put the yearly amount at about 500,000,000 pounds and its use is still growing. Of the 500,000,000 pounds used, a very large percentage is animal fat.

When the use of fat in feeds first became popular, it was generally used at relatively low levels where it did a good job of controlling dust and

did not upset the nutritional balance between protein and energy. Experimental work with higher levels of fat in feeds showed that improved growth and feed conversion could be obtained when both fat and protein levels were raised and maintained at the proper ratio. Since less feed is consumed per day at the higher fat levels, the vitamins and minerals in the feed must be carefully watched also.

Fat is the most concentrated source of energy currently available for use in feeds, and its use made the terms "high-energy, high-efficiency" become a reality. At the recent meetings of the American Feed Manufacturers Association in Chicago, Mr. Combs of the University of Maryland told about his recent chick tests in which he was able to get broilers weighing 3 pounds in less than 7 weeks with a feed conversion of 1.2 to 1.3 pounds feed per pound of chicken. This feed conversion has not yet been achieved in the feeding of hogs or cattle but there has been a noticeable improvement in recent years.

Time does not permit us now to go into all of the feeding work that has been done with fat. It has been used successfully as a concentrated energy source. It is also of value in the improvement of the physical characteristics of the feed. A rather novel use for fat has been found by Barrick and Wise at the North Carolina Agricultural Experiment Station (A.I. Report 38, A.H. Series 27, March 21, 1958) when fat was used to limit grain intake of steers on pasture. Corn and stabilized fat were mixed and self-fed to steers on pasture, and compared with another lot which was self-fed a corn-salt mixture. The lot fed the corn and fat made greater daily weight gains (2.55 vs. 2.38 lb. per day) and brought a greater monetary return when slaughtered. The steers when self-fed consumed an average of 0.75 lb. fat per head per day which is approximately the level that has given the best results in other feeding tests where the steers were not self-fed. Ruminants, unlike other species do not seem to tolerate high dietary levels of fat, probably because of its effect on the rumen microflora. Poultry and hogs can utilize levels of fat up to 30 per cent or higher as long as the energy level is balanced with protein, minerals and vitamins. Practical levels are dictated by cost, handling equipment, etc., and at the present time are generally in the range of about 2 to 10 per cent.

Pelletted feeds at one time could not contain more than about 5 per cent fat because of problems of maintaining a hard pellet. Several feed manufacturers have now solved the pelleting problem and can add up to 15 per cent or more of fat if desired. High-fat pellets are on the market in several areas of the country.

While the amount of fat used in feeds is a sizable item and goes a long way toward reducing the surplus of tallow and grease in this country, it represents only about 18 per cent of the current production. Exports are currently accounting for approximately 40 per cent of the current production, leaving about 42 per cent to be used for other purposes. This 42 per cent represents about 1,160,000,000 pounds of fat. Part of it will go into the manufacture of soap but a very large portion of it will have to find other industrial uses.

Fat splitting and glycerol production has taken considerable quantities in past years. Glycerol has brought a good price, but the picture there is changing with glycerol being produced from propylene, and by fermentation from molasses. The Optal process currently being developed promises high purity and good yields of glycerol along with methyl esters of fatty acids at low cost.

In many parts of the country, water conservation is receiving increasing attention and is extremely important as our growing population and industry spreads over the dry areas of the country. New products are being developed to seal off the surface of ponds and reservoirs to reduce evaporation. One of these products is a fatty alcohol made from tallow. It is said to spread an invisible film over the water and reduce evaporation between 35 and 60 per cent.

Fatty acids from tallow and grease have many uses. Their use in household soap has declined during recent years but industrial uses have been growing. One of the largest uses for fatty acids is in rubber where they serve as a plasticizer and softener. Specially processed soaps are used in the manufacture of rubber goods where they prevent sticking of rubber to the molds.

The rupture of the oleic acid molecule or other fatty acid leads to the production of dibasic acids, which form the base for many so-called synthetic lubricants for high temperature applications as in jet engines. The dibasic acids also find their way into nylon type polyamids. Heavy metal soaps of the fatty acids of tallow and grease form the base of many lubricating greases. Other oils made from grease are the base, after sulfurization, for many of the extreme pressure lubricants and automatic transmission fluids. Lard oils also serve as a base for lubrication in the working of metal as they lubricate cutting surfaces and tools to a greater degree than any other known material. Lard oils are also used in the lubrication of textile fibers.

There are many other industrial uses for derivatives of tallow and grease but most of them use up only small amounts per year. We need new uses that can consume large tonnages. The tremendous consuming power for chemicals in our economy can supply markets for great quantities of chemicals if they have the right properties. All that is required is the necessary research work to build these properties into the fat or fatty acid molecule. Many possible uses have been visualized and, in some, preliminary work has been carried out.

There is a definite need for methods of permanently waterproofing fabrics, particularly cotton and rayon. Fat ketenes and isocyanates show promises. Waterproofing of a permanent nature is also needed on paper, wood, plaster, concrete, and many other surfaces.

There is a need for soil stabilizing agents to enhance moisture absorption when land is completely dried out, and to prevent erosion. Other types of stabilizers are needed to stabilize or waterproof soils along highways, along the shoulders and in the roadbed. Fat derivatives might be developed which could serve these purposes.

The tremendous highway and construction programs use large quantities of concrete. The properties of concrete can be modified and improved with the use of air-entraining agents to make the concrete more workable during fabrication and to retard deterioration during freezing and thawing. Fatty base additives show some promise in this field. In asphalt for paving purposes too, fatty additives have been found which improve adhesion of asphalt to stone and minimize the brittleness of asphalt in cold weather.

There is another area of possible use for fats that is getting closer to the feed use. For many years, bloat in cattle has been a troublesome affliction when the cattle are on succulent pastures. Recent work has indicated that certain oils may be effective in preventing bloat, either when administered in other feeds or when sprayed on the pastures.

The foregoing is not a complete picture of the non-food uses of animal fat. There are many other uses and prospective uses but in the short time available I can only give you a general outline of the present uses and possibilities for this very important by-product of the animal industry.

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MR. SULZBACHER: I want to thank Charlie Adams for his help in projecting the slides, and especially to thank the speakers for taking the time to come here.

If we have left you people thinking that there is a considerably larger field, both for research and development of applications, than what the meat packer or processor does with his fat that was our aim. Thank you.

CHAIRMAN CAHILL: Thanks to you, Bill and your committee and the participants on this program, for what I consider a very straight forward, clear cut presentation of our fat situation.

This program was designed keeping in mind the questions that you folks turned in at the close of last year's conference. The suggestion most frequently received was that there ought to be ample time for discussion. You will note that throughout the two-day program we have several hours allotted for discussion. If any of you are here for the first time I think we need to tell you that there are no strangers here. We encourage you folks to come forth with your questions and your comments.

I don't think anyone turned in the suggestion that we have a recess, but we knew you were expecting it; so let's take ten minutes now and reassemble promptly.

(Recess)

CHAIRMAN CAHILL: May we have your attention, please? We have one more brief session for this morning's program. There is a committee of long standing and action to report. We have asked Mr. Lowell Walters to chair this session. We turn the floor over to Lowell.

MR. L. E. WALTERS: Thank you, Vern.

Ladies and gentlemen, as you wll know, the function of the Meat Judging Manual and Contest Committee changes somewhat from year to year, and the report that we have this morning is primarily a progress report.

I should like to call on our good friend, Bob Deans, to read the minutes of the coaches' meeting at the International Livestock show last fall, if he will. Bob.

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