PROCESSING AND STORAGE PROBLEMS OF LARD

J. W. COLE
UNIVERSITY OF TENNESSEE

We know that lard is one of the most economical fats with great shortening power and that it is also one of the best all-purpose cooking fats, and easily digested. However, we all have seen lard that was dark, having a more pronounced flavor and odor than is desirable, just because a few simple steps in the processing were not followed.

Preparation of Lard Stock

Pork fat to be rendered should first of all be fresh and in the best possible condition. The quicker it is rendered after chilling the carcass, the better it is. If pork fat is held under ordinary storage temperature of 32 to 35 degrees F. over five to seven days, the free fatty acid content increases resulting in lard with a lower smoke point and keeping quality. The smoke point (250-425 F.) is quite important in certain types of cookery. A recent test by Consumers Union has shown the smoke point of lard to be an average of 350 degrees F. as compared to 400 degrees F. for most vegetable shortenings. Do not expose lard stock to light and keep away from objectionable odors. Leaf and trimming fat can be blended; however, intestinal fat should be rendered separately for lard of highest quality.

Removal of the skin on lard stock is recommended as too much rind may give lard a softer body and possibly a shade off the desired chalk-white color. After "rinding" the fat should be cubed (1" square) or run through a chopper. Grinding lard stock speeds up the rendering process. Remove all of the lean. Lean meat will turn brown and crisp before the rendering process has been completed and will give the lard an off color.

Rendering Process

Improper cooking has probably lowered the quality of lard more than all other problems put together. Overcooking or cooking at high temperatures will increase fatty acid content and lower the keeping quality greatly. Most of the off color in lard is caused by improper cooking. The steam jacketed kettle with steam pressure varying from 30 to 50 pounds pressure is a good means of rendering where such a kettle is available. The cooking temperature of the lard should not exceed 240 to 250 degrees F. at any time during the rendering. Stainless steel, rust-free iron, or aluminum kettles are all satisfactory for rendering. Do not use copper or rusty iron containers as there is a possibility that the fats will combine and form oxidative salts that lower the stability of lard. If steam is not available and the open fire is used, frequent stirring and hard wood that will give a uniform heat should be employed. Frequent stirring tends to speed up the rendering process with a more thorough job.

The usual tests for doneness are: (1) the cracklings become amber in color and, if the fat still has the rind, small white blisters will form on the skin surface; (2) when no moisture rises from the lard. This can be tested by passing a cold lard can lid over the kettle to test for condensation.

The hot lard should be strained through sufficient muslin or cheese cloth to remove sediment, cracklings, and so forth. When a lard press is used to remove all the fat possible, it, together with all of the utensils for storing, should be scrubbed and dried. Any old or rancid fat on the containers will lower the quality of the new lard and cause it to deteriorate more quickly.

Cooling Lard

Cool the hot lard as quickly as possible and stir frequently during the cooling process. Avoid beating or whipping as this will introduce air which may shorten the keeping quality of the lard. If lard is not stirred, the lard oil tends to separate out from the stearin and causes a grainy texture.

Lard Stabilizers

At this point reference is made to a recent release (1029 Nov. '48) from the office of K. F. Warner, Extension Meat Specialist, U.S.D.A.

Subject: Lard Stabilizers

Many of you are asked questions about the use of stabilizers in lard that is rendered at home or in locker plants. This information from the Bureau of Animal Industry was helpful to me and we hope it will be to you.

Rancidity in lard is due to the chemical break-down of some of the fats and the addition of oxygen. Air, heat, light, and metal speed up this process. Once lard has become rancid it has changed chemically. There is no way to repair the damage.

To slow down the development of rancidity in lard the standard recommendations have been to: Use clean, fresh fat, render the lard thoroughly without over heating (under 250 degrees F.), pack in small containers, fill containers full (to drive out air), seal containers, and store in a dark, reasonably cool place.

These recommendations stand and should be followed. In addition we now have chemical stabilizers, which serve as antioxidants and delay rancidity development even more. Among these are:

Approved Lard Stabilizers

1. Nordihydroguaiaretic acid. Sometimes called "NDGA".
   Amount permitted by Meat Inspection Division, B.A.I., 1/100 of 1 percent, plus 5/1000 of 1 percent citric acid.

2. Propyl gallate. Available under various trade names.
   Amount permitted by Meat Inspection Division, B.A.I., 1/100 of 1 percent plus 5/1000 of 1 percent citric acid.

3. Butylated hydroxyanisole. Usually sold in combination with another antioxidant.
   Amount permitted by Meat Inspection Division, B.A.I., 2/100 of 1 percent.

4. Thiodipropionic acid plus dilaurylthiodipropionate.
   Amount permitted by Meat Inspection Division, B.A.I., 1/10 of 1 percent (1/100 of 1 percent thiodipropionic acid, plus 9/100 of 1 percent dilaurylthiodipropionate). Not yet on the market.

5. Hydrogenated vegetable oil. 4 to 6 percent.
   These oils contain a small amount of naturally occurring antioxidants (Tocopherols).
   Recommended by the Bureau of Agricultural and Industrial Chemistry, U.S.D.A.

General Recommendations:

1. Approved stabilizers delay the development of rancidity in lard, are practical to use, and seem wise to recommend.

2. The U.S.D.A. has no experimental experience with the various products and cannot compare their performance.

3. Citric acid serves as a synergist. It increases the effectiveness of the antioxidant.

4. Some other lard stabilizers are on the market. Read their labels and check their ingredients against the chemicals listed above.

5. Lecithin is an effective emulsifying agent.

6. Use commercial stabilizers as directed on the container.

The use of soda to "sweeten" lard is not recommended too highly. Potatoes have been suggested to help slightly rancid lard. Cook 3 to 4 potatoes from every 10-15 lbs. lard until they become quite brown or dark in color. Carrots can be used in place of the potatoes.

Storage

Store in a cool, dark place in small containers that have been completely filled and sealed. The storage temperature should be around 40 degrees F. and not over 60 degrees F.

Poor keeping lard may be caused by:

1. Fat partially rancid before rendering
2. Fat from underfinished hogs
3. Insufficient rendering
4. Overheating and sediment
5. Poor containers and exposure to heat and light
6. Too much beating or whipping
7. Musty and other objectionable odors in the storage room
8. Storage in Temperature above 60 degrees F.

Problems

As was stated in the beginning - we know about lard - all of its good points! However, we should face the greatest problem that confronts lard and that is the many forces behind the shifting fats and oils picture. The time has come for us to carefully analyze "the handwriting on the wall".

Hogs are the chief converters of grain into edible meat. Although they can put on more pounds of gain with less feed than cattle or sheep, they still cannot compete with cattle and sheep in utilizing grasslands and what would otherwise be termed wasteland. More fats and oils can be produced from growing vegetable oils than through an acre of corn fed to hogs. Mr. Frank Kutich, college economist with Iowa State gives the following figures:

1 acre of Copra produces 2,880 lbs. Coconut Oil
1 acre of soybeans produces 200 lbs. Soybean Oil
1 acre U.S. Land produces 51 lbs. Lard (plus 190 lbs. pork)

These figures bring up a new food-producing team that thrives naturally in liquid pastures without depending upon the soil. This new food team is supposed to lift the efficiency of food production ten to twenty fold. The first member of this team is Chlorella, a green alga single celled plant as in pond scum. In an acre of shallow pond, fed with common minerals and a common gas, many times as much basic food can be grown as on one acre of our best soil. And further experience with the "tilling" of this new crop may well bring richer harvests.

The other member of the team is a yeast cell. It takes the place of the pig in making fats and protein. It does not depend upon the soil and works twice as efficiently as the hog. This new team is not just a laboratory idea but is actually being used today to help better the diet of an ever increasing world population. Granted that this new team will never take the place of a T-bone steak nor a loin pork chop. However, it may well develop into another factor in a slower demand for rendered pork fat.

Synthetic oils made chiefly from petroleum are being used for soaps. Synthetic resins are replacing drying oils in paints. More two-way oils are being used in food production making for more competition for lard.

Forty per cent of shortening and lard sold goes into bakery products. Synthetic emulsifiers, or so called "bread softeners", have been developed to cut this 40 per cent figure down materially.

This age has been described among other things as "the ready-mix age". The housewife can buy practically anything from soup to cakes in the package. Here again lard has been left by the wayside in favor of vegetable shortenings. Recently, lard dropped in price to the point where it was selling at half the price of most vegetable shortenings. Still lard sales did not boom nor are they booming now. Lard seems to have lost ground with the American housewife of today. Changing tastes have hurt lard while helping meat consumption. Southern people are changing over to more red meat. That leaves more fat backs to go into lard.

What can be done about this serious problem in connection with pork fat? The recent butter-oleo fight should prove that nothing can be gained along these lines. Suggestions have come from the Secretary of Agriculture

office to the effect that (1) improved quality, (2) new uses, and (3) export markets may be the answer. The recent decision of the government to lift quantitative limitations on fat exports can only be a temporary aid. The other two suggestions are being followed and still our lard situation is not improving.

What can we do as "meats" men? We are forced to attack the problem at its source - the hog. A meatier type hog sold at lighter weights seems to be a partial answer at least. In order to get the farmers to produce this kind of hog, we are going to be forced to push hog buying on a more equitable basis such as buying on carcass grades and cut-out yields.

The vice-president of one of the largest packing companies in the world recently said, "----------would welcome an improved system of hog buying that would permit more refinement in buying according to cut-out performance".

It is up to us to take advantage of this kind of co-operation and push a program that would help solve the greatest problem of lard rendering today - too much low-priced lard.

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CHAIRMAN MILLER: Mr. Cole certainly brought out some thought stimulating questions. John Christian from the University of Connecticut will lead this discussion.

PROF. CHRISTIAN: Thank you, Mr. Chairman.

This paper on lard was very well done. This lard export problem might be compared with aspirin, It relieves the situation, but it does not cure it. I have the same problems in my meats laboratory. We are trying to produce a hog with a leaner, longer look. It does not produce as much lard, but, what am I going to do with the lard I get? The dining halls will not take it; you can not sell it to the faculty wives. So I am left with about 50 pounds, and in some cases, 300 or 400 pounds. There is no place to put it. I finally sold it as waste fat for about four and one-half cents a pound. Maybe some of you can help me out on my problems.

Perhaps some of you have questions to ask Mr. Cole on lard storage.

PROF. ZIEGLER: Mr. Christian, I have a question to ask Professor Tomhave, Ken Warner or anyone else on this Committee of Judges: If I have my meat judging team place the pork cuts according to our trend of thought here, are you men going to cut their score because they can not see the pork the way you are used to having them look at it? In other words, are you going to penalize the boys on softness as much as you did heretofore, because you can not have unfinished pork and have firmness, unless you have it frozen.

Another point concerning the keeping of lard on the farm. We have been doing work on the canning of lard, and you talk about light. You want to keep lard away from light. Well, we have had lard in sealed quart jars in the sun half the day, at eighty degrees Fahrenheit right straight through. In one year's time that lard came out just as sweet as any lard you want.

Now, where are you getting all this light stuff from, that you had to put it away in the dark? The lard was freshly rendered lard from three

hogs that had been killed, and had been chilled for twenty-four hours, and the jars were sterilized. The one jar was sealed, the other jar had a puncture in the lid; we put a hole in it so it could get air. We stored them at 34°; that's in the refrigerator. It fluctuated from 33 to 38°. Then we took it over to the office where our temperature normally runs around 72°. We put it in our meat room where the temperature is normal, 60 - 62° the year around. We put some in zero storage; some on top of the lockers where it was real hot, exposed to light and also unexposed to light. We had three samples. One was wrapped so the light could not get in.

Dr. Miller here is the fellow who makes the final analysis on it, the peroxide values; the free fatty acid determination. Then we make organoleptic tests. And in every case the lard that was sealed from the air was good and sweet at the end of one year. That which was exposed to air was unusable and inedible. Light did not affect the keeping quality of the lard.

PROF. BRADY: What about the lard that was not sealed that was exposed to light?

PROF. ZIEGLER: It was not any more rancid than the other.

PROF. BRATZLER: Did you have any frozen lard in that?

PROF. ZIEGLER: Yes, the lard was frozen; that was zero. Its peroxided value and free fatty acid was fairly low.

PROF. BRATZLER: Sealed and unsealed?

PROF. BUTLER: When did you test it after breaking the seal? Immediately after?

PROF. ZIEGLER: Immediately after.

PROF. BUTLER: Did you test it again the day after, or something like that?

PROF. ZIEGLER: That is right.

PROF. BUTLER: Again, and still it did not increase?

PROF. ZIEGLER: We made the organoleptic test about the day after.

PROF. BUTLER: Still sweet?

PROF. ZIEGLER: Yes. We have also used NDGA, certain percentages, and the one with the maximum amount of NDGA that you are allowed to use, that lard of course, had lower free fatty acid content, lower peroxide value, but we did not find that it stabilized the lard too much when it was stored in glass jars. We recommend to the farmer, of course, that he put about a three-pound can of vegetable shortening in, and he will say "What vegetable shortening?", and the quickest one we can think of is Crisco, put it in a 50-pound can of lard, which does not sound very good to the manufacturer of lard, because you are recommending a vegetable shortening, but your own Federal Government brought that point out; and if they do not do that, we recommend that they keep it in small containers in the refrigerator.

If they have a cold storage place, put it in 50-pound cans; fill the can to the very top on a re-fill, put a piece of wax paper on it, fit the lid down tightly over the waxed paper, and do not break the seal until they need it. Put it in this storage, 33° to 40° Fahrenheit, and that lard will come out in great shape.

Then we have other farmers who say "I never have any trouble with my lard." They are using it one year later. So I have had the privilege of testing some of that lard, and their idea of what good lard is and mine do not correspond.

MR. WARNER: Well, Mr. Ziegler, speaking as one chemist to another now, -- it seems to me that you have proved that air - oxygen - is a requirement in the break-down of lard, and there are other agencies that speed up the oxidation of the lard, but they are normally naturally impotent in the absence of air. Would that not be your conclusion, as a chemist?

PROF. ZIEGLER: I believe so.

PROF. BRADY: That is not what he said, though.

I thought you said it did not make any difference whether you had the can sealed.

PROF. ZIEGLER: Exposed to light or in the dark.

PROF. BRADY: No, I say if it is not sealed. That is the question.

PROF. ZIEGLER: I said the difference in the chemical determination, free fatty acid and peroxide was not significant.

PROF. BRADY: Or did not have any effect.

PROF. ZIEGLER: Now, we have been doing this work over two years. We are on our third year, and we will see how it will stack up again. But that is the way for a farmer to keep lard, in a can; seal it tight, and anyway, you have it in about the right amounts there - have two-quart jars, glass jars. Cole here had it in that sealed tin can there. That lard is in good shape, in my estimation.

PROF. BRATZLER: This question is addressed to the chemists in the group: What can be done to rancid lard to make it sweet? Will carrots, potatoes or cabbage sweeten it? Is there anything anyone has done to sweeten up rancid lard, or is it impossible? I personally have always maintained that when lard is rancid, it remains rancid, but I have heard a lot of arguments to the contrary, and I was wondering if anyone had done any work.

PROF. ZIEGLER: I would say if it contains over one per cent free fatty acid, you should make soap out of it. If it is just slightly tainted, you can remove the taint by boiling it with fresh raw potatoes.

MISS BELLE LOWE: It is true though that your potatoes will increase the water content, and water content increases the free fatty acid again, so you have a cycle.

PROF. ZIEGLER: That is right.

PROF. COLE: A vicious cycle.

PROF. CHRISTIAN: Any other questions?

PROF. BRATZLER: Did you get that first question that Mr. Ziegler asked on how much they are going to cut these boys?

PROF. CHRISTIAN: The question was directed to the committee that is to meet some time this evening.

PROF. BRATZLER: I am sure that all the meat coaches would like to get the instructions clearly.

PROF. ZIEGLER: I mentioned that so they would remember it when they came to it.

PROF. COLE: Mr. Chairman, I would like to defend that a little bit. I do not think that we have to have soft hogs to reduce the amount of lard. I am getting hogs that have fat backs in excess of an inch and a half at 225 pounds. They still have plenty of quality and firmness, but their percentage of lard is too high, and I think that is the problem we should aim at first -- still keep our quality, but reduce the lard by about a third.

PROF. BULL: Mr. Chairman, I do not have a question, but I would like to caution the younger men about taking too seriously the swine-type demonstrations that the packers are so willing to put on for you. I have been playing with swine work for a good many years, and I am thoroughly convinced that the producer would put out the proper type of hog to produce the maximum amount of pork and the minimum amount of lard if the packer was paying the premium. Now they will tell you they will pay the premium, and a few of the smaller packers will.

We have had swine-type demonstrations at the University of Illinois. We had the head hog buyer of one of the biggest plants here in the Yards come down and put on the demonstration to prove to the satisfaction of everybody concerned, including himself, that the meat-type, medium fat hog was worth more than the fat hog. The same man would go back in the Yards the next morning and pay more money for the hogs that he had proved to us, a couple of days before, were worth less money. In other words, as somebody stated a while ago, they will buy these hogs. It seems that many hog buyers are only interested in getting a high dressing percentage, which they claim lowers their cost on the hoof.

We have to sell hogs, so do not take it too seriously. It has been going on for a long time, and still not many packers are paying the premium for the better type hog.

PROF. COLE: Mr. Chairman, I would like to make one short statement in rebuttal to that, and that is that I tried to present here the shifting facts in the oil picture. We have not always had synthetic fats, and we have not had this new food producing team - however important that is going to be - and we have not always had vegetable oils or soybean oils produced cheaply, so I really think the packers are a little more earnest right now than they may have been in the past. They are a little more willing. If they say they are going to give a premium they do it.

PROF. BUTLER: I resent this use of the word "premium". I do not think they are paying a premium at all; they are just paying what the hogs are worth compared to the other hogs.

PROF. COLE: Call it differential.

PROF. BUTLER: I think we ought to drop this business of a "premium", because a premium involves the same sort of thing as a prize, and it is not a premium at all; it is just a difference in the real value of the hog.

PROF. CHRISTIAN: Well, if there are no more questions, I will turn the program back to Mr. Miller.

CHAIRMAN MILLER: I wish to thank all the speakers and discussion leaders for staying right on schedule. We started a little late on this particular section, and we have ended up exactly in the time allotted, even though it is a little later than the program called for.

I will now turn the meeting back to Chairman Tomhave.

. . . Mr. Tomhave resumed the Chair . . .

The meeting adjourned at 5:15 o'clock p.m. . . .

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