THE FUNCTIONS OF THE MEAT LABORATORY IN DEVELOPING PORK CURING METHODS AND THE USE OF ANTIOXIDANTS IN PREVENTING SPOILAGE

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Since many of us are working under extreme handicaps in that we do not have the physical equipment with which to do meat curing work, I find that in discussing this topic it is necessary for me to speculate as to what I feel the functions of the Meat Laboratory should be when it comes to developing Pork Curing Methods.

In approaching this subject from the standpoint of Meat Processing which we are now considering, I feel we might divide or group the functions of the Meat Laboratory into four categories based upon the facilities and conditions under which we feel the work is to be carried on.

By this, I mean we are dealing with students who are going to be curing pork under a wide range of conditions.

1. On-the-farm curing of pork and pork products.

2. Pork curing methods to be used by the locker operator.

3. Pork curing methods used by the commercial meat packing plant.

4. Research facilities for carrying on investigational studies.

Allow me now to discuss each of these phases and to show how the functions of the meat laboratory in developing pork curing methods may vary, depending upon conditions and purposes to be accomplished.

First - On-the-farm curing of pork and pork products.

We are primarily interested in seeing that our students learn the proper techniques to follow and the equipment and supplies needed in order to do a satisfactory job of pork curing under home and farm conditions.

The meat laboratory should be equipped with facilities to carry on the curing of pork products by either brine or dry salt methods or a combination of the two.

Under the dry salt curing method we need tables or racks on which the cured products can be stored during the curing process.

We should have the students measure out the ingredients and weigh up the meat and keep a written record of the time schedule to be followed in securing a desirably cured product.

If I were to ask you men gathered here for your specific recommendations on the proper procedure to follow in curing pork, I am quite sure I would get a wide variety of answers. Because each of you has no doubt developed a method for curing pork under a certain set of conditions that you

feel is infallible, and yet I doubt if a practice followed and recommended by Francioni of Louisiana could be used successfully by Al Cowan of Massachusetts.

Therefore, it is the function of the meat laboratory to teach the students the so-called "tricks of the trade" for that particular area that will enable the student to always secure a satisfactory product under home and farm conditions.

Secondly - Pork curing methods to be used by the locker operator.

Our locker operators encounter many problems in pork curing that are of vital interest and concern to them since their very existence depends on rendering efficient service.

Since the locker operator cannot control the volume of business or flow of fresh pork into his plant or the method of slaughter and handling which is used in many instances, it is essential that he become familiar with the most approved techniques to use in curing the products he handles, such as the anti-oxidants and ultra-violet light. These will be discussed later, but it is the function of the meat laboratory to show the extent to which they can be used and the efficiency of their use, especially for the locker operator.

The importance of carrying capacity of his refrigerator unit and humidity control equipment should be stressed since these are vital to do a good job.

We in the meat laboratory need to keep emphasizing for him the importance of carrying on an educational program for his patrons, stressing the importance of proper handling, feed and management of the hogs before slaughter, proper slaughtering and thorough and rapid chilling and above all strict sanitation.

Third - Pork curing methods used by the commercial meat packing industry.

It should be the function of our meat laboratories to see that our students are familiar with the operations as carried on in the large meat packing plants.

This can be done through field trips through some of the large plants in the area and in addition invite in as guest speakers men from this field to discuss the problems of the large meat packer.

These discussions are invaluable as it builds for better understanding between the producer and the processor and assists in securing a mutual understanding of each other's problems.

As far as the college meat laboratory itself is concerned there is probably little it can do to aid students in understanding the commercial meat business other than has just been mentioned.

Fourth - Research facilities for carrying on investigational studies.

In developing pork curing methods the meat laboratory is still endeavoring to find a standard curing mixture and method of using it that will guarantee a perfectly cured pork product under a given set of climatic conditions.

By the use of antioxidants to prevent spoilage we are trying to assure the producer that he will be able to have for consumption all of the product which he puts in cure.

Antioxidants have been employed by research workers for from fifteen to twenty years or perhaps more, but to date no one so far as I can determine has come up with an acceptable product that has proved desirable to the meat curing trade.

Following is a list of antioxidants which have been used:

(a) A.M.I. 72, a new antioxidant developed by the American Meat Institute under the direction of Dr. A. R. Kraybill.

(b) Nordihydroguaiaretic acid (N.D.G.A.). This material has been used with citric acid and with phosphoric acid in varying amounts and it has increased the keeping time of bacon.

(c) Unrefined soybean oil.

(d) Unrefined (expeller process) cottonseed oil.

(e) Avenex No. 3 (Pulverized oats).

(f) Avenex No. 4 (Decorticated oat flour).

(g) Avenol No. 1 (Oat oil).

(h) Gum guiac.

(i) G-4 (Griffith Company).

(j) Hydrogenated vegetable oil.

(k) d-isoascorbyl palmitate.

(l) Soybean lecithin

(m) Tocopherols.

(n) Prophl Gallate.

And no doubt many others going under certain trade names.

Rancidity not only renders food unpalatable but it can also be responsible for the partial destruction of essential fatty acids, and other nutrients such as vitamin A, E, D and certain members of the B complex.

Fats may develop off-flavors and odors through action of enzymes, absorption of odors, atmospheric oxidation and action of micro organisms.

The effect of an antioxidant is to lengthen the induction period and hence delay the onset of rapid oxygen intake.

Stability refers to a measure of the extent to which the fatty substance resists the development of oxidative rancidity.

However, to make a long story short, we may say that rancidity is determined by taste and odor and in this respect we as humans vary greatly as to the degree of rancidity we are willing to accept.

A great deal of the research work in the uses of antioxidants has been done by men in this room such as Sleeter Bull, Thomas Ziegler, D. E. Brady and others, and I am quite sure they are far more capable of discussing this subject than I am.

So that in the discussion which follows, I would suggest you ask them for specific comments on their work in this field.

Below is a list of references which will prove of value in further study along this line.

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CHAIRMAN MILLER: I am sure we are all grateful to Mr. Kerr for his fine presentation of a very carefully worked out paper, and I know that you do wish some discussion on this paper. The discussion will be led by Mr. Blumer of North Carolina.

PROF. BLUMER: Mr. Chairman, Ladies and Gentlemen: This subject has many ramifications, and I think we should limit our discussion pretty much to two groups; one, the locker plants and small meat processers and two, farmers. The commercial people have large and competent research staffs, who are quite capable of handling their particular problems, so I think it should be limited to those two groups.

In developing curing methods, I wonder if we want to develop an entirely new curing method. We have more or less established certain flavors by making a certain type of ham, for example, in a particular part of the country. So maybe we want to control the conditions which promote that particular flavor, rather than to develop a new method. But I'll throw the discussion open to the floor.

PROF. WILFORD: In answering Mr. Kerr's question as to how long the ham would be in storage, I am going to quote that one of our meat curing men has cured meat for years and years and his family back of him. He says that as soon as the enzymes have developed the white specks in the ham, that is as far as it needs to go. He puts them in the cooler, stops the loss of weight, and as long as he has the flavor there, it is all right. But he states that one-year-old hams are about the best. He says you can go ahead with the two-year-old hams if you want to. The only thing you have done was to take out more moisture, making it more of a mummy, and you have to soak it longer to get it to a somewhat normal condition.

PROF. BLUMER: Thank you. Are there other comments?

PROF. HALE: I just wondered, Mr. Wilford, did this man buy a ham when he took one out, and therefore protect himself against any change of price? Or, does he charge a high enough price for this aged ham so he can take off any difference that might occur in the price of hogs?

PROF. WILFORD: I do not think he charges any differently for two-year-old hams than he does for one-year-old hams. He gets plenty of money for each one of them. I think it is $1.10 right now. No, he gets a good enough margin over the price he pays the packers for the hogs; (he buys them) and to pay for any loss in weight he gets; whether it is a year old, or two-year-old ham.

PROF. BLUMER: Are there other comments?

PROF. ZIEGLER: I have a question I would like to ask. It seems to me sometime ago I read in the National Provisioner that the Bureau of Foods had withheld the right for anyone to use that AMI-72. Does anybody know anything about that?

PROF. BLUMER: What is the restriction on AMI-72?

MR. WARNER: I do not think there is any. The original Pennox No. 1, (I think they called it) had--hold yourself--butylated hydrox anesthyl, plus hydroquinone. Food and Drug prohibited hydroquinone, and they have taken it out and added propyl gallate instead. The function of one is to keep the shortening sweet; the function of the other is to give a better carry-over in the crackers or whatever the shortening was used for. It gives added storage life to the product that is made with it, and the butylated hydrox anesthyl plus propyl gallate is now permitted and is sold by Tennessee Eastman as Pennox No. 2. The first one has been withdrawn. The new one is in distribution. That is my understanding.

PROF. BLUMER: If it was not for the Food and Drug Administration, I think it would be pretty easy to cure meat and develop antioxidants to do the job, but unfortunately, or fortunately, we have them to deal with.

Are there other questions or comments?

PROF. BRATZLER: I just wonder - I have been exposed to some of the boys coming up from the South and maintaining the excellence of southern cured hams. What does the peroxide run in two or three-year-old hams? Have any of you gentlemen tasted them?

PROF. BLUMER: Well, we have not had much trouble with rancidity in hams. The rancidity problems have been pretty largely in bacon and sausage, and in lard and pork as it is stored in the freezer locker plant, but not with hams. The skin is a good bit of protection, I think, for rancidity and besides that, you cut off a large portion of the fat which is over the outside of the ham.

The average southern farmer, I suppose, has about that much (indicating) mold on his hams, so he is going to do a good bit of trimming and get down into that section where there is not much rancidity; where there is no discoloration and there is nothing but that pure, good old ham flavor.

PROF. ZIEGLER: Do you remember the remark I made at the Society of Animal Production, that the flavor over-all is rancidity?

PROF. BUTLER: Out at Griffith Laboratories yesterday, Harry Gleason was showing me around. I asked him what this G-4 was, and it is just a mixture of propyl gallate, lecithin, and tocopherol which is soluble in oil. He said he had a little trouble getting propyl gallate dissolved, but got it all mixed up and got a patent on it.

I asked him about this question of including antioxidant right in the curing mix, and he said Oscar Mayer had come out with an antioxidant which was claimed would increase the stability period of cured products when included right in the curing mix, but he maintained that it is impossible to include an antioxidant in the curing mix because of the destructive properties of the nitrite in the antioxidants.

PROF. BLUMER: Are there any other comments?

MR. WARNER: I would like to ask a question: That is, whether any of you have used Griffiths antioxidant seasoning, treated seasoning, which is claimed, according to the advertisements, to hold the flavor of the seasoning and to increase the life of frozen season sausage. Have any of you used it or heard of its being used?

PROF. BLUMER: We have used it, but to date have no specific results.

PROF. BRADY: That must be six months old now, isn't it?

PROF. BLUMER: It is older than that. It is effective so far.

PROF. BLUMER: I think our time is about up. This is a good place to stop.

CHAIRMAN MILLER: Our next topic is along the line of whether we are going to have yearling or four-year-old hams. If you are going to have them, how are they going to be stored? Bob Black is going to tell us something about the "Problems in the Storage of Cured Pork and Value of Sprays and Dusts in the Control of Parasites." Professor Black.

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