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# QUALITY PRESERVATION IN CENTRAL FRESH MEAT PROCESSING

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Author states that problems of quality preservation in central fresh meat processing can be solved with existing technology and also lists ground rules for a successful operation.

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Before I start talking about the complications of Meat Quality, I like to go back a few years in my memory.

As a boy, I grew up in the tropics, NOT in the highly developed United States of America.

I used to eat salted fish, dried to a rock-hard consistency and deep-fried in oil.

I ate water-buffalo meat that was beaten into thin slices and highly seasoned. It was pitch black except for the seasoning. Again, it was deep-fried before anyone would dare to eat it.

Fresh meat was available at very high prices, and it had to be eaten the day after slaughter.

We used to buy a lot of fish, still alive. That was the surest way to guarantee its quality and freshness.

We fully accepted it then, and, probably, life hasn't changed a great deal out there. In fact, people all over the world still accept this method of perishable handling. "WE HAVE ALWAYS DONE IT THIS WAY," and "EVERYBODY IN TOWN IS DOING IT THIS WAY," and "I SEE NO REASON TO ACCEPT THE RISK TO CHANGE MY WAY OF THINKING."

What has pushed the U.S. Meat Industry to make such strides in the last 50 odd years???

This evolutionary change has been fast, even though to those intimately involved, it often does not seem fast enough. In fact, the Research conducted in the field of Meat Quality during the last 50 years is very impressive.

Meat Quality, in the limited sense I want to talk about today, concerns the PRESERVATION of this Quality. It would be far beyond my qualifications to talk about the many other aspects, especially in front of such a learned audience.

I believe that I can safely say that it is NOT KNOWLEDGE that we are lacking today, rather it is the APPLICATION OF THIS KNOWLEDGE which, for one reason or other, is not rigorously pursued.

So, I am not going to unveil a new DISCOVERY of some dramatic sort. All I want to do is talk about a series of applications of existing knowledge and since these applications were based on proven facts, it should surprise NO ONE that they worked, wherever we did NOT stray from the Ground Rules.

Success often is the reward to those who are willing to take a risk. Success and PROFIT, however, come to those who jump on the bandwagon AFTER a great number of risks have been taken by others. To these EARLY - "ME TOOERS" I am directing myself today. For those, the day of decision is TODAY.

I am also not going to bore you with a long list of authors who researched microbiology, meat chemistry and Meat Technology in general. The list would be too long. But to them I owe the successful applications of the Ground Rules.

And these Ground Rules really are fairly simple:

1. Bacterial growth is a cause of the deterioration of fresh meat. There are a few accepted methods to keep them from getting out of hand. Cold temperature is the most practical one. Between 30 F and 40 F I can over simplify that by saying that these bacteria grow 5 times as fast at 40 F as at 30 F. So every degree counts. This is a clear way for people in the industry to realize that a 10 day shelflife at 30 F can become a 2 day shelflife if the meat is kept at 40 F, and 1 day at 45 F. I have proven in practice over and over that this sort of relationship exists. I have applied this in our Central Meat distribution system, despite a great deal of opposition based on "practical experience."

2. The second Rule is that the outside temperature of meat, the surface temperature, is the temperature that counts in bacterial control. Taking the internal temperature of a roast is very misleading. Bacteria growing on the outside of the roast could care less what the INSIDE meat temperature is.

3. I hope that I can convince everybody here in this audience that they should rethink their opinions about the typical meat display case. In a typical meat display case, the OUTSIDE meat temperature often is 10 F warmer than the inside of the meat. In fact, it can be 50 F while the package is placed in an airstream which is below freezing. And this outside layer is where the discoloration takes place, and if the OUTSIDE of the package looks bad, the customer refuses to buy this package, regardless how cold the inside is. I have shown over and over, in actual field observations, that radiant heat from lights and other warm objects, will make even the best meat case a "hostile environment." Working with a central retail meat operation allowed me to make some observations about the typical meat display case in the supermarket. Using plain, basic thermodynamics, all observations not only made sense, but a direction towards solutions also followed logically.

Looking at the display case as a closed system, one observes the following. Air is

blown over a coil, which cools off this air. The cold air then is blown over the meat in the case, to cool it off, or is it? It very seldom is. Cold air being heavier than warm air quickly slips under the rack and continues under the rack until the front of the case where the return air duct is located. And what does this cold air do for the meat on top of the rack? Not a great deal, I can assure you. And just look at the package in the center of the case. They are brilliantly lit by incandescent lights, highlighting and sparkling the package and at the same time Heating the SURFACE by radiant heat. An incandescent light bulb changes 90% of its input wattage into invisible infrared heat rays. Even the heat reflectors or "Cool" incandescent lights heat up the meat surface several degrees; (as many as 12 F). And this is only ONE radiant heat input, there are others, like heated ceilings, canopies, etc. So what does the refrigeration engineer do to compensate for the combination of heat input and poor heat exchange between product surface and the cooling air? He cranks down the temperature of the refrigerated coil. So we see cases all over the country with air entering the cases at 10 F to 20 F. The moment the store turns its lights off and the rest of the store cools off, meat starts to freeze in the display case. Believe it or not, there are operations which leave the lights over the meat on all night in order not to freeze the meat.

4. Bleeding, and subsequent weight loss is also directly related to meat temperature and meat temperature fluctuation. And, here again, most meat display cases and coolers exhibit large air temperature fluctuations. In our Company, I purposefully did away with these temperature swings by applying known technology.

5. And how can we even begin to control bacteria. Every piece of meat we ship from the packer or breaker to the Supermarket or Central Distribution point is LOADED with bacteria. What sense does it make to clean equipment everyday if we bring all this contaminated meat into the establishment? Even sterile tables in the morning are quickly contaminated with the first piece of meat being placed on it. This now will cross-contaminate all subsequent meat placed on the same equipment.

Hopefully, we are close to a breakthrough soon, by sanitizing the outside of the incoming beef, or at least kill 99.9% of the beasties.

During the manufacturing step of any Central Meat Processing Plant we constantly have to think about the Perishability of Meat and how we can "marry" this Awareness with an Efficient Work Flow. And a Marriage is Imperative, gentlemen since if we improve efficiency at a great cost of protection of meat quality, we might as well stop right there. And yet, we are so apt to do this and then argue well, this one compromise isn't going to hurt us much. But these "little hurts" are cumulative, and each one adds to a shorter shelflife of the meat.

Personal hygiene is a typical one where a "marriage" is very workable. Don't let one man do "too many dissimilar functions." Don't let him handle meat and also pick up a dirty pallet or the bottom of a pail. The educational process will have to start at the top, since for some reason or other, many people consider it "unmanly" to wash their hands.

Don't let trimmings accumulate. It is such a temptation for a worker to become sloppy in his trimming procedures if he sees no causal relationship between his action and the bad ground beef produced later on. And management, intent on efficiencies will often try to forget the inevitable chore of "moving trimmings along" because of the pressure of the job at hand.

Also, do not let unwrapped meat accumulate prior to wrapping and pricing. Every butcher and meat scientist knows what THAT does to the shelflife of meat and yet that is the temptation of the industrial engineer bent on "efficiencies" without regard to meat technology. As everybody will appreciate, each piece of meat (primal or

sub primal) does produce several, different cuts of retail meat. Should the scales be reset 100 times a day or 20 times a day and that explains the temptation to allow unwrapped meat to accumulate.

6. Coolers in the Stores. There really is no trick to it to keep a cooler in a store at a reasonable 30 F. It will take some understanding from the butcher in the store to make it work by not keeping the door open needlessly.

7. Transportation of perishables is often a weak link. And again, it seems hard for people to understand how much damage is done in this step. Yet, several good answers are available if one just bothers to look for them. And in transporting centrally prepared retail cuts there is only one way to do it, and that is to do it RIGHT.

8. Ground beef fat control during production. It has amazed me how many people still believe that "eye-balling" is "good enough" for 15 to 18% of their tonnage of fresh meat, in spite of overwhelming evidence to the contrary. Or the variant of this optimism is the idea of "after the Fact" controlling. And yet, it is technologically so simple to control fat content purposefully and legally in a Central Operation.

9. We always come back to "sales Prediction." But, if Quality and Freshness are protected, meat can be stored in the "Bank" of the store cooler for many days. So this Quality Control is the only thing which can prevent "Sales Prediction" from growing into a monster.

Gentlemen, Let me close by saying the technical solutions to Central Meat Processing are KNOWN, ALL we have to do is take the STEER by the HORNS, AND USE our existing knowledge.