




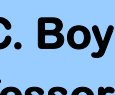


MEAT COOKERY

Meat Cookery		Made Easy	
<p>Roasting</p>  <ol style="list-style-type: none"> 1. Place meat, fat side up, on rack in open roasting pan. 2. Insert meat thermometer so bulb is centered in meat. 3. Do not add water. Do not cover. 4. Roast in slow oven (300°F to 350°F) to approximately 5°F below desired doneness as indicated on meat thermometer. 5. Allow roast to stand for 10 minutes before carving. Temperature usually will rise about 5°F during this time. 	<p>Pan-frying</p>  <ol style="list-style-type: none"> 1. Brown meat on both sides in small amount of fat. 2. Drain as desired. 3. Do not cover. 4. Cook at medium-to-high temperature until done, turning occasionally. 		
<p>Broiling</p>  <ol style="list-style-type: none"> 1. Set oven regulator for broiling (broiler). If necessary, an extra broiler pan may be used. Broil meat on rack with pan. 2. Place meat on rack 3 inches from heat. For thicker cuts, 2 to 3 inches from heat. 3. Broil until meat is brown on one side. 4. Turn and broil second side until done. 5. Broil both sides after broiling is desired. 	<p>Braising</p>  <ol style="list-style-type: none"> 1. Dredge meat in seasoned flour. 2. Brown meat on all sides in fat in heavy utensil. Pour off drippings. 3. Add small amount of liquid. Cover pan tightly. 4. Cook at low temperature until tender. 5. Thicken pan liquid with flour or cornstarch if gravy or sauce is desired. 		
<p>Panbroiling</p>  <ol style="list-style-type: none"> 1. Place meat in heavy, frying pan. (Lightly grease pan for best results.) 2. Do not add water. Do not cover. 3. Cook slowly, turning occasionally. 4. Pour fat from pan as it accumulates. 5. Brown meat on both sides. 6. Cook to desired doneness. Season as desired. <p>44</p>	<p>Cooking</p>  <ol style="list-style-type: none"> 1. Dredge meat in seasoned flour. 2. Brown meat on all sides in fat in heavy utensil. Pour off drippings. 3. Add small amount of liquid. Cover pan tightly. 4. Cook at low temperature until tender. 5. Thicken pan liquid with flour or cornstarch if gravy or sauce is desired. <p>45</p>		

Prepared by:
Dr. C. Boyd Ramsey
Professor Emeritus

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ASFT DEPT. - MEAT SCIENCE

OBJECTIVES

- To show the importance of cooking procedures on meat palatability
- To match each meat cut with the best cooking method
- To present the key procedures needed for successful indoor and outdoor meat cookery

WHAT WE WILL COVER IN THIS UNIT

COOKING METHODS

EFFECTS OF TEMPERATURE

EFFECTS OF DONENESS

MEAT MARINADES AND TENDERIZERS

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ASSIGNMENT IN *THE MEAT WE EAT*

CHAPTER 24

Preparing and Serving Meats

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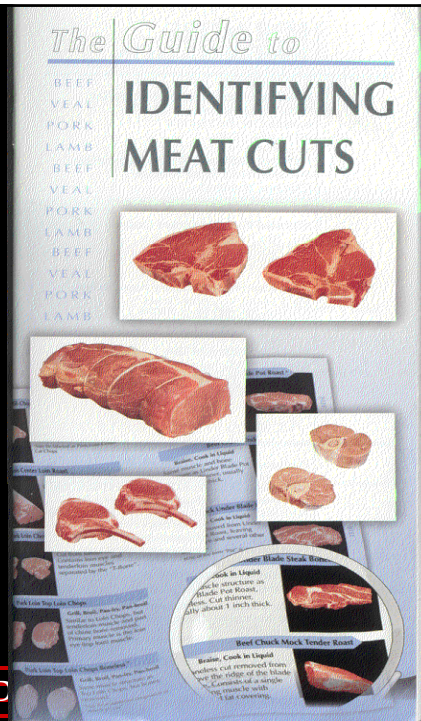
KNOW HOW TO COOK MEAT BY EACH METHOD SHOWN IN Meat Cookery - Three Easy Steps ON PAGES 52 - 54 OF "THE GUIDE TO IDENTIFYING MEAT CUTS"

Very Important!

Know which cooking method to use with all beef, pork and lamb retail cuts.

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ASFT D



BEEF STEAK COLOR GUIDE

Degrees of Doneness

STUDY PAGES 54 - 55 OF "THE GUIDE TO IDENTIFYING MEAT CUTS"



Very Rare
130°F. Approx. 55°C



Rare
140°F. Approx. 60°C



Medium Rare
150°F. Approx. 65°C



Medium
160°F. Approx. 70°C



Well Done
170°F. Approx. 75°C



Very Well Done
180°F. Approx. 80°C

KNOW THE INTERNAL TEMPERATURE CORRESPONDING TO EACH DONENESS

IN ADDITION TO FOOD SAFETY --

REASONS FOR COOKING MEAT IN THE HOME:

IMPROVE PALATABILITY

AROMA

FLAVOR

TENDERNESS - POSSIBLY

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COOKING METHODS FOR MEAT

DRY HEAT

Roasting
Broiling
Grilling
Pan broiling
Griddle broiling
Deep-fat frying
Stir-frying

MOIST HEAT

Braising
Cooking in liquid
- Boiling
- Simmering
- Stewing

DRY HEAT

SURROUND THE MEAT WITH DRY,
HOT AIR IN AN OVEN, UNDER A
BROILER, ON A GRILL OR OVER
A BED OF CHARCOAL OR COALS

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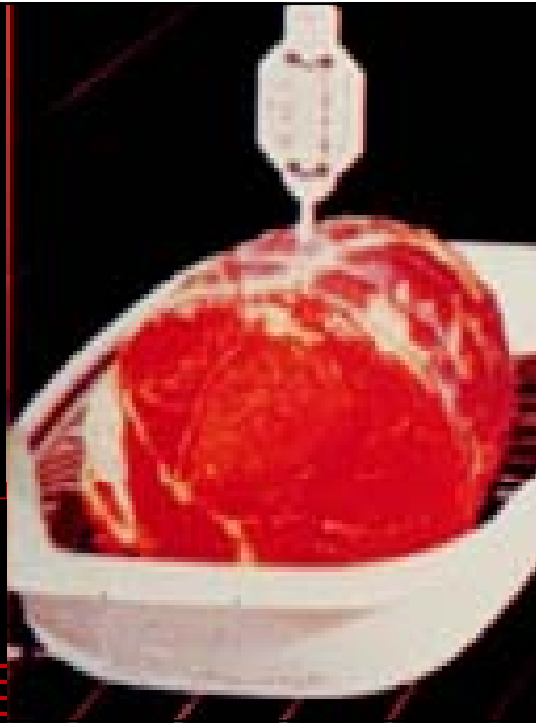
DRY HEAT DOES NOT TENDERIZE

DRY HEAT METHODS ARE SUITABLE FOR THE
MORE TENDER CUTS OF MEAT SUCH AS STEAKS
AND CHOPS BECAUSE DRY HEAT HAS LITTLE
TENDERIZING EFFECT

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ROASTING - FOR THICK, TENDER CUTS



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DRY HEAT COOKERY METHOD FOR THICK CUTS

ROASTING



**STUDY
PAGES
52 - 54**

1. Heat oven to desired temperature (325° to 350°F for most cuts; 425°F for tenderloin cuts).

2. Place roast (directly from refrigerator), fat side up, on rack in shallow roasting pan. Insert ovenproof meat thermometer so tip is centered in thickest part of roast, not resting in fat or touching bone. Do not add water. Do not cover.

3. Remove roast 5° to 10°F below desired degree of doneness. Transfer roast to carving board; tent loosely with aluminum foil (temperature will continue to rise 5° to 10°F to reach desired doneness and roast will be easier to carve).

LONG TIME, LOW TEMPERATURE COOKERY OF LARGE MEAT CUTS

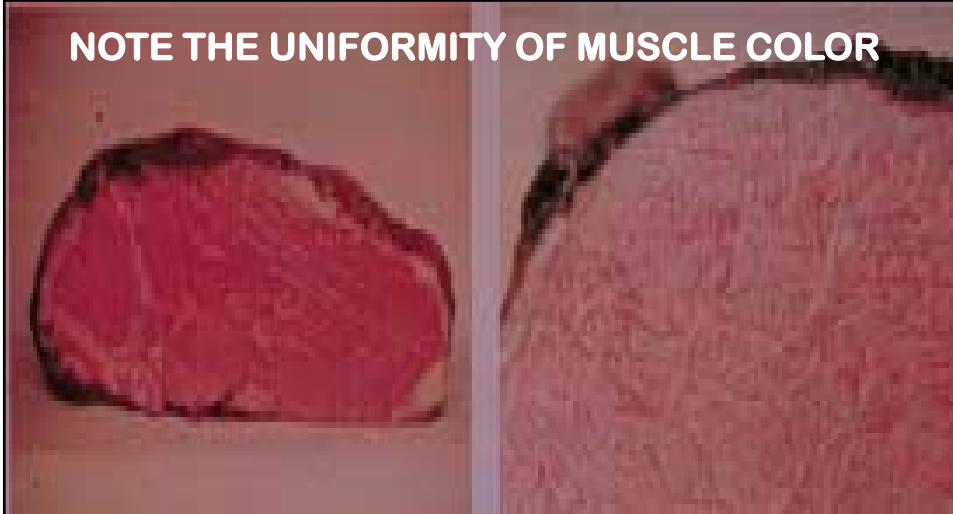
- If a large meat cut, such as a prime rib or steamship round, is cooked for a long time at a low oven temperature (200^o or lower), muscle tenderization may occur.
- Meat tenderizers cannot be used under such conditions because they have too much time to act.

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BEEF ROASTS SLOWLY COOKED COMMERCIALY IN A WATER BATH

NOTE THE UNIFORMITY OF MUSCLE COLOR



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COOKING METHOD

BROILING – FOR THIN TENDER CUTS SUCH AS STEAKS, CHOPS AND CURED PORK

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DRY HEAT COOKERY METHOD FOR THIN, TENDER CUTS

BROILING



1. Set oven regulator for broiling; preheat for 10 minutes.
2. Place meat (directly from refrigerator) on rack of broiler pan. Season as desired. Position broiler pan so that surface of meat is within desired distance from the heat source (about 2 to 3 inches for thinner cuts ($\frac{3}{4}$ " to 1"); 3 to 4 inches for thicker cuts).
3. Broil to desired degree of doneness, turning once. After cooking, season with salt, if desired.

TRY BROILING BACON IF YOU HAVEN'T TRIED IT

Smoked Pork Sliced Bacon

Broil, Pan-fry, Roast

Sliced from Slab Bacon.
Thickness based on
customer desires (usually $\frac{1}{8}$
inch or less).

**BROILING AND ROASTING
ON A RACK CONSIDERABLY
REDUCE FAT CONTENT
COMPARED TO FRYING**



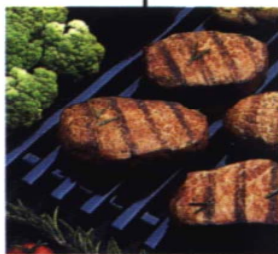
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DRY HEAT COOKERY MEAT FOR THIN, TENDER CUTS

GRILLING

1. Prepare charcoal (because gas grill brands vary, consult owner's manual for guidelines). When coals are medium, ash-covered (approx. 30 minutes), spread in single layer. Position cooking grid.



2. Season meat (directly from refrigerator), as desired. Place on cooking grid directly over coals.
3. Grill to desired degree of doneness, turning occasionally. After cooking, season with salt, if desired.

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ON TOP OF THE STOVE, DRY HEAT COOKERY METHOD FOR THIN, TENDER CUTS

PAN-BROILING



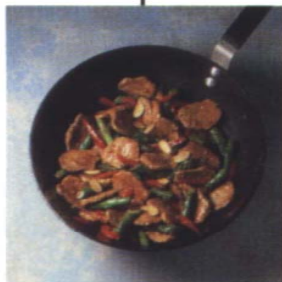
1. Heat heavy nonstick skillet 5 minutes over medium heat.
2. Season meat (directly from refrigerator), as desired. Place in preheated skillet (do not overcrowd). Do not add water or oil. Do not cover.
3. Pan-broil to desired degree of doneness, turning once. Remove excess drippings from skillet as they accumulate. After cooking, season with salt, if desired.

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ALLOWS BROILING WHEN YOU DON'T HAVE AN OVEN

USE ONLY WHEN MEAT IS TOO DRY WITHOUT ADDED FAT

PAN-FRYING



1. Heat small amount of oil in heavy nonstick skillet over medium heat until hot.
2. Season meat (directly from refrigerator), as desired. Place meat in preheated skillet (do not overcrowd). Do not add water or cover.
3. Pan-fry to desired doneness, turning occasionally. After cooking, season with salt, if desired.

FRYING SIGNIFICANTLY INCREASES THE CALORIC VALUE OF FOODS OF ANY KIND AND INCREASES HUMAN WEIGHT PROBLEMS

**DON'T FRY YOUR WAY
TO OVERWEIGHT**



**DON'T FRY MEAT IF YOU NEED TO
RESTRICT YOUR CALORIC INTAKE!**

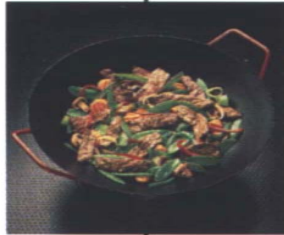
**Cubed steaks
should be fried
to prevent
dryness
resulting from
their open
structure.**



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FOR SMALL, THIN PIECES OF MEAT

STIR-FRYING



1. Partially freeze meat for easier slicing. Cut into thin, uniform strips or pieces. Marinate to add flavor or tenderize, if desired.
2. Heat small amount of oil in wok or heavy nonstick skillet over medium-high heat until hot.
3. Stir-fry meat in half-pound batches, continually turning with scooping motion, until outside surface of meat is no longer pink (Cook meat and vegetables separately, and then combine and heat through.)

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MAIN COOKING METHOD CATEGORY

MOIST HEAT

SURROUND THE MEAT WITH
EITHER STEAM OR HOT LIQUID
IN A CLOSED VESSEL

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WHEN TO USE MOIST HEAT METHODS

MOIST HEAT SHOULD BE USED ON LESS TENDER MEAT CUTS BECAUSE IT HAS A TENDERIZING EFFECT - TOUGH CONNECTIVE TISSUE IS SOLUBILIZED TO TENDER GELATIN

COOKING METHODS

BRAISING - FOR THIN, LESS TENDER CUTS SUCH AS FLANK STEAKS OR ARM STEAKS OF BEEF

Note spelling - "brazing"
is a kind of welding.

MOIST HEAT COOKERY METHOD FOR THIN CUTS

BRAISING



1. Slowly brown meat on all sides in small amount of oil in heavy pan. Pour off drippings. Season, as desired.
2. Add small amount ($\frac{1}{2}$ to 2 cups) of liquid (e.g., broth, water, juice, etc.).
3. Cover tightly and simmer gently over low heat on top of the range or in a 325°F oven, until meat is fork-tender.

**SAME AS BRAISING EXCEPT FOR THE
AMOUNT OF LIQUID USED**

COOKING IN LIQUID - FOR THICK,

LESS TENDER CUTS SUCH AS

HEEL-OF-ROUND OR ARM POT ROASTS.

COULD BE CALLED "POT ROASTING"

COOKING IN LIQUID (STEWING)

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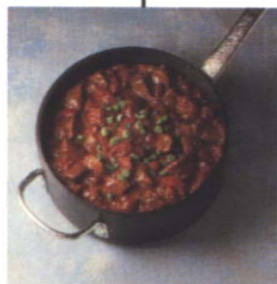
ASE



ALSO CALLED STEWING IF MEAT PIECES ARE SMALL

MOIST HEAT COOKERY METHOD FOR THICK CUTS

COOKING IN LIQUID



1. Coat meat lightly with seasoned flour, if desired. Slowly brown on all sides in small amount of oil in heavy pan. Pour off drippings.
2. Cover meat with liquid (e.g., broth, water, juice, etc.). Add seasoning, as desired. Bring liquid to boil; reduce heat to low.
3. Cover tightly and simmer gently over low heat on top of range until meat is fork-tender.

CROCK POT OR SLOW COOKER



CROCK POT

- Because moist heat cookery is used, you must add flavoring agents to the food to make it taste better.
- An excellent cooking method when the cook works outside the home.
- Start the cooking before you leave for work and have a delicious meal ready when you return.
- For food safety purposes, the cooker should be set on "high" until the food gets hot and then turned to "low".

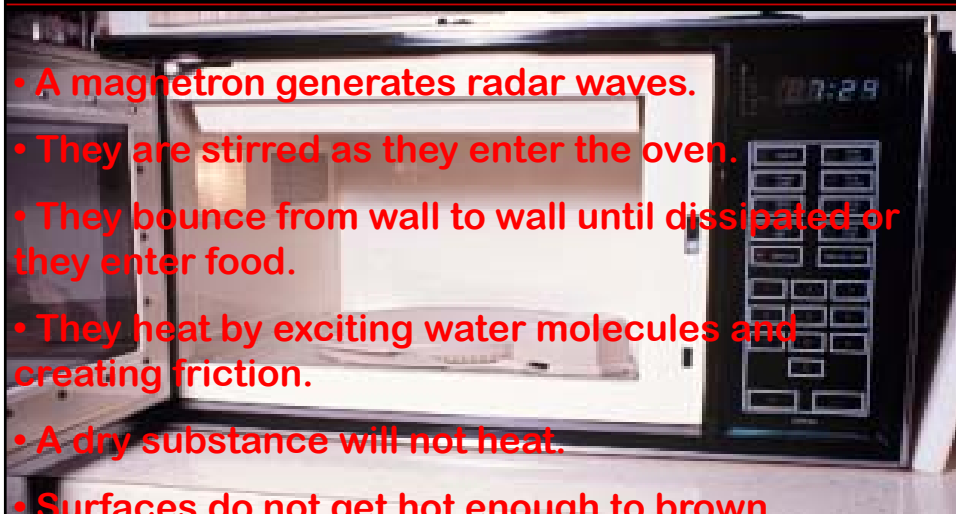
A MICROWAVE OVEN NEEDS A TURNTABLE TO PROMOTE UNIFORM COOKING



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HOW DO MICROWAVE OVENS WORK?

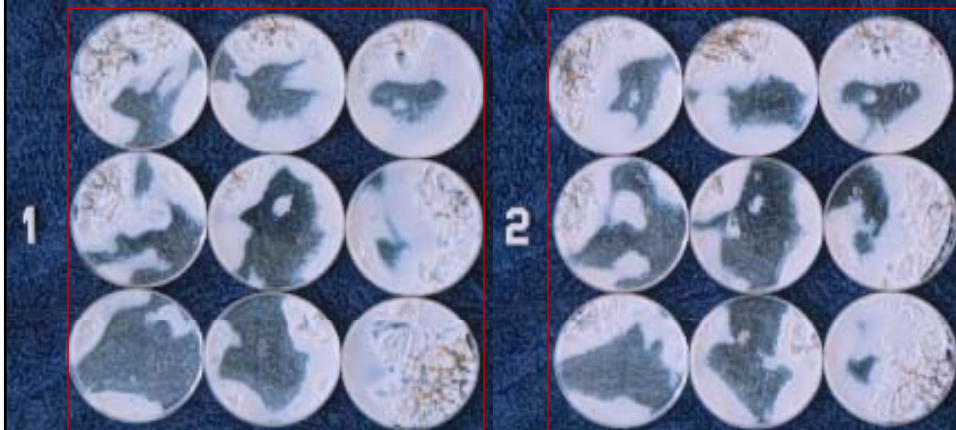


- A magnetron generates radar waves.
- They are stirred as they enter the oven.
- They bounce from wall to wall until dissipated or they enter food.
- They heat by exciting water molecules and creating friction.
- A dry substance will not heat.
- Surfaces do not get hot enough to brown.

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EGG WHITE PARTIALLY COOKED IN TWO MICROWAVE OVENS (1 & 2)



WHERE ARE THE HOT AND COLD SPOTS?

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COOKING A STEAK ON A BROWNING DISH IN A MICROWAVE OVEN



WHAT CAUSES DIFFERENT MUSCLE APPEARANCE AT VARYING TEMPERATURES?

- Myoglobin changes from a reddish to brownish color at 149°F.
- Thus, in cooking meat the surface regions will be hotter and change color before internal regions.

150°
135°
150°

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CHANGE IN
COLOR FROM
MEDIUM RARE

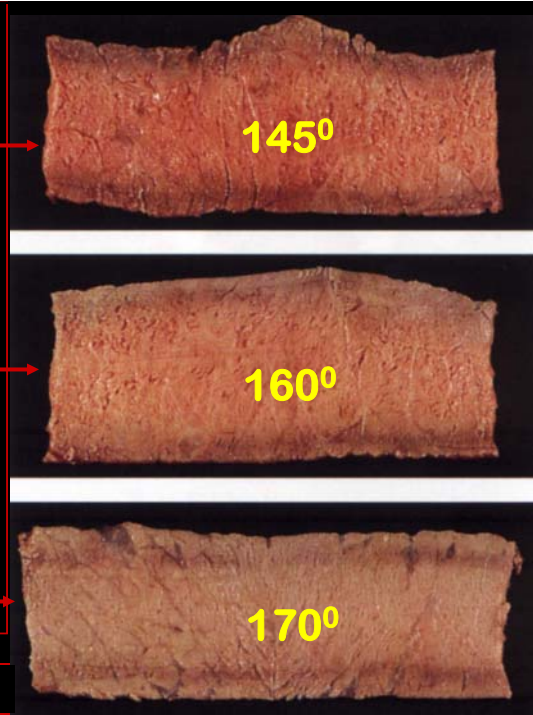
TO

MEDIUM

TO

WELL DONE

SEE PAGE 55



WE CAN TAKE ADVANTAGE OF THIS KNOWLEDGE

- If we cook large roasts slowly, more time will be available for pigment change at or near 149°

- Thus, we can have a well done appearance (that some people require) but have the increased juiciness and tenderness that a lesser state of doneness allows.

(i.e., we can have a well done appearance at a less than well done temperature)

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RECOMMENDED DEGREES OF DONENESS

	Medium-Rare	Medium	Well Done
Beef	145°F	160°F	170°F
Veal	*	160°F	170°F
Lamb	145°F	160°F	170°F
Pork	*	160°F	170°F
Ground Meats	*	160°F	170°F

**Not recommended for less than medium degree of doneness.*

FROM PAGE 54 OF *IDENTIFYING MEAT CUTS*

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DON'T OVERCOOK MEAT

**GENERALLY, THE LONGER
MEAT IS COOKED, THE
LESS JUICY IT BECOMES**

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**COOKING LOSSES INCREASE WITH
COOKING TIME AND TEMPERATURE**

**THEREFORE, THOSE WHO EAT MEAT WHICH
IS "RARE" IN DONENESS EAT
JUICIER MEAT THAN THOSE WHO EAT
"MEDIUM" OR "WELL-DONE" MEAT**

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VARIABLE EFFECTS OF HEAT

MUSCLE FIBERS BECOME TOUGHER
WITH LONGER COOKING, BUT
CONNECTIVE TISSUE TENDS
TO BECOME MORE TENDER

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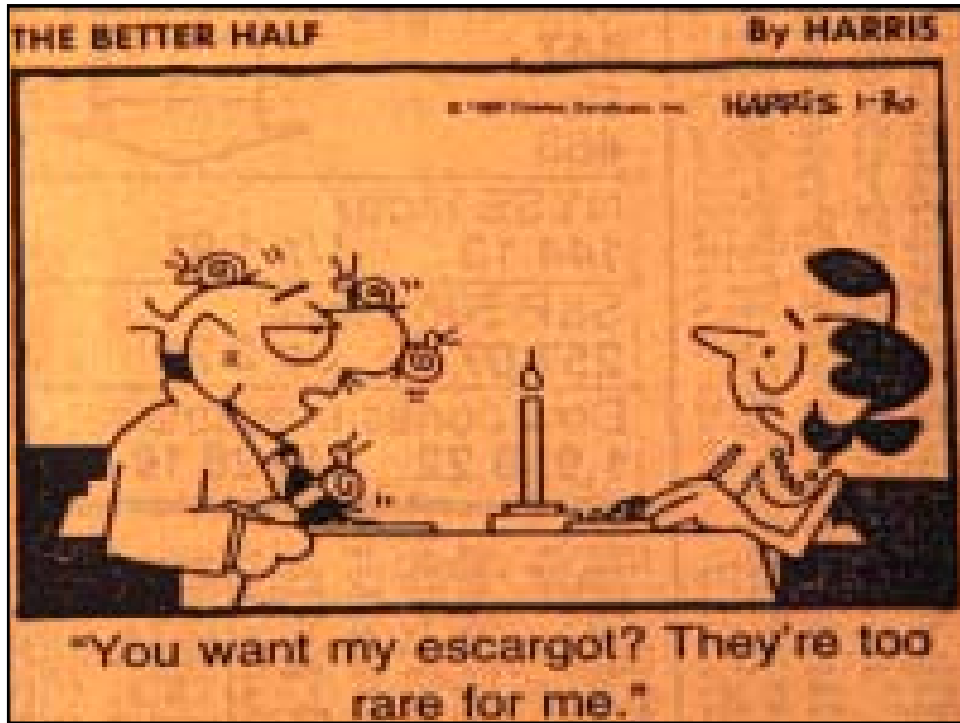
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LESS DONE, MORE JUICINESS & TENDERNESS

THUS, A "RARE" STEAK USUALLY
IS MORE TENDER THAN ONE COOKED
MORE WELL-DONE

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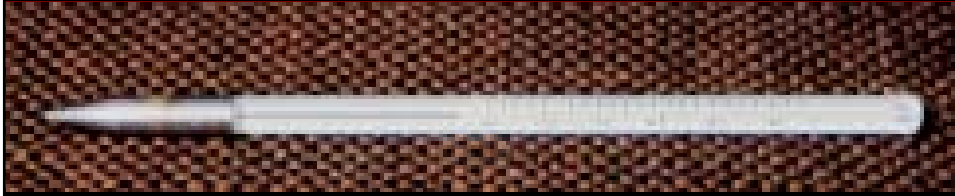
DIAL AND STEM THERMOMETERS

MORE ACCURATE, BUT FRAGILE

MORE DURABLE BUT MOST HAVE PLASTIC DIAL COVERS THAT MELT IN HEAT

TEXAS TECH **ASFT DEPT. - MEAT SCIENCE**

THERMOMETER FOR MICROWAVE OVENS - THEY DON'T WORK WELL



They contain an alcohol that is non-toxic. However, this alcohol column tends to separate into segments with use.

Many microwave ovens have a built-in temperature probe.

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ELECTRONIC TEMPERATURE PROBE USED IN TTU MEAT SCIENCE RESEARCH



LESS EXPENSIVE MODELS ARE AVAILABLE FOR HOME USE

USING A METAL SKEWER TO MAKE A HOLE FOR THE MEAT THERMOMETER

Insert the thermometer's tip in the geometric center of the roast or steak but not against bone or in fat.



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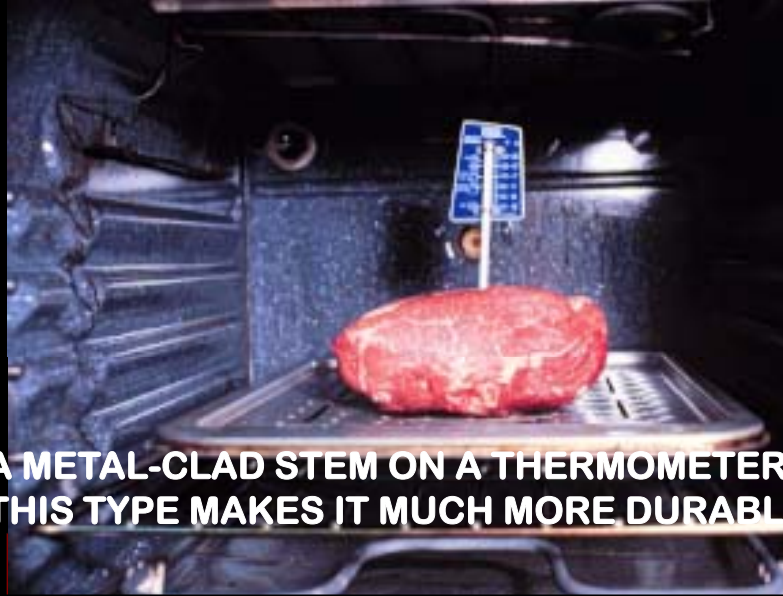
MEASURE SO THAT YOU CAN PLACE THE TIP OF THE THERMOMETER HALF WAY THROUGH THE ROAST



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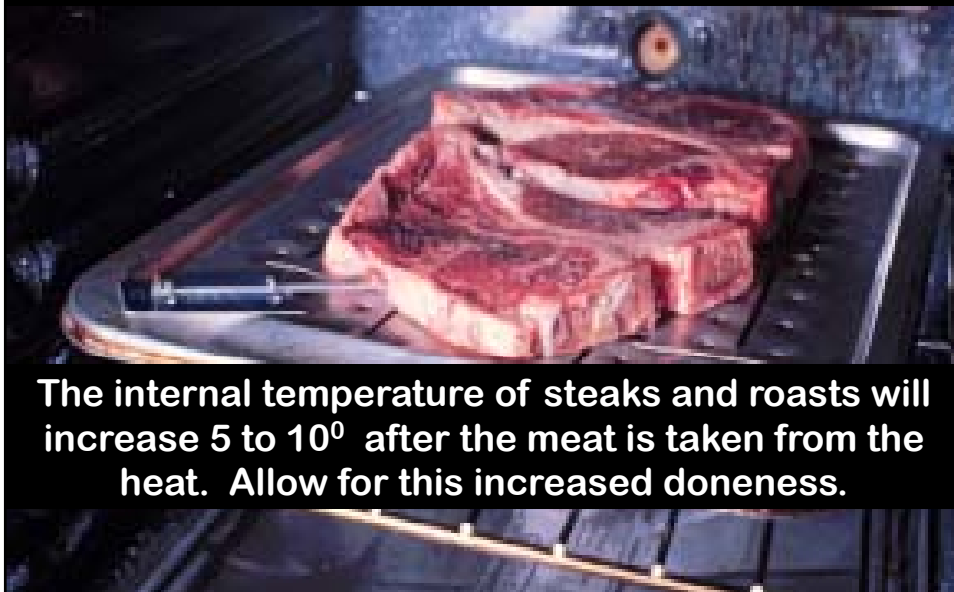
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A THERMOMETER PROPERLY PLACED IN A ROAST



A METAL-CLAD STEM ON A THERMOMETER OF THIS TYPE MAKES IT MUCH MORE DURABLE

PORTERHOUSE STEAKS WITH A THERMOMETER IN PLACE READY TO BE BROILED IN AN OVEN



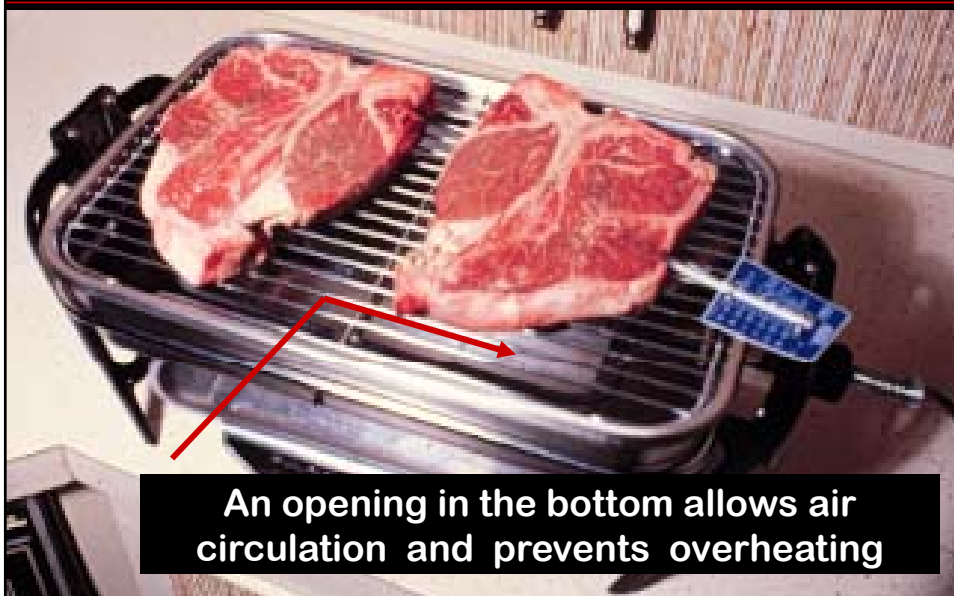
The internal temperature of steaks and roasts will increase 5 to 10° after the meat is taken from the heat. Allow for this increased doneness.

INSERT THE THERMOMETER FROM THE EDGE OF STEAKS, CHOPS OR HAMBURGERS



This farberware grill is excellent for home use - an exhaust hood above it is not necessary

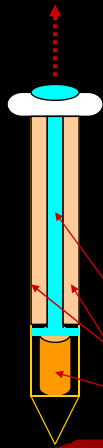
TEMPERATURE AT THE MEAT ON A FARBERWARE GRILL IS ABOUT 300° - NEAR IDEAL



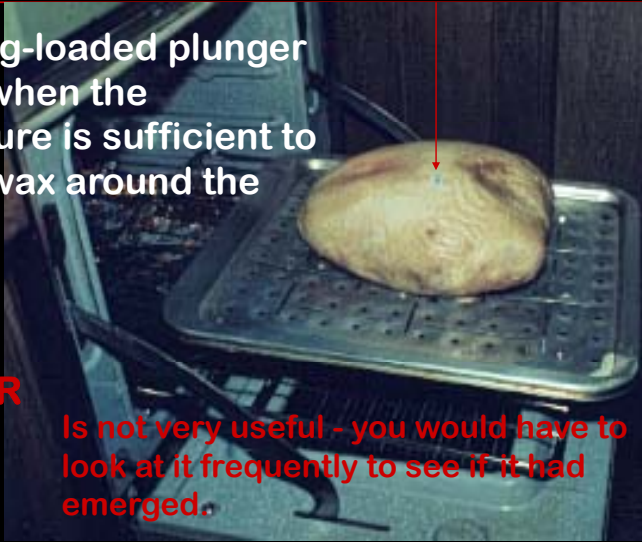
An opening in the bottom allows air circulation and prevents overheating

INTERNAL TEMPERATURE DEVICE IN A TURKEY BREAST TO BE ROASTED

The spring-loaded plunger pops up when the temperature is sufficient to melt the wax around the plunger.



PLUNGER
WAX
SPRING



Is not very useful - you would have to look at it frequently to see if it had emerged.

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RESTAURANT CHEFS CLAIM THEY CAN DETERMINE DONENESS BY DEPRESSING THE COOKING MEAT WITH A SPATULA

- The amount a cut of meat depresses depends on its doneness (more done, less depression), but the problem is that meat varies greatly in firmness.
- If this pressure method of determining doneness always “worked,” we would receive meat with the doneness we order in restaurants.

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FOR HEALTH'S SAKE, DON'T CHAR MEAT!!!

- Some Japanese research shows that charring meat may produce carcinogens.
- So, don't overcook meat or cook with too much heat that produces charred areas.
- Don't cook with flames when charcoaling. If a fire erupts, have water handy to douse it.

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NOT EATING TRIMMABLE FAT REDUCES CALORIES BY 346 & CHOLESTEROL BY 60 mg IN JUST ONE STEAK



480 Calories
120 mg Cholesterol

Trim the fat before you cook because the fat migrates to muscle during cooking.



134 Calories
60 mg Cholesterol

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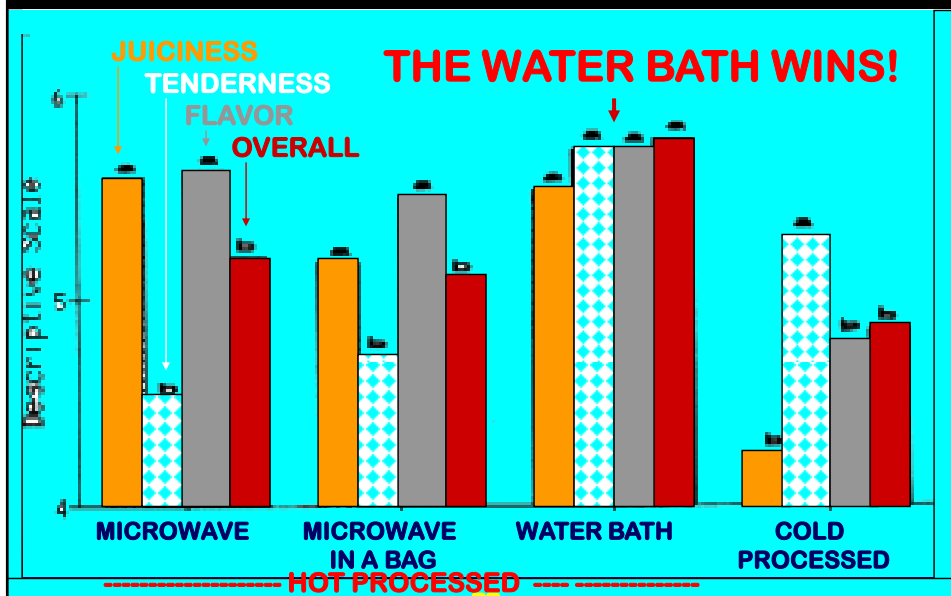
THE MEAT IS DONE BUT WE'RE NOT READY TO EAT - WHAT DO I DO?!?!?!?!?!?!?!?!?

- When cooking large cuts such as roasts, hams, turkeys, etc., if the meat gets done too soon, wrap it in foil and a towel and put it in a cooler. If you don't have a cooler, wrap it in foil and layers of cloth. It will stay warm for hours.
- Do smaller cuts the same way but for shorter times.
- It is better to have roasts done early because they need to "set up" at least a few minutes before being carved.

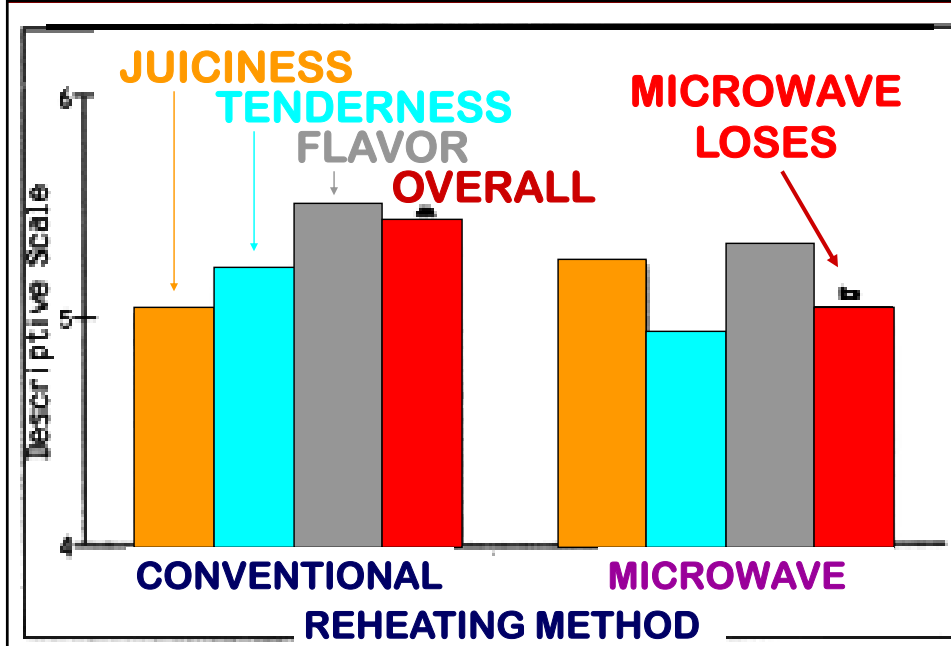
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WITH PROPER PROCESSING & COOKING, HOT PROCESSED PORK IS MORE PALATABLE THAN COLD PROCESSED



EFFECTS OF CONVENTIONAL AND MICROWAVE OVEN REHEATING OF PRECOOKED PORK PRODUCTS



PROCEDURE IN TTU PORK CHOP RESEARCH BY KERSH AND RAMSEY

- Pork loin chops were cut 1/4, 1/2, 3/4 and 1 inch thick.
- They were cooked by broiling, frying or microwaving.
- Doneness was determined visually or with a meat thermometer.
- A trained sensory panel evaluated tenderness, juiciness and flavor.

COMPARING COOKING METHODS

RESEARCH ON COOKING OF PORK CHOPS BY
RAMSEY ET AL. AT TEXAS TECH UNIV.:

BROILING PRODUCED MORE TENDERNESS
FRYING PRODUCED THE BEST FLAVOR
MICROWAVES PRODUCED SLIGHTLY LOWER
PALATABILITY RATINGS

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**IF YOU DON'T HAVE A MEAT
THERMOMETER, GET ONE!!!!**

CHOP THICKNESS DID NOT AFFECT
PALATABILITY IF A THERMOMETER
WAS USED TO DETERMINE DONENESS

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**YOU CANNOT TELL WHEN MEAT IS
DONE BY LOOKING AT ITS SURFACE**

WHEN EXTERNAL APPEARANCE WAS USED AS THE
ENDPOINT FOR COOKING, THIN CHOPS WERE
OVERCOOKED AND THICK CHOPS WERE UNDERCOOKED

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**WHEN MEAT IS WRAPPED IN ALUMINUM
FOIL, MOIST HEAT IS USED - FLAVOR ↓**

TWO USES FOR ALUMINUM FOIL:

☞ USE WHEN ROASTING AT A HIGH OVEN
TEMPERATURE (400°F OR 205°C+)

☞ COVER ENDS OF WINGS AND DRUMSTICKS
OF ROASTING POULTRY

BOTH USES PREVENT CHARRING OF THE MEAT

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COOKING DATA FOR 12-LB. HAMS

COOKING METHOD	OVEN TEMP °F	COOKING TIME, MIN. PER LB.	COOKING LOSS, %	PALATABILITY RANKING
ROASTED IN ALUMINUM FOIL	400	17	24	5 TH
ROASTED UNCOVERED	400	16	28.5	3 RD
ROASTED COVERED	350	22	19	4 TH
ROASTED UNCOVERED	250	32	10	2 ND
ROASTED UNCOVERED FROM FROZEN STATE	250	64	8	1 ST

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WHAT ABOUT COOKING BAGS FOR ROASTING?

- Do not use cooking bags
- They insulate, wasting energy and your money
- They trap steam, shifting from roasting to braising with the trapped steam
- Braising tenderizes but greatly harms the meat flavor
- Meat should be naked during roasting

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EFFECTS OF COOKING SPEED & DONENESS - DATA COLLECTED IN ANSC 3201 LABS

COOKING METHOD	INTERNAL TEMP., °F	COOKING LOSS, %	WBS VALUE	SENSORY PANEL SCORE		
				TEND.	JUIC.	FLAVOR
BROILING	155	19.3	7.7	6.0	6.6	6.4
BROILING	180	30.2	9.2	5.6	5.0	5.1
CHARCOAL GRILLING	155	13.4	5.7	7.2	6.6	7.3

Compare lines 1 and 2. The only difference is the doneness: 155 vs. 180 internally. **How did the greater doneness change the meat?**

Compare lines 1 and 3. Only differences are charcoal and a slower cooking w/charcoal.

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

SUMMARY

SELECT CORRECT COOKING METHOD FOR EACH MEAT CUT

COOK SLOWLY

USE A MEAT THERMOMETER WHEN COOKING WITH DRY HEAT

DON'T OVERCOOK

MEAT TENDERIZERS

- Enzymes that degrade proteins and tenderize meat.
- **Review information given earlier**
- Papain is most widely used
- In home situations, any tenderizer is difficult to incorporate into the meat beyond about a 1/4-inch depth.
- Commercially, enzyme solutions can be pumped into meat cuts.

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

INGREDIENTS OF A MARINADE

MARINADE - USED TO MARINATE MEAT CUTS, AMOUNT SUFFICIENT TO MARINATE 4 BEEF STEAKS, 6 PORK CHOPS OR 10 LAMB CHOPS:

COOKING OIL - 1/2 CUP

LEMON JUICE, COOKING SHERRY, WINE

OR VINEGAR - 2 TSP.

BLACK PEPPER - 1/4 TSP.

MARJORAM - 1 TSP.

GINGER (OPTIONAL) - 1/4 TSP.

TOO SALTY TO
DRINK

HOW TO USE A MARINADE

- Mix the marinade and coat all surfaces of the steaks or chops.
- Leave in the refrigerator for 4 to 24 hours.
- Re-coating of the meat with the marinade is desirable.

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

ADVANTAGES OF MARINATING

- Increases juiciness coming from the oil in the marinade
- Increases flavor coming from the spices
- Surface tenderness may be increased by the lemon juice or similar ingredient
- Downside: calorie count will be increased because of the added fat

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

INGREDIENTS FOR A GOOD CHICKEN BBQ SAUCE - IMPARTS A GOLDEN COLOR

Ingredient	For 4 halves	For 100 halves
Cider vinegar	1 cup	1 gallon
Cooking oil	1/3 cup	3 pt
Salt	4 tsp	2 cups
Tabasco sauce	2 tsp	4 bottles
Worcestershire sauce	3 tsp	2 bottles
Garlic powder (optional)	1/8 tsp	2 tsp

This sauce can be sprayed on cooking chicken.

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

OUTDOOR COOKERY MADE EASY

- Thousands of cartoons have been drawn poking fun at backyard “cooks” in a cloud of smoke.
- With a few key points, you can escape being a cartoon subject and can become an excellent backyard chef.

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

HOW IS SMOKED FLAVOR PRODUCED?

- Charcoal or gas grills produce smoked flavor on meat because the meat grease cooks out and drips on something hot, creating smoke.
- Grease dripping on hot metal would produce essentially the same flavor as charcoal or gas grills.

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

CHARCOAL VS. GAS AND WOOD CHIPS

- In previous years of this class, we determined that students could not tell the difference in flavor of pork chops cooked over charcoal and on gas grills.
- If you want a stronger smoked flavor, soak hardwood chips in water (so they will smolder and not flame) and place them on top of the charcoal or on top of the layer of rock-like material in a gas grill.

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

TEXAS GRILLS NEED “HATS”

- Because of an abundance of wind in many parts of the country, **particularly Texas**, you should purchase a grill with a lid.
- It will be cheaper in the long run if you buy a more heavily- constructed grill because they “rust out” more slowly.
- You don't need a **big grill** for everyday family use.

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

AN IDEAL CHARCOAL GRILL FOR EVERYDAY FAMILY USE

CAST IRON BODY WITH STAINLESS STEEL GRILL

Two dampers to control heat

Milled edges on lid and bottom - air tight

Is about 30 years old and still going strong



GRILL WITH CHARCOAL REMAINING FROM THE PREVIOUS COOKING



CHARCOALING KEY POINT

USE ONLY ENOUGH CHARCOAL TO COVER THE AREA UNDER THE MEAT TO BE COOKED

THESE BRIQUETTES WOULD HEAT ONLY THE AIR

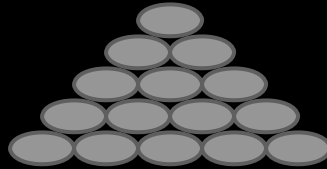
WE DON'T NEED MORE "HOT AIR" IN TEXAS!



CHARCOALING KEY POINT

STACK THE CHARCOAL IN A PYRAMID SHAPE
BEFORE APPLYING LIGHTER FLUID

Each briquette then helps light the one touching it and they light more quickly.



TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

CHARCOAL STACKED READY FOR LIGHTING

Partially-burned briquettes from the previous cooking are in the bottom layer.



TEXAS TECH

APPLY LIGHTER FLUID GENEROUSLY

Do **NOT** use gasoline unless you also want to be “lit”.

Kerosene and diesel fuel are OK to use.

TEXAS TECH



LEAVE THE LID OPEN WHILE THE CHARCOAL IS LIGHTING

More O_2 causes faster combustion

TEXAS TECH



CHARCOALING KEY POINT

ALLOW AT LEAST 20 MINUTES AFTER LIGHTING CHARCOAL BEFORE COOKING OF MEAT IS BEGUN

- This time allows all fumes from the lighting fuel to burn and prevents off-flavors in the meat from the fuel.
- Cooking is easier if the charcoal is hot before you begin.

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

6 MINUTES AFTER LIGHTING CHARCOAL - GRAY ASH APPEARING



TEXAS T

15 MINUTES - NOT READY



26 MINUTES - READY TO COOK



THE EASIEST METHOD OF LIGHTING CHARCOAL IS BY BROILING IT

You must have an exhaust hood above the oven because charcoal smokes while lighting.

The pan's finish will be ruined by the intense heat.

RACK IN TOP POSITION

TEXAS TECH



CHARCOAL
READY TO
COOK AFTER
BEING
BROILED 3
MINUTES

TEXAS TECH



CHARCOALING KEY POINT

ALWAYS UNIFORMLY SPREAD THE CHARCOAL
ACROSS THE BOTTOM OF THE GRILL BEFORE
COOKING IS BEGUN

Briquettes that touch create enough
heat to cause flames from heated
grease; one by itself does not

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

USING TONGS TO SPREAD THE CHARCOAL

Don't cook
with flames
that will
char the
meat.



TEXAS TECH

LETTING THE GRILL HEAT BEFORE MEAT IS PUT ON

The grill will be wiped after it gets hot.



TEXAS TECH

WIPE THE GRILL AFTER IT IS HOT

Heat from the charcoal will kill all microbes on the grill.

Washed grills rust more than unwashed grills.



THIS CAST STAINLESS STEEL GRILL DOES NOT RUST

TEXAS TECH

KEY POINT: APPLY COOKING OIL TO PREVENT THE MEAT STICKING TO THE HOT METAL

Any edible oil or fat can be used to coat the grill.



TEXAS TE

COOKING AND PRODUCING THE SMOKED FLAVOR

Regulate the heat by opening or closing the dampers - more open produces more heat.



TEXAS TECH

Closing the lid and shutting the dampers deprives the charcoal of oxygen, saving the remaining charcoal for the next cooking.

TEXAS TECH



TURNING MEAT ONLY ONCE IS MOST DESIRABLE

- Best results in both palatability and cooking losses are obtained if meat is turned only one time during broiling and grilling. Cook one side, season the cooked side, and cook the second side until done.
- Season the cooked side because salt draws moisture from raw meat.
- To turn only once, you must have the heat at the correct level. Experiment!

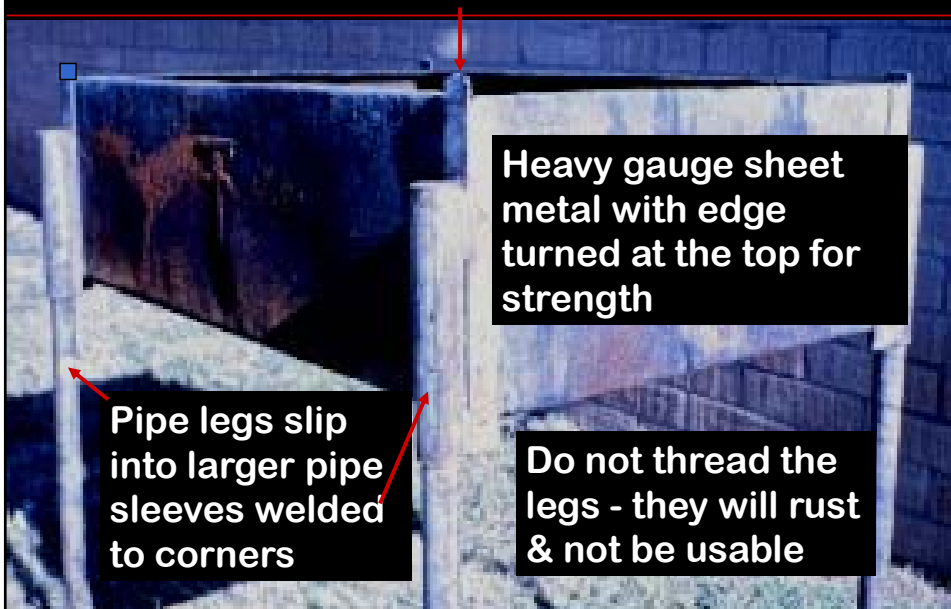
TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

For health purposes and ease of tending, a grill should never be made larger than this one: 1 x 2 x 3 ft.

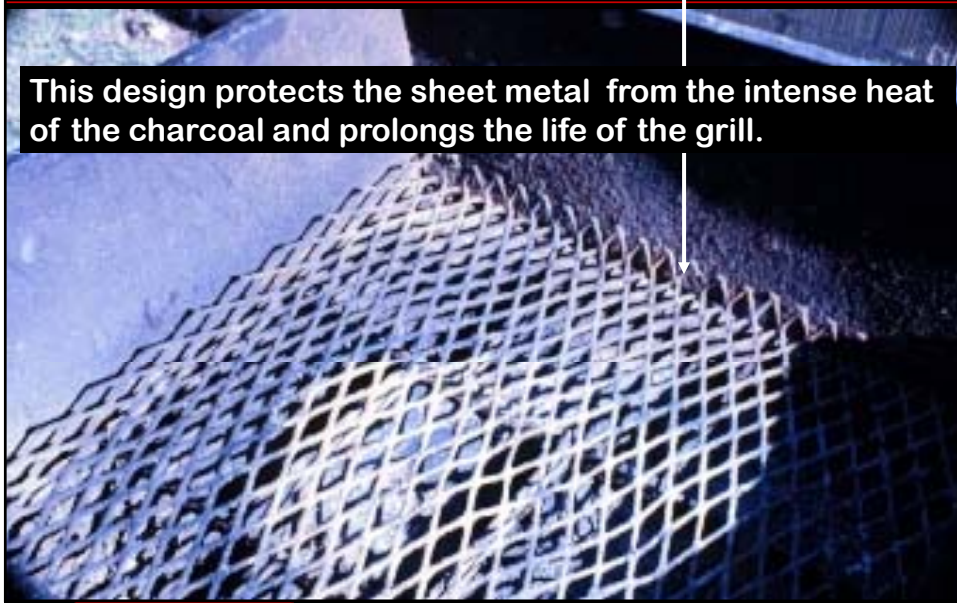


CORNERS ARE ANGLE IRON WITH A LIP ON THE OUTSIDE TO KEEP THE GRILL IN PLACE



**INSIDE GRATE FOR HOLDING CHARCOAL RESTS ON A
FLAT IRON FRAME AND HAS TURNED-UP EDGES**

This design protects the sheet metal from the intense heat of the charcoal and prolongs the life of the grill.



**WHEN USING A 1 X 2 X 3 FT. GRILL, A 10-LB.
BAG OF CHARCOAL IS NEEDED**

Cut the bag across the top of the ends and in the top center, but do not pour the charcoal out. Apply lighter fluid and let the bag keep the charcoal stacked for lighting.



10 LB. CHARCOAL

A 3D perspective diagram of a rectangular charcoal bag. The bag is shown with a white top surface and a grey side surface. Dotted lines indicate the top edges of the bag. The text "10 LB. CHARCOAL" is printed in red on the white top surface.

After about a half hour, bring unburned paper to the top and then spread the charcoal before cooking.

TEXAS TECH

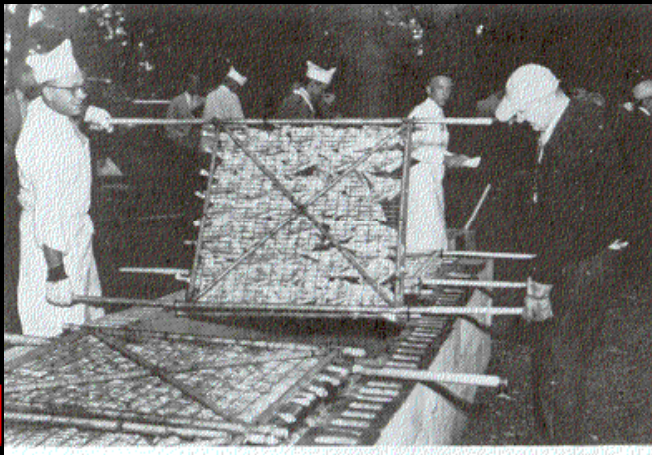
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GRILL TO HOLD THE MEAT IS MADE OF SMOOTH EXPANDED METAL



CHECK YOUR TEXT

- See MWE for information about making concrete block grills
- See figure 24-12 about turning large quantities of cooking meat



WHAT ABOUT GAS GRILLS?

- Gas grills are handy - you don't have to wait for charcoal to light and the heat can be regulated just by turning a dial.
- Downsides:
 - they are notorious for grease fires - accumulated meat grease burns & scorches the meat before you notice
 - most grills have hot and cold spots, depending on the burner design

TEXAS TECH

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MORE ABOUT GAS GRILLS

- You must have some material in place to protect the burner from dripping meat grease and more evenly distribute the heat from the burner.
- One such product that works well is ceramic and is called "devil's anvils".
- Do not use lava rock because the pockets in the rock hold grease and cause even more fires than other better products that have smoother surfaces.
- Charcoal may give more flavor, depending on how much smoke is generated.

TEXAS TECH

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PIT BARBECUING IS FOR LARGE CUTS OF MEAT

See the information on pages 1,013 and 1,014 in MWE if you have an interest in doing pit barbecuing.

Two most common pit BBQing mistakes:

- Not having the pit sealed well enough so that heat and steam escape
- Not allowing enough time for the meat to get done

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

WHAT ARE THE KEYS TO MATCHING RETAIL CUTS WITH THE PREFERRED COOKING METHODS?

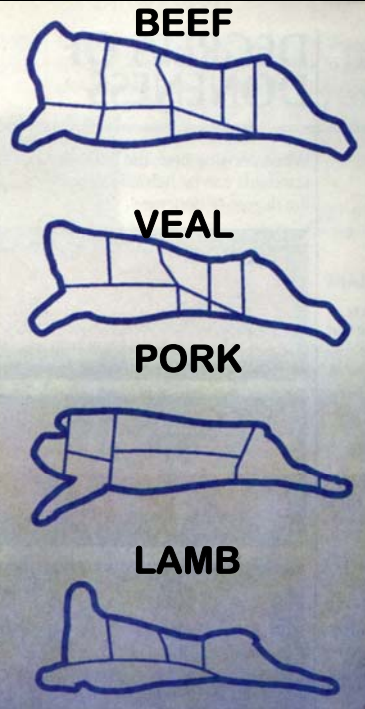
- You must know where on the carcass the cut originated. If you learn lab materials, you will know the origins of cuts.
- Then learn what parts of the carcass are tender and tough (or intermediate)
- Tender ones need dry heat methods
- Tough ones need moist heat methods
- Lastly, learn cooking methods for thick and thin cuts and you have it!

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

BEEF PRESENTS MORE TENDERNESS PROBLEMS THAN VEAL, PORK OR LAMB WHY?

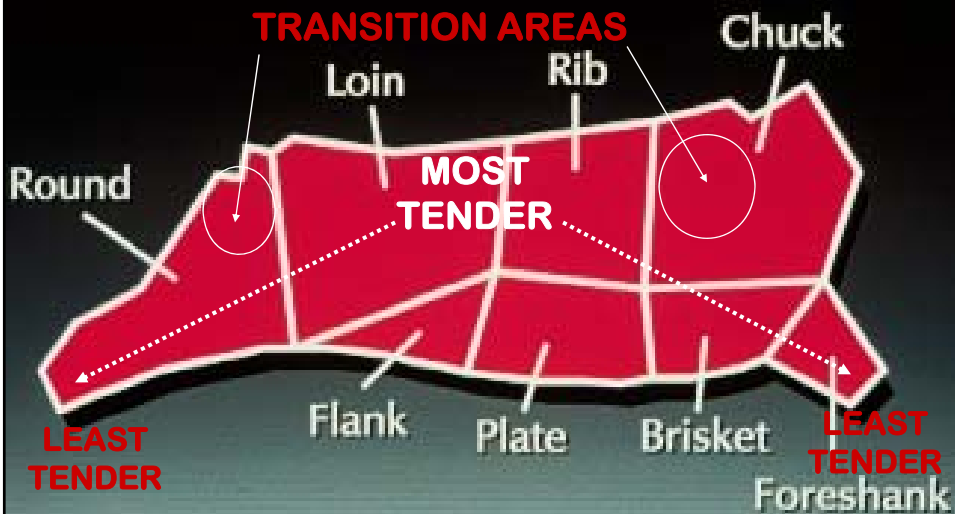
All cuts except shanks and necks of pork and lamb can be cooked with dry heat.



TEXAS TECH

ASFT DEPT.

FOR BEEF, CENTER OF THE BACK IS MOST TENDER



TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

ALL LAMB AND PORK CUTS ARE TENDER EXCEPT THE SHANKS AND NECK. WHY?

Lamb Leg Sirloin Chops



Cut from sirloin section of leg. Contains backbone and part of hip bone, which vary in shape with each chop. Muscles include top sirloin, tenderloin, and flank. Fat on outside, fell removed.

DRY HEAT COOKERY METHODS (Broil, Panbroil, Panfry)

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

WHY NO DRY HEAT COOKERY CHOICE?

Beef Chuck Arm Steak

Braise, Cook in Liquid

Same muscle and bone structure as Arm Pot Roast. Cut thinner, usually about 1/2 inch thick.

ROASTS ARE AT LEAST 1.5 INCHES THICK; AT LEAST 2 INCHES IS BETTER.



TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

DRY HEAT COOKERY METHODS ARE OPTIONS FOR A LAMB CUT FROM THE SAME LOCATION AS THE BEEF CUT

Lamb Shoulder Arm Chops

Broil, Pan-fry, Pan-broil, Braise

Cut from the arm portion of the shoulder. Contains cross section of round arm bone and rib bones.



TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

DITTO FOR PORK

Pork Shoulder Arm Steak

Braise, Pan-fry, Pan-broil, Grill, Broil

Same muscle and bone structure as Arm Roast, but cut about $\frac{3}{4}$ inch thick.



TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

MOIST HEAT NOT NEEDED FOR THIS TENDER MIDDLE MEAT CUT OF BEEF

Beef Rib Steak Small End

Grill, Broil, Pan-fry, Pan-broil

Same muscle structure as Rib Roast Small End, usually cut about 1 inch thick.



TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

DITTO FOR LAMB

Lamb Rib Chops Frenched

Grill, Broil, Pan-fry, Pan-broil

Same as Rib Chops, but lean and fat from end of rib bone has been removed, exposing about 1 inch of bone.

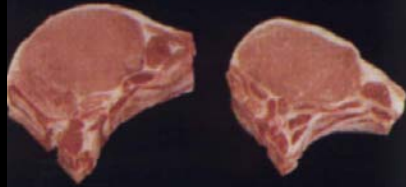


TEXAS TECH

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AND PORK

Pork Loin Rib Chops [†]



Grill, Broil, Pan-fry, Pan-broil

Contains loin eye muscle, backbone and part of rib bone. Usually cut $\frac{3}{4}$ to 1 inch in thickness.

[†]May be labeled as Pork Loin Center Cut Chops

TEXAS TECH

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THE BLADE REGION OF BEEF NEEDS EITHER DRY OR MOIST HEAT COOKERY DEPENDING ON THE MEAT QUALITY

Beef Chuck Blade Roast

Contains blade bone, backbone, rib bone, and a variety of muscles. Usually cut about 2 inches thick.

(Braise, Roast)



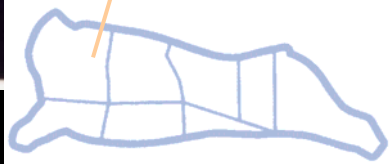
TEXAS TECH

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THIS BEEF CUT IS FROM A TRANSITION AREA (NOT TOUGH OR TENDER) ON THE CARCASS

Beef Chuck 7-Bone Steak

IF CHOICE OR PRIME



Braise, **Broil***, **Grill***, Cook in Liquid

Same muscle and bone structure as 7-Bone Pot Roast. Cut thinner, usually about 1 inch thick.

**Marinate before cooking*

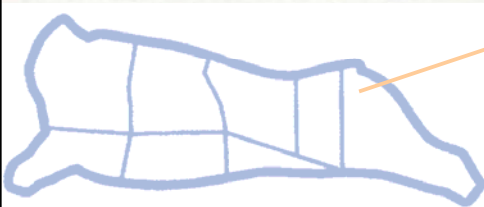
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THE SAME INFORMATION APPLIES TO RUMP ROASTS

Beef Round Bottom Round Rump Roast

Braise, Cook in Liquid, Roast








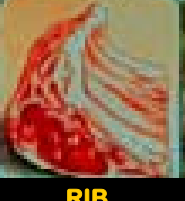


Cut from the sirloin end of the bottom (outside) round.



TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

WHICH BEEF CUTS ARE MOST LEAN?

				
TENDERLOIN STEAK 174 CALORIES	TOP ROUND STEAK 162	VERY LEAN CUBED STEAK 180	SIRLOIN STEAK 172	FLANK STEAK 207
				
GROUND BEEF 235	TOP SIRLOIN STEAK 177	RIB ROAST 204	EYE OF ROUND ROAST 155	BOTTOM ROUND ROAST 159

HOW SHOULD VARIETY MEATS BE COOKED?

Most variety (organ) meats are not tender. Does this fact give us a lead about proper cooking methods?

WHAT COLLEGE PROFESSORS HAVE TOO MUCH OF!



**THEIR TOUGHNESS
NECESSITATES USING MOIST
HEAT COOKERY OR GRINDING
FOR SAUSAGES**

TEXAS TECH

ASFT DEPT. - MEAT SCIENCE

HAVE A HEART!

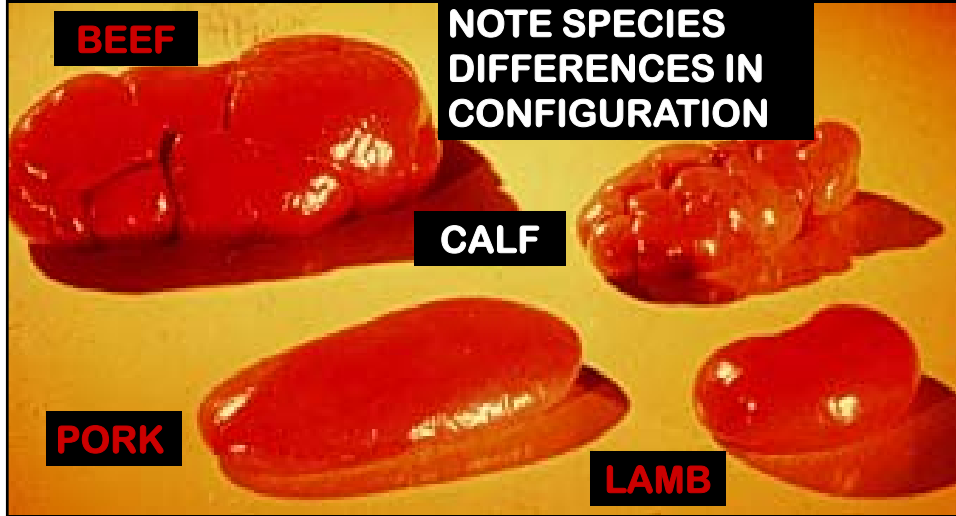


**MOST HEARTS ARE
EXPORTED OR USED IN
SAUSAGES IN THE U.S.**

TEXAS TECH

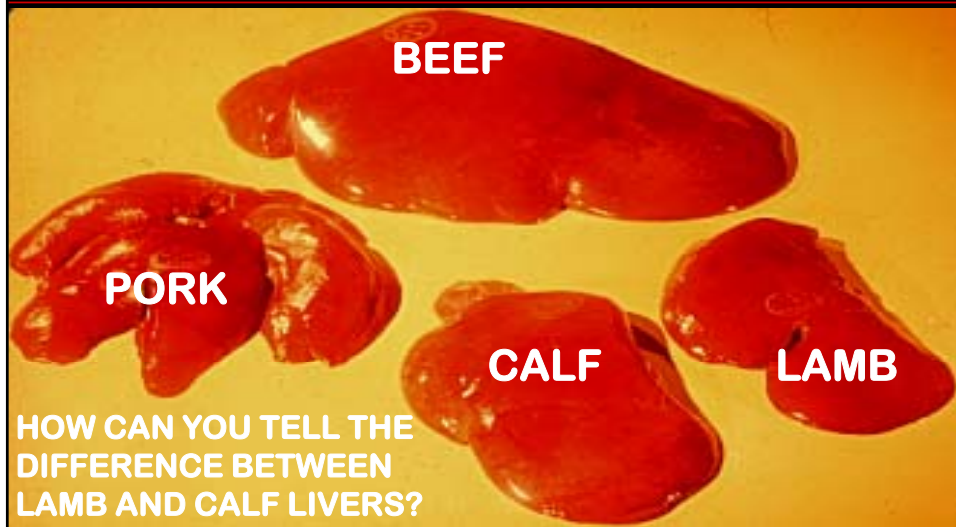
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HOW WOULD YOU COOK KIDNEYS?



ANSWER: BOIL THE PEE OUT!!!

LIVERS - LAMB LIVER OFTEN IS SOLD AS CALF LIVER. WHY?



TEXAS TECH

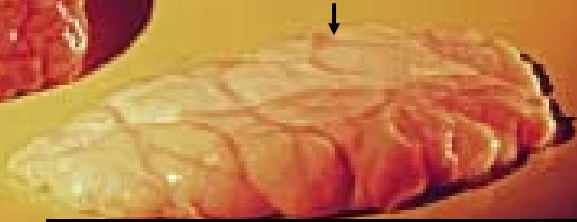
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WHAT COLLEGE STUDENTS NEED TO USE MORE!



SWEETBREADS - THE THYMUS GLAND OF YOUNG BOVINE. SAUTE THEM.

SOME PEOPLE LIKE BRAINS AND SCRAMBLED EGGS



ALSO CAN BE OBTAINED FROM THE PANCREAS OF SWINE

TEXAS TECH

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THE END



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