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South Dakota State University Agricultural  
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11-1-1971

## You Have Your Deer, Now, Enjoy Its Meat

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### Recommended Citation

Willis, R. and Deerhardt, D., "You Have Your Deer, Now, Enjoy Its Meat" (1971). *Bulletins*. Paper 596.  
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**Cover Photo: South Dakota Department of Game, Fish and Parks.**

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This publication is a result of research by the Department of Home Economics, Agricultural Experiment Station under project S-368, Care, Preparation and Cooking of South Dakota Wild Game. Further work will be done under project S-612, The Nutritive Value and Utilization of Selected South Dakota Products.

*You have your*

# Deer

*Now, enjoy its*

# Meat

By

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Deer hunting, a widely enjoyed sport, can give still greater satisfaction by providing excellent table meat. Furthermore, deer have become so abundant in certain areas of the United States that proper use of this resource is both desirable and necessary.

Venison is an important supply of meat for some families. Others find it a pleasing change from the usual meats of domestic animals. Some families, because there's an avid hunter in the household, simply eat venison to avoid the "sin of waste." Unfortunately, in other cases deer carcasses are discarded because of what some hunters and families consider as undesirable flavor in this meat.

On a cost per pound basis, venison is expensive. This is another good reason for proper care and use of the meat. While differences of individual deer are factors in accep-

tability, the flavor of venison can be controlled to a certain extent by hunter or homemaker. This can be done by proper initial care of the meat, storage, and cooking procedures.

South Dakota State University research was done on the acceptability of venison. Evaluation was by a taste panel as well as by use of special laboratory equipment. The taste panel consisted of four to six persons, both men and women, from the Wildlife and Home Economics Departments of the Agricultural Experiment Station. The sensory qualities that were studied included juiciness, tenderness, flavor, aroma, appearance and general acceptability of the cooked meat. Special laboratory equipment to measure tenderness and juiciness was used to provide measurements for comparison with panel evaluations.



## Browse

Flavor differences in venison meat were minor in relation to the type of browse predominant in the feeding area. Aroma was more distinctive for meat from deer browsing on mountain mahogany bushes in the southern Black Hills of South Dakota. However, the aroma was not considered unacceptable by the taste panel. Tenderness, measured by shear force, and juiciness, measured by extractable fluid, varied in meat of deer from different feeding areas, but were not detected by the taste panel. Significant differences in tenderness *among animals* was evident—and tended to overshadow other things which affected tenderness.

Apparently, browse, such as mountain mahogany, is not alone responsible for undesirable flavor in venison. When other adverse factors occur, however, the effects of different types of browse may be more noticeable.

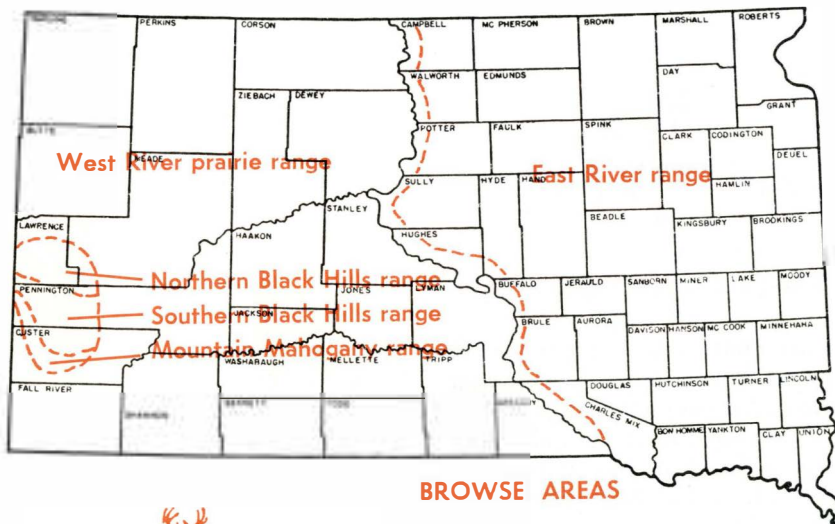
## Experimental

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Mountain mahogany in the southern Black Hills has been censured for adversely affecting flavor of meat. Predominant browse in the northern Black Hills is pine and juniper. West River prairie browse has a predominant of grassland and prairie rose, while East River farm land has mostly corn and wild plum. Both mule and white-tailed deer collected by state game biologists from four areas of the state with the different predominant kinds of browse were used for palatability studies. With one exception, all animals were does.

A trained four- to six-member taste panel (men and women) evaluated cooked, unseasoned roasts and chops from these animals for juiciness, tenderness, flavor, aroma, appearance and general acceptability. In the laboratory, tenderness was also measured by force in pounds required to cut 100 grams of meat. Juiciness was measured by using a Carver laboratory press to determine the extractable fluid.

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## Sex of Deer

The hunter out for “trophies” may find that he is disappointed with the eating quality of the meat he brings home. In an attempt to explain this, roasts and chops from a buck and a doe were prepared for evaluation by the trained taste panel. The panel did not detect an appreciable difference in flavor or juiciness, but did detect a more intense aroma of the meat from the doe. The aroma was acceptable to the panel, however. Shear force measurements of tenderness indi-

cated the doe was less tender than the buck. The taste panel found the chops from the doe were also less tender. This is not in agreement with studies in Utah (1) indicating that flavor, tenderness and general palatability of meat from the female animal is more acceptable, at least until animals reach old age. The small number of animals used in the SDSU study may have permitted animal differences to predominate over sex differences. A good “trophy” indicates an older buck, and age is likely to be an important factor in acceptability of the meat.

## Experimental

Two Black Hills white-tail deer, a doe and a buck of about the same age, were used in this phase of the studies. Four cuts of meat were made from each side of the animal, one from the rump and three from the round (sirloin tip, outside and

inside round) to be roasted and evaluated by an experienced taste panel. Sixteen chops, cut from each loin of the animal, were grouped into four lots of four adjacent chops to be broiled at one time for panel evaluation.



## *Frozen Storage Time*

The recommended storage periods vary for frozen meats. Beef storage periods, for example, range from 8 to 12 months for roasts and steaks; for pork the range is 4 to 8 months for roasts and 3 to 4 months for chops. (4).

Venison held up to 6 months in frozen storage appeared to have no loss in quality. After longer periods a downward trend in flavor and juiciness of chops was detected. The percentage of total cooking loss increased with longer storage periods. Tenderness of roasts increased with frozen storage time but little flavor difference was noticed. Aroma of fresh loin chops was more intense, and they were somewhat less tender as determined by taste panel and shear force measurements.

It would appear that quality of venison is well retained within reasonable periods of frozen storage. Deterioration was noted in the smaller cuts (chops) earlier than in the larger pieces of meat (roasts) and was not detected until after the venison was in frozen storage for 9 to 12 months.

### **Experimental** ---

Venison round was cut into boneless roasts and the rib and loin portion cut into 1-inch (2.5 cm) chops. The meat was wrapped in plastic laminated freezer paper, and held in frozen storage at 0° to -20° F. (-18° to -29° C.) for periods of 0 (not frozen) 1, 3, 6, 9 and 11 or 12 months.

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## *Trimming of Fat*

Fat has been identified in some research as the source of flavor differences in beef and pork (2). This may not be true with venison, however, because no significant effect on the acceptability of venison resulted when visible fat was trimmed from the meat before frozen storage, before cooking, or just before presenting the cooked meat to the taste panel. Although flavor was more distinctive when chops were rated with the fat left intact, it was an acceptable flavor. Had the fat itself been sampled, flavor differences might have been detected. Water soluble flavoring components, easily volatilized and changed by the heat of cooking, have been identified in the body fat of lamb and mutton (3). The possibility that the fat of venison may hold unacceptable flavor constituents was considered but has not been proven.

### **Experimental**

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Half of the roasts cut from the rounds were trimmed of visible fat before putting the meat in frozen storage and the other half of the roasts were left untrimmed. Normally, the round of venison has only small amounts of fat. The loin was cut into 1-inch (2.5 cm) chops and divided into three groups: one group trimmed of fat before storage; two groups stored untrimmed, one of these was trimmed of fat before cooking. The defrosted roasts were cooked in a 350° F. (177° C.) constant temperature oven and removed at an internal temperature of 168° F. (75° C.). Aluminum foil was placed loosely around the meat. The chops were defrosted and oven broiled to an internal temperature of 170° F. (77° C.). All visible fat was removed from all samples before presentation to the taste panel to prevent panel members from identifying treatments. Thus, flavor effects due to the fat would have been due to melting of the fat into the meat during cooking.

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## *Cut of Meat*

The homemaker is familiar with the quality of the retail cuts of beef and pork. The deer carcass is usually divided into similar cuts presumed to have similar range of quality.

The rump and the round of the deer carcass were used for these studies. The round was cut into three boneless roasts, sirloin tip, inside and outside round (see drawing on carcass cuts). The whole loin section was cut into 1-inch chops.

The cuts varied in tenderness. The rump and sirloin tip roasts proved to be the least tender. The chops from the loin end were more tender than those from the rib section, as is generally true in beef and pork.

## *Cooking Methods*

Tenderness of the various beef or pork cuts usually determines the cooking method chosen for the particular piece of meat. The more tender cuts are roasted or broiled, the less tender cuts are pot roasted, braised or stewed. Various methods of roasting and broiling were used in evaluating the acceptance of venison roasts and chops.

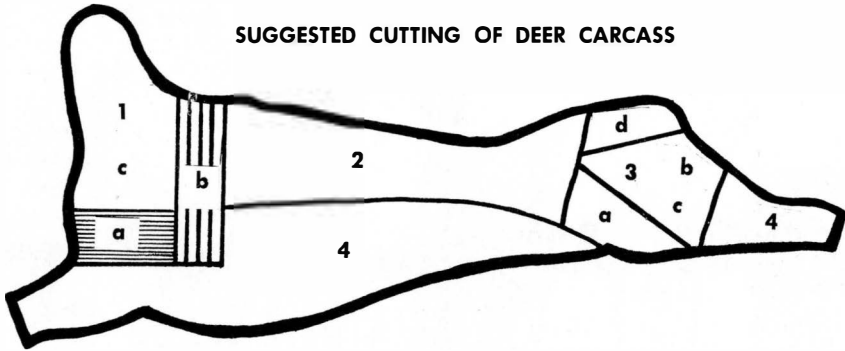
### **Roasts**

Open pan roasting in a constant temperature 325° F. (163° C.) oven was much preferred. The roasted meat was significantly more juicy and tender, total cooking losses and pan drippings were less. But, as might be expected, volatile losses were greater. When a hotter oven —350° F. (177° C.) — was used, cooking losses increased some, and the meat was slightly less juicy. Browning of the meat in open pan roasting is evident in the darker color of the liquid pressed from the meat and the increased juiciness of the meat is indicated by the larger amount of liquid obtained by pressing. Roasts wrapped tightly in foil and baked in a 450° F. (232° C.) oven were significantly less acceptable, flavor and aroma were more intense, and the meat was not as tender or juicy. The only apparent advantage of this higher temperature oven was shortened cooking time in minutes per pound.

### **Chops**

Pan broiling of chops was preferred. Aroma, flavor, tenderness and juiciness ratings by the taste panel were highest for this method of preparation and cooking losses were less. Pan broiling was liked better than oven broiling and very much preferred to braising of chops. The panel reported the braised chops to be less tender and juicy, with less desirable flavor and aroma. In addition, the braised chops had a considerable increase in total cooking loss and dripping loss over the pan broiled chops. The panel preferred pan broiled chops over braised chops 52 times out of 60 possible choices.

## SUGGESTED CUTTING OF DEER CARCASS



**Bold Face Type** indicates portions used in SDSU studies.

### 1. SHOULDER

- a. Arm Chops
- b. Blade Chops
- c. Ground or Stew Meat

### 2. RIB AND LOIN

All Chops

### 3. ROUND AND RUMP

- For Roast—**a. Sirloin Tip**
- b. Inside Round**  
(inside of c.)
- c. Outside Round**
- d. Rump**

For Steak—Entire section

### 4. SHANKS AND FLANK

Ground Venison

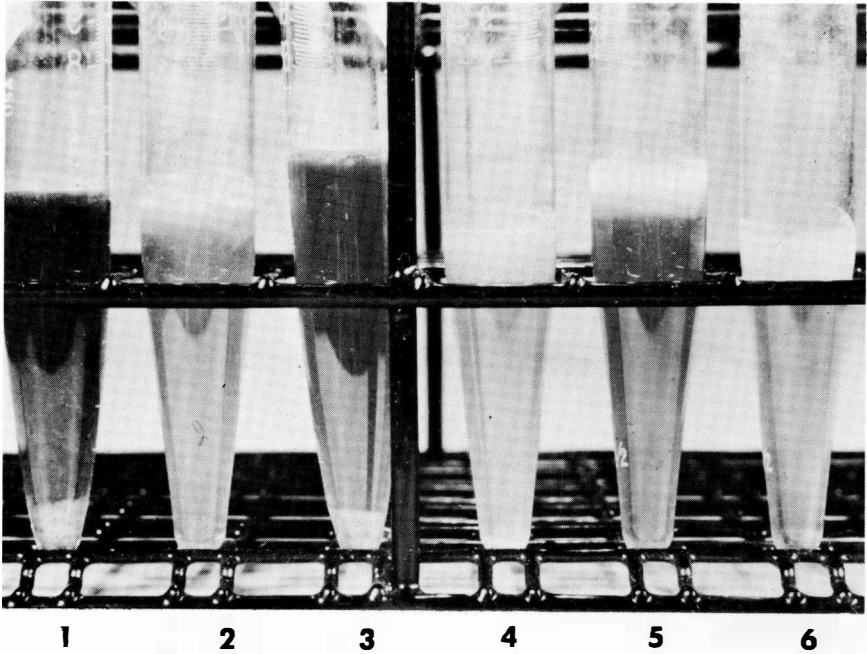
## Experimental—Roasts

Paired roasts (right and left side of carcass) cut from the round were removed from the freezer and defrosted several hours at room temperature followed by overnight refrigeration. Internal temperature of the piece of meat during cooking was determined by a thermocouple inserted into the center of the roast. Preheated constant temperature ovens were used.

By random selection, one roast of each pair (right or left side of carcass) was baked in a shallow, uncovered pan in a 325° F. (163° C.) oven. The corresponding roast of the pair was wrapped tightly in foil and baked in a 450° F. (232° C.) oven. The thermocouple was inserted by carefully piercing the foil. No seasonings were used. Roasts were removed from the oven

when an internal temperature of 170° F. (77° C.) was reached. Another set of paired roasts was baked in a shallow, uncovered pan but one was placed in a 325° F. (163° C.) oven and the other in a 350° F. (177° C.) oven.

Three ¾-inch (1.9 cm) slices of roasted meat were used for tenderness and extractable fluid determinations. Six ½-inch (.04 cm) slices were used for taste panel evaluations. Extracted fluid was measured in graduated centrifuge tubes, refrigerated, and read in milliliters of total liquid, fat and drip (note photograph showing differences in liquid from pressing). Color differences due to browning were noted. Percentages of total cooking loss, volatile and drip losses were computed.



Extracted fluid from open pan roasting versus tightly covered venison roasts.  
Numbers 1, 3 and 5 are open pan; 2, 4 and 6 are covered.

### Experimental—Chops

The loin of the carcasses was stratified into right and left sides with three blocks of four 1-inch (2.5 cm) chops per side. Adjacent pairs (right or left side of carcass) of chops were defrosted and cooked at one time for presentation to the taste panel. A thermocouple was inserted into the side of one of the four chops in the sample. No seasoning was used. Chops were turned only once during broiling.

For pan broiling an electric fry pan was set to maintain a surface temperature of 350° F. (177° C.). The preheated pan was brushed with fat. The chops were cooked on one side to an internal temperature of 125° F. (52° C.), turned, and

cooked to an internal temperature of 170° F. (77° C.).

For oven broiling chops, the oven was set to maintain a temperature of 450° F. (232° C.) at the broiling surface. Chops were turned once and removed at 170° F. (77° C.).

The chops which were braised were browned 3 minutes on each side in a preheated 350° F. (177° C.) electric fry pan brushed with fat. The control on the thermostat was then set at the middle range of simmer,  $\frac{1}{2}$  cup (60 ml) water added, the pan covered, and cooking continued until the internal temperature of the chop was 185° F. (85° C.) In computing the amount of drippings, allowance was made for the water added.

# Recipes

## Ground Venison

A good way to use the lesser cuts and trimmings of the deer carcass is to grind the meat and use it for venison burgers, loaf and sausage. The pieces of meat are likely to be lean, causing the ground venison to seem dry. Researchers at SDSU found that the addition of water (4 tbsp—or 60 ml—per pound of meat) plus some fat, ground beef or pork sausage improved the acceptability of cooked ground venison.

A binder such as cornstarch or flour is desirable to keep the meat from being too crumbly. Other binders which may be used are powdered milk, waxy cornstarch, rice flour, tapioca flour, corn meal or food grade gum. Cornstarch was acceptable in the fresh ground product and after frozen storage. Additionally, it is inexpensive, readily available and does not change the desirable characteristics of the meat.



The following basic recipe was developed for home use:

	%	Weight gm.	Measure
Venison cubed or trimmings .....		454	1 lb
Leaf lard .....	5.0	23	2 tbsp
Salt .....	1.0	4.5	1 tsp
Black pepper .....	0.2	0.9	$\frac{3}{8}$ tsp

Grind together through a  $\frac{1}{2}$ -inch blade and then a  $\frac{1}{4}$ -inch blade. Venison is likely to get soft and mushy if ground finely.

Add a binder:

Cornstarch ..... 0.5% 2.3 gm. 1 tsp.

Different seasonings and seasoning combinations were tried. The following combinations are recommended:

**To 1 pound of meat:**

	%	Grams	Teaspoon
Ground sage .....	0.1	0.45	$\frac{1}{2}$
Oregano .....	0.1	0.45	$\frac{3}{4}$

OR

Orange juice ..... 4.0 18.0 3 (1 tbsp)  
Smoke salt ..... 0.5 2.3  $\frac{1}{8}$

OR

White pepper ... 0.1 0.45  $\frac{1}{4}$   
Nutmeg ..... 0.1 0.45  $\frac{1}{4}$

Other seasonings that were liked are thyme, sage, ginger and black pepper.

## *Deerburger Loaf*

Since ground venison alone may seem dry, a combination of half venison and half pork with seasonings, as in this recipe for deerburger loaf, is suggested. Binding flour (usually rice flour) is available at processing plants.

### **Deerburger Loaf**

	Weight	Measure
Venison .....	1.1 kg	2½ lb.
Pork .....	1.1 kg	2½ lb.
Binding flour .....	100 gm	¾ cup plus 1 tbsp
Monosodium glutamate .....	25 gm	2 tbsp plus 2 tsp
Cold water .....	450 gm	1 cup
Parsley .....	3 gm	3 tbsp
Salt .....	10 gm	1½ tsp
White pepper .....	1 gm	½ tsp
Celery salt .....	3 gm	1 tsp
Onion powder .....	3 gm	¼ tsp

Grind meat through ½-inch blade, mix in seasonings and water, grind again through ¼-inch blade. Make into loaves of desired size. Bake in moderate oven 350° F. (177° C.), approximately one hour, depending on the thickness of the loaf. This loaf freezes well and is good served cold.

The same proportions of venison and pork with varied seasonings makes desirable patties too. Binding flour may be used if desired.

### **Deerburger Patties**

	Weight	Measure
Venison .....	1.1 kg	2½ lb
Pork .....	1.1 kg	2½ lb.
Variation 1		
Salt .....	15 gm	¼ tsp
White pepper .....	1 gm	½ tsp
Binding flour .....	12.5 gm	2 tbsp
Sage, ground .....	1 gm	1 tsp
Thyme .....	1 gm	¾ tsp
Variation 2		
Salt .....	25 gm	¾ tsp
White pepper .....	2 gm	1 tsp
Cloves .....	0.5 gm	¼ tsp
Sage, ground .....	3 gm	1 tbsp
Sugar .....	5 gm	1½ tsp
Variation 3		
Salt .....	45 gm	2 tbsp plus 1 tsp
White pepper .....	7.5 gm	1 tbsp
Sage, ground .....	1 gm	1 tsp.

Grind and mix as for deerburger loaf. Shape into patties. Pan broil, 325° F. (163° C.), approximately 15 minutes, turning once.

## *Venison Bologna*

Each processing plant usually has its own special recipe for bologna and salami. This venison bologna recipe, using venison and pork, was acceptable either hot or cold to the panel.

### Venison Bologna

	Weight	Measure
Venison.....	2.7 kg	6 lb
Pork (may include some leaf lard).....	1.8 kg	4 lb
Coarse black pepper....	2 gm	1 tbsp
White pepper.....	2 gm	1 tsp
Ginger.....	1 gm	½ tsp
Onion powder.....	2.5 gm	1 tsp
Caraway seed, Dutch ground.....	1 gm	1 tbsp
Non-iodized salt.....	45 gm	2 tbsp plus 1 tsp
Commercial sugar cure	90 gm	¼ cup
Binding flour.....	50 gm	¾ cup
Cold water.....	700 gm	1½ cup

Few drops of oil of lemon

Grind meat with ½-inch blade, mix in seasonings and water. Grind again through ⅛-inch blade. Stuff. Smoke at 100° F. (38° C.) for 15 hours (light smoke). Boil or fry. May be served either hot or cold.

### *Cured Venison (Smoked)*

All kinds of meat may be cured and smoked for a change in flavor. There are many ways of smoking meat and improvising smoke houses. This method was good.

The meat was soaked in a 30% to 40% commercial sugar cure brine, as tested on a salometer, for 7 days, left to drip 2 days, then into the smoke house for 3 days at 140° F. (60° C.) or less, bringing the internal temperature of the meat to 100°-110° F. (38°-43° C.). This method is referred to as "cold smoke."

The meat must be cooked additionally before eating. Open pan roasting in a slow oven — 325° F. (163° C.)—was preferred by the panel for cured roasts from the hind quarter. The cured shoulders were boiled 2½ hours, causing a much greater cooking loss but a tender meat. Smoked loin chops were both pan broiled and oven broiled. The loin chops seemed to be too soft or mushy in texture when smoked. The panel preference was for pan broiled. All samples were cooked to an internal temperature of 170° F. (77° C.).

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