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HOME CANNING OF MEAT UNDER CONDITIONS IN LOUISIANA

BY

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AGRICULTURAL EXPERIMENT STATIONS

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HOME CANNING OF MEATS UNDER CONDITIONS IN LOUISIANA*

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INTRODUCTION

Canning of meat in the farm home is an important way of helping in the family food budget and in obtaining a better balanced diet. When meat is butchered on the Louisiana farm in the winter, it keeps for a short time only, on account of the variation in winter temperatures. To be kept for future use the meat must be either cured or canned. It cannot be frozen for winter use as it is in the northern farm homes. If sold to the market, it brings a much smaller price than the price the farmer must pay for meat for table use. Increasing the meat consumption on the farm would be especially desirable in pellagrous districts, as lean meat in the diet helps in preventing pellagra. Canning meat is one way of increasing meat consumption on the farm as it gives an easily available supply of meat throughout the year.

Meat canning is encouraged by the Extension Service of Louisiana State University. Canning club records show that in 47 parishes in the state the women and girls canned 101,352 quarts of meat and fish in the year 1930.

HISTORICAL

In many of the southern states there is the opinion that glass jars are unsatisfactory for meat canning. From a 1930 Texas bulletin (1) we have the recommendation “All meats should be canned in tin and in a steam pressure cooker or canner in order that they may be completely sterilized.” In a 1929 Florida bulletin (2) “it is recommended that for greater convenience and safety, meats be canned in tin as far as possible.” From a 1929 Louisiana bulletin (3) is the statement that “it is the consensus of opinion (though not backed by experimental evidence) among those who have had experience in home canning of meats on the farm under Louisiana conditions that from the standpoint of safety it is preferable to use the steam pressure canner rather than the water bath, and to can in tin cans instead of glass jars.”

*The author wishes to acknowledge the valuable cooperation of Mr. J. B. Francioni, Jr., of the Animal Industry Department.
These opinions may result from the time when rubber rings were more apt to be of poor quality, as indicated in the following quotation from a 1919 United States Department of Agriculture bulletin (4) "Another objection to the use of glass jars is that the rubber rings often are of inferior quality and even good rubber rings are liable to deteriorate in a warm, moist climate if stored for any length of time." Another U. S. D. A. bulletin (5) revised in 1924 contains the greater part of the direction given under "canning in tin cans" in the earlier bulletin, but does not contain the above quotation.

Although there are advantages and disadvantages in using glass for canning and in using tin, there is now no experimental evidence for the belief that the factor of safety or of spoilage need enter into the consideration. Recognizing that this is a consideration in the minds of many people, and believing that more farm women would be able to can meat if they could use glass jars, the present investigation undertook to secure some experimental evidence on the point in question.

Other points on which information was sought were the length of processing periods which will successfully keep meat canned in Louisiana in the winter and stored through the summer months, and the effect of different storage conditions and storage temperatures on the keeping of the meat.

In a meat canning experiment carried on in Iowa (6) a three hour processing in the boiling water bath was found to be sufficient to successfully keep meat canned in pint jars under conditions prevailing in that state.

**EXPERIMENTAL**

Material and Methods.

Meat dressed and cut under conditions on a farm was canned in February, 1929 and 1930, and stored seven to nine months including the summer months. A total of 779 cans and jars were canned.

The meat was secured from the Animal Industry Department of the University; it was dressed and cut through the courtesy of Mr. J. B. Francioni Jr. The meat canned in 1929 was from animals that had been killed less than 24 hours, while that canned in 1930 had been in cold storage not more than 4 days.

Number 2 tin cans and pint Mason Jars were used. The cans were sealed with lids having composition gaskets in the 1929 experiments and with lids having paper
gaskets in 1930. The jars were sealed with new rubber rings and new zinc caps.

Both beef and pork were used. There were 395 pounds canned in 1929 and 384 pounds canned in 1930. Half was canned in tin and half in glass; half was processed in the pressure cooker and half in the boiling water bath; half was stored at room temperature and half was stored in a basement. The lengths of the different processing periods used in the pressure cooker were 45 minutes and 60 minutes at 15 pounds pressure, and in the boiling water bath were 3 hours and 4 hours.

The meat was cut into pieces convenient size for serving, 453 gram (1 pound) portions were weighed, browned in a frying pan and packed into hot jars and cans. One half cup of hot water was put into the frying pan to make an unthickened brown sauce. When boiling, this was poured over the meat. Boiling water was added, if necessary, to fill the jar or can to within one inch of the top. One teaspoon of salt was added. The jars were sealed to within one-half inch of a complete seal if they were to be processed in the hot water bath and almost completely sealed if to be processed in the pressure cooker. The jars and cans were processed for stated lengths of time in the hot water bath or the pressure cooker, using half jars and half cans in each lot. In the use of the pressure cooker the precaution of allowing the petcock to remain open seven minutes after the appearance of steam was observed, since it has been shown that this is important in getting the desired temperature. (6) Timing the processing was started when the pressure gauge registered 15 pounds. At the close of the processing, the petcock was opened only a little, to allow the pressure to decrease gradually. In the use of the boiler, the jars and cans were submerged in enough boiling water to cover the tops at least three inches, and the timing was started when the water reached a “jumping boil.” After removing from the cooker or boiler the seal was completed on the jars. The cans were plunged into cold water to assist in cooling. After standing over-night half the jars and half the cans from each lot were stored in the basement and the other half at room temperature.

The storage temperature variation for the cans and jars stored at room temperature was practically that of the outside air. In the summer occasionally it reached as high as 98 °F. This temperature would give good opportunity for bacterial growth. However in many Louisiana homes there is no opportunity for a storage place cooler
than room temperatures. In the basement used in 1929 the temperature reached as high as 80 °F on some of the hottest summer days. The temperature of the basement room used in 1930 was only about 5° to 8° lower than outside temperatures in the hot weather. The basement used in 1929 was damp, while the basement room used in 1930 was comparatively dry.

In determining spoilage after the storage period had elapsed the following tests were used: general appearance of the jar or can and of the meat, suction, odor, pH, titrable acidity, ammonia and amino nitrogen as determined by the Sorenson formol titration, microscopic examination of the sediment, and an attempt to cultivate bacteria in dextrose agar containing Andrade's indicator.

Results.

**Meat Canned in 1929.**

No spoilage which was attributed to underprocessing occurred. The 3 and 4 hour process in the boiling water bath, as well as the 45 and 60 minutes at 15 pounds pressure were found to be satisfactory processing periods under the conditions of the experiment. No imperfect seals or leaks were found in any of the glass jars. No rubber rings had deteriorated to break the seal.

Spoilage occurred in 13 of the 192 tin cans. That this spoilage was due to leaks rather than underprocessing was shown by one or more of the following tests:

1. Bubbles arose when can was immersed in hot water for five minutes.
2. Microscopic examination of liquid showed mixed cultures including cocci as well as rods.
3. Bacteria isolated from the spoiled cans were non heat-resistant cocci.

The 13 cans in which there was spoilage due to leaks were divided as follows:

**Processing periods:**

<table>
<thead>
<tr>
<th>Processing Periods</th>
<th>Details</th>
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<tr>
<td>2</td>
<td>had been processed 3 hours in boiling water bath.</td>
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<tr>
<td>2</td>
<td>had been processed 4 hours in boiling water bath.</td>
</tr>
<tr>
<td>3</td>
<td>had been processed 45 minutes at 15 lbs. pressure.</td>
</tr>
<tr>
<td>6</td>
<td>had been processed 60 minutes at 15 lbs. pressure.</td>
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Spoilage occurred the most frequently in those cans which had the longest processing period. This was, of course, contrary to expectations. One possible explanation was destruction of the composition in the composition gaskets by the long period of heating. This explana-
tion was not substantiated however by sealing tests which were made later. In the sealing tests, 200 cans containing hot beef broth were sealed, 100 with composition gaskets and 100 with paper gaskets, to determine whether or not there was a difference in the quality of the seal formed by the two types of gaskets. The cans were processed at 15 pounds pressure for 60 minutes, and stored. In this trial, no difference in the seals was found. Another possible explanation of the imperfect seals is that the can sealer might have been slightly out of adjustment at times. The belief that the latter may be the correct explanation of part of the leaks is strengthened by the fact that spoilage occurred in cans sealed on only three of the five days of canning.

Storage conditions:

Contrary to expectations, more spoilage occurred with those cans stored at cooler temperatures. However, none of the storage rooms were cool. Nine of the cans which spoiled had been stored in the basement and 4 had been stored at room temperature. The dampness of the basement may have been the important factor here as some of the cans had rust spots. Rusted cans are apt to allow pinhole perforations.

Meat Canned in 1930.

No spoilage occurred in any of the 192 cans of meat. No spoilage due to imperfect seals or leaks occurred in any of the 192 jars. Two jars of beef processed 3 hours in the boiling water bath and stored in the basement room spoiled. These 2 jars of beef were 2 out of 24 jars of beef that were processed 3 hours in the boiling water bath. They were, at the same time, 2 out of the 96 jars and cans of both beef and pork which were processed for that length of time. The spoilage in these 2 jars was shown by bacteriological tests to be due to underprocessing rather than leaks or imperfect seals.

SUMMARY

Seven hundred and seventy-nine pounds of beef and pork were canned in February 1929 and 1930 with the following variables: Canning in glass and in tin, processing in the pressure cooker and in the boiling water bath, storing at room temperature and in the basement.

The glass jars were found to make perfect seals which were maintained during the storage period. The meat canned in glass showed no spoilage attributed to
leaks or imperfect seals. Due to unexplained reasons, some spoilage due to imperfect seals or leaks occurred in the meat canned in tin cans in 1929, but none occurred in the meat canned in 1930.

There was no spoilage due to underprocessing in any of the meat processed for either 45 or 60 minutes at 15 pounds pressure in the No. 2 cans or pint jars. This was also true of that processed 4 hours in the boiling water bath. However, processing canned meat in the boiling water bath is not recommended in this climate because of the possibility of poisoning from botulism.

The meat stored in the basement showed more spoilage than that stored at room temperature. Even the basement temperatures were warm during the summer.

LITERATURE CITED