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INFLUENCE OF STORAGE AND THERMAL TREATMENT OF PIG SKINS AND BEEF TRIPES ON SOME PROPERTIES OF THEIR SUSPENSIONS AND EMULSIONS

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tripes suspensions and emulsions influence the separation of juice and fat from the content of canned minced pork during the processing.

MATERIALS AND METHODS

Raw materials.- In our experiments there were used:

- cured pork trimmings (with cca 22% of fat) of 1o months old pigs, weighing in average 115 kg each;
- fatty tissue (of regiae dorsi) from the same pigs;
- pig skins (of regiae dorsi) from the same pigs;
- tripes (rumen) of about 2 years old beef cattle.

Preparation of raw materials.- Pig skins and beef tripes were storaged at +4°C.

Prior to mincing and disperzing the pig skins and beef tripes were boiled in water at 98°C, whereby the ratio water:raw material was 2:1. When examining the influence of storage (after 4, 24 and 48 hours) the thermal treatment lasted for 6o minutes. For examinations of the influence of thermal treatment (0, 3o, 6o, 1oo, 15o minutes) on the quality of suspensions and emulsions pig skins and beef tripes previously storaged for 24 hours were used.

Preparation of suspensions and emulsions.- After having been drained for 1o minutes, thermally treated pig skins and beef tripes were ground in grinders through plate with holes of Ø 13 mm each. For preparation of pig skin suspensions

33% w/w of water was used. For the preparation of beef tripe suspensions the quantity of used water amounted to 22% w/w. For the preparation of tripe suspensions less quantity of water was added by reason of smaller swelling capacity of tripes and considerably lower consistency of suspensions and emulsions (with 33% of added water it was impossible to evaluate the consistency of suspensions and emulsions). Suspensions were made by threefold grinding in emulsifier (PUC - Vicosator) by adding one third of the fixed quantity of water on occasion of each grinding.

Emulsions were made so that 5 kg of the corresponding suspensions and 2 kg of ground fat were taken and after manual mixing they were left to pass twice through the emulsifier.

pH values were evaluated by PYE - pH meter in water extract, the ratio suspension: water being 1:2o.

The weight changes occurring in pig skins and beef tripes storaged for 4, 24 and 48 hours prior to thermal treatment were evaluated in the following way: 25 kg of material was boiled at 98°C for 1o minutes and the weight changes were registered after the material was taken out from water and drained for 5 minutes. The same material was then put back into the boiling water and its weight was registered again after the following 2o minutes of heating (boiling lasted for 3o minutes in total). This procedure was repeated after the next 3o minutes (boiling - 6o minutes in total), after 4o minutes (boiling - 1oo minutes in total) and after 6o minutes (boiling -

15o minutes in total).

The consistency was evaluated with 5 mm thick samples by means of a device constructed at the "29 Novembar" meat packing plant in Subotica, which is a simplified modification of Höppler's consistometer. The samples for the consistency determination were obtained by pouring the liquid suspension, i.e. emulsion, immediately after their preparation into corresponding forms and after keeping at 4°C for 3o,6o and 12o minutes. The consistency of each sample was measured and expressed by power (in grams) with which it is necessary to act upon the movable piston of 5o mm^2 surface area of the device in order to pierce the sample of the suspension i.e. emulsion. The power necessary to pierce the sample was uniformly increased by adding small lead shots into a container fixed to the free upper part of the piston. The obtained readings represent the average arithmetic value of 5 evaluated samples.

Determination of juice and fat retention ability, during the thermal treatment, of suspensions and emulsions as well as of cured minced pork (ground in grinder through plate with holes of Ø 13 mm each), by adding 1o percents of suspension, was carried out by heating of samples filled in cans (99 mm in diameter and 25o mm in height) at 113°C, for 12o minutes. The separated juice and fat were evaluated 48 hours after the sterilization.

RESULTS

As the figures 1 and 2 show the pH changes of suspensions are minimal and do not depend to a greater extent on the duration of storage of pig skins and beef tripes after slaughtering. Extended boiling of pig skins and beef tripes leads to a slight increase of pH values of their suspensions. We, therefore, are of opinion that the pH changes are not of such an importance that they could influence in a more considerable measure the changes of the examinated suspension properties.

The results in figure 3 show that there exist considerable differences in weight after various durations of pig skins and beef tripes boiling periods - in dependence on the previous storage. Pig skins, four hours after slaughtering and by extended heating are getting more and more in weight, i.e. they are more and more swelling. Skins, kept for 24 and 48 hours after slaughtering, by heating up to 3o minutes are losing in weight and through further boiling they reach the starting weight (after 6o minutes). The following boiling for 4o minutes does not change the weight of pig skins.

The beef tripe is much less capable to retain water if compared with pig skin; the weight of the tripe decreases abruptly when heated, especially at the beginning (during the first 3o minutes) and during the following heating it remains almost unchanged. The changes in weight during the heating - in dependance on the storage, are the following:they are the highest after 4

hours of slaughtering (38%), and the lowest after 48 hours of storage (27%).

Figures 4 and 5 show that there are substantial differences in the consistency of suspensions and emulsions of pig skins if compared with tripe suspensions and emulsions. In all cases the consistency of the former is much higher than the one of the latter. The consistency of pig skin suspensions is always higher than that of emulsions, whereas in beef tripe suspensions viz. emulsions the proportion is opposite. Figures 4 and 5 show also that the consistency of pig skin emulsions and suspensions decreases regularly by extended heating of skins whereas the heating of tripes at the beginning leads to an increase of the consistency whereafter to a gradual decrease i.e. to the lowering of the consistency of suspensions and emulsions.

The obtained results show that the suspensions and emulsions do not discharge juice and fat during the thermal treatment. Exception is the suspension of the thermally untreated tripe, which disharges considerable quantities of juice when heated and the same occurrs with emulsions as well. No separation of fat during sterilization of pig skin emulsions was practically noted. Beef tripe emulsions discharge, however, a certain quantity of fat when thermally treated. Thus, for instance, the storage of beef tripes increases the quantity of fat discharged during the sterilization, from 0.03 up to 3.4 percents. Thermal treatment of beef tripes prior to the preparation of emulsions produces likewise a certain influence upon the

quantity of fat separated during the sterilization. In the case when the beef tripe was not thermally treated the emulsions discharged 6.7 percents of fat. Preliminar heating of beef tripe for 3o minutes leads to a minimal discharge of fat during the sterilization (o.28%). An extended heating of tripes prior to their suspending viz. emulsifying (6o and 1oo minutes) results in discharging fat in quantities of 1.7 viz. 1.4 percents.

Results in figures 6 and 7 show that adding of suspensions, made of differently treated pig skins and beef tripes to cured minced pork, leads to considerable discharging of juice and to less separation of fat during the sterilization of these products. In addition to this it was noticed that through a longer storage of tripe (Fig. 6) prior to the preparation of suspensions and emulsions, the quantities of juice and fat discharged within the cans were increased. A vice-versa position ensued, however, when pig skin suspensions and emulsions were added.

Summarizing the obtained results the following CONCLUSIONS may be drawn:

1. Pig skins possess a considerably higher swelling capacity during boiling than beef tripes. Through storage of pig skins (for 24 and 48 hours) their swelling capacity decreases and through a longer boiling this capacity raises. Beef tripe if boiled only for a shorter period of time loses (during the first 3o minutes) considerable quantity of water whereas through the storage this loss is decreased to a certain extent.

2. The consistency of pig skin suspensions and emulsions is always higher than that of beef tripe dispersions. Storage of pig skins prior to suspending and emulsifying increases the consistency of their dispersions which is of no essential importance in beef tripes. Longer boiling of pig skin decreases the suspension and emulsion consistency. The preliminar thermal treatment of beef tripe does not change more essentially these properties.

The adding of fatty tissue to pig skin suspensions decreases their consistency. This means that the obtained emulsions are somewhat softer. An opposite effect is reached when fatty tissue was added to beef tripe suspensions.

3. Both suspensions and emulsions of pig skins and beef tripes do not discharge either juice or fat during the heating period. On the contrary, if they are added to minced pork the quantity of discharged juice will be increased.

INFLUENCE OF STORAGE AND THERMAL TREATMENT OF PIG SKINS AND BEEF TRIPES ON SOME PROPERTIES OF THEIR SUSPENSIONS AND EMULSIONS

Summary

The subject of our examinations was to find out the extent to which the storage and thermal treatment of pig skins and beef tripes are able to influence the changes in weights, pH values, consistency of their suspensions viz. emulsions. At the same time our purpose was to reveal how the addition of 10 percents of skin and tripe suspension or emulsion influences the discharge of juice and fat from the content of canned cured minced pork.

On the base of the obtained results, the following conclusions may be drawn:

1. Pig skins possess a considerably higher swelling capacity during boiling than beef tripes. Through storage of pig skins (for 24 and 48 hours) their swelling capacity decreases and through a longer boiling this capacity raises. Beef tripe if boiled only for a shorter period of time loses (during the first 30 minutes) considerable quantity of water whereas through the storage this loss is decreased to a certain extent.

2. The consistency of pig skin suspensions and emulsions is always higher than that of beef tripe dispersions. Storage of pig skins prior to suspending and emulsifying increases

the consistency of their dispersions which is of no essential importance in beef tripes. Longer boiling of pig skin decreases the suspension and emulsion consistency. The preliminar thermal treatment of beef tripe does not change more essentially these properties.

The adding of fatty tissue to pig skin suspensions decreases their consistency. This means that the obtained emulsions are somewhat softer. An opposite effect is reached when fatty tissue was added to beef tripe suspensions.

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ВЛИЯНИЕ ХРАНЕНИЯ И ТЕРМИЧЕСКОЙ ОБРАБОТКИ СВИНЫХ ШКУР И ГОВЯЖЬЕГО ПРЕДЖЕЛУДКА НА НЕКОТОРЫЕ СВОЙСТВА ИХ СУСПЕНСИЙ И ЭМУЛЬСИЙ

Резюме

Целью исследований было установление в какой мере хранение и варка свиных шкур и говяжьего преджелудка влияет на изменение веса, pH консистенцию их суспенсий, т.е. эмульсий. Одновременно определялось как добавление от 10% суспенсий, т.е. эмульсий шкур и преджелудка действует на выделение воды и жира из консервов измельченного свинного мяса.

На основании полученных результатов можно сделать следующие выводы:

I. В течении варки свинные шкуры набухают гораздо больше чем говяжий преджелудок. Хранение свиных шкур /24-48ч./ вызывает уменьшение набухания, в то время как длительной варкой способность набухания повышается. Говяжий преджелудок даже и при кратковременной варке / в первые 30мин./ теряет значительное количество воды, а хранением эта потеря до некоторой степени уменьшается.

2. Консистенция суспенсий и эмульсий свиных шкур всегда больше чем дисперсии говяжих преджелудков. Хранение свиных шкур до изготовки суспенсий и эмульсий повышает консистенцию их дисперсий, что на говяжий преджелудок не распространяется. При более длительной термической обработке шкур, уменьшается консистен-

ция суспензий и эмульсий. Что касается говяжьего преджелудка, то на него предварительная термическая обработка не оказывает существенных изменений в этих свойствах.

С добавлением жиросырья суспензиям спинных шкур, уменьшается их консистенция, т.е. полученные эмульсии в некоторой степени мягче. У говяжьего преджелудка обратный результат.

3. В период созревания не доходит до выделения соков и жира из суспензий и эмульсий спинных шкур и говяжьего преджелудка. Но при добавлении суспензий и эмульсий консервам измельченного мяса, повышается количество выделенного сока.

FIG.1. INFLUENCE OF STORAGE OF PIG SKINS AND BEEF TRIPE ON pH OF THEIR SUSPENSIONS

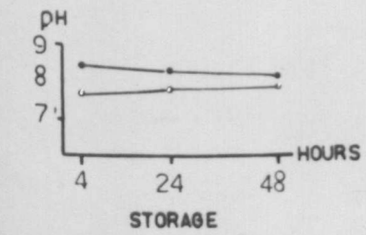


FIG 2. INFLUENCE OF THERMAL TREATMENT OF PIG SKINS AND BEEF TRIPE ON pH OF THEIR SUSPENSIONS

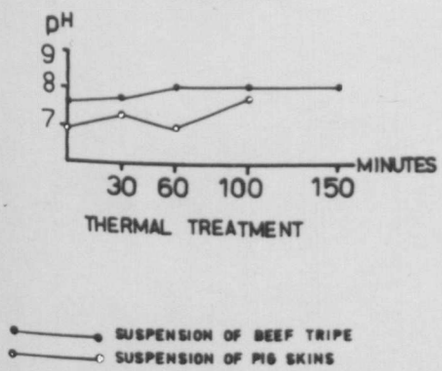


FIG.3. INFLUENCE OF THERMAL TREATMENT ON THE WEIGHT OF PIG SKINS AND BEEF TRIPE PREVIOUSLY STORED 4, 24 AND 48 HOURS

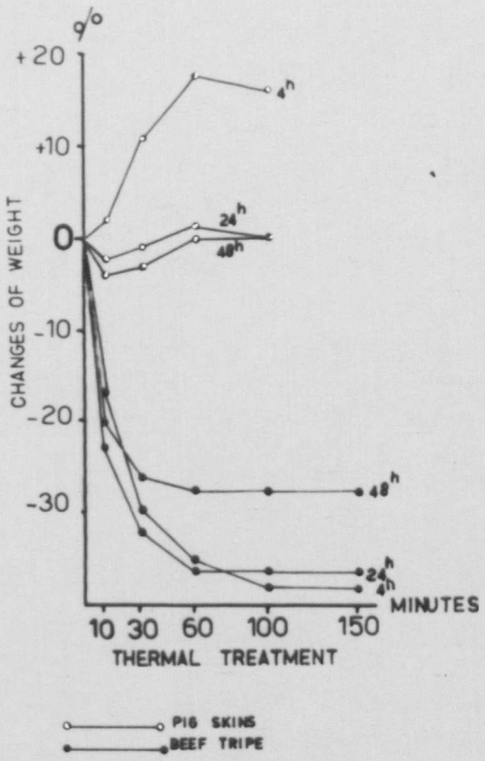


FIG.4. INFLUENCE OF STORAGE OF PIG SKINS AND BEEF TRIPE ON THE CONSISTENCY OF THEIR SUSPENSIONS AND EMULSIONS MEASURED AFTER a) 30, b) 60, AND c) 120 MINUTES

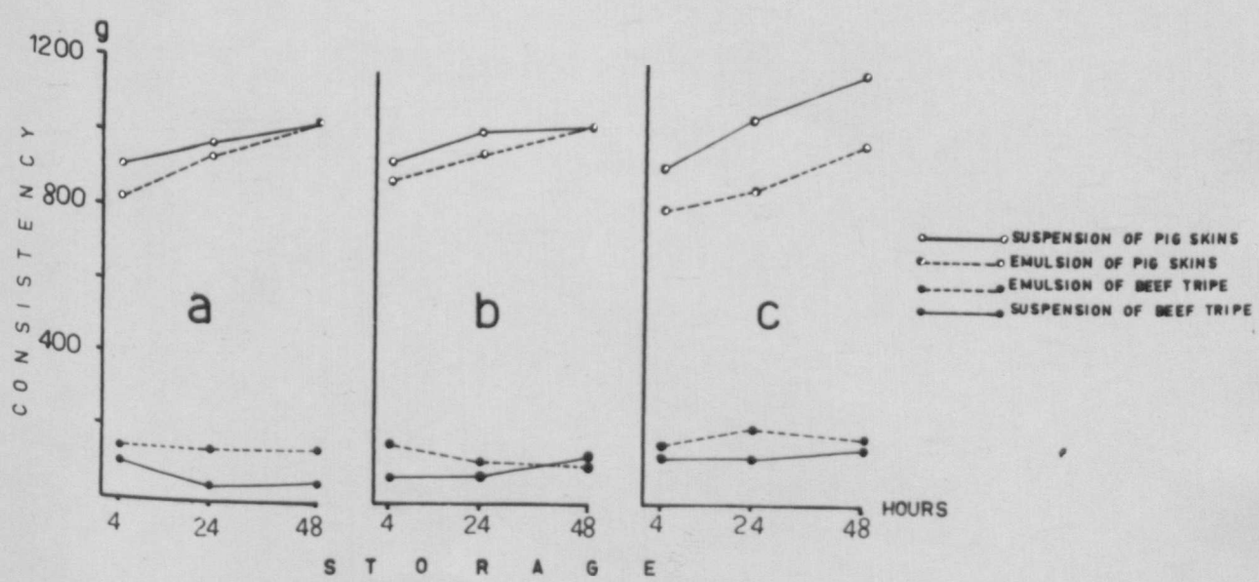


FIG.5. INFLUENCE OF THERMAL TREATMENT OF PIG SKINS AND BEEF TRIPE ON THE CONSISTENCY OF THEIR SUSPENSIONS AND EMULSIONS MEASURED AFTER a/30, b/60 AND c/120 MINUTES

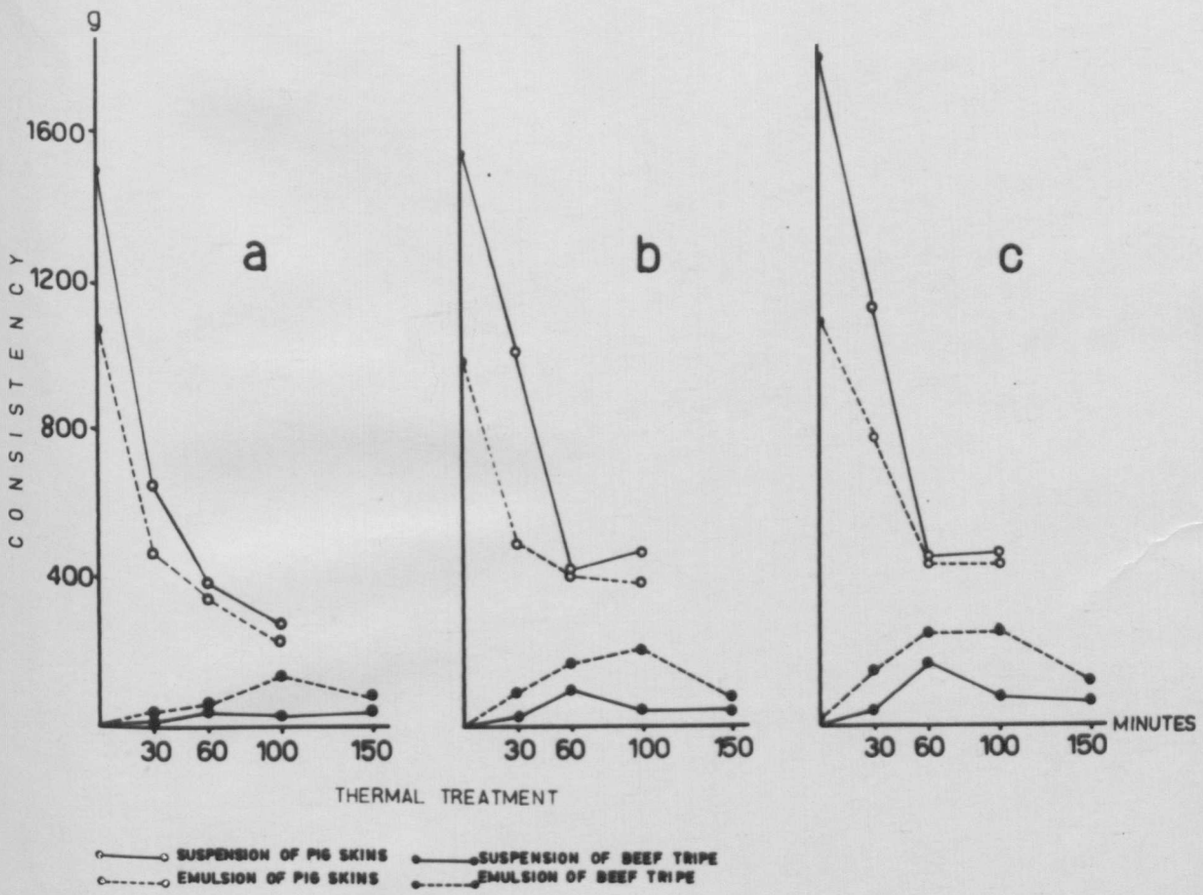


FIG.6. INFLUENCE OF ADDED SUSPENSIONS AND EMULSIONS /PREPARED FROM VARIOUSLY STORAGED PIG SKINS AND BEEF TRIPE/ TO CURED COMMINUTED PORK ON THE QUANTITY OF SEPARATED JUICE AND FAT IN STERILIZED /113°/120 MINUTES/ CANS

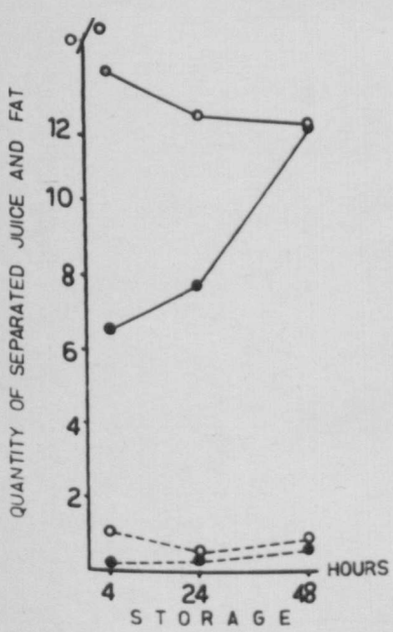
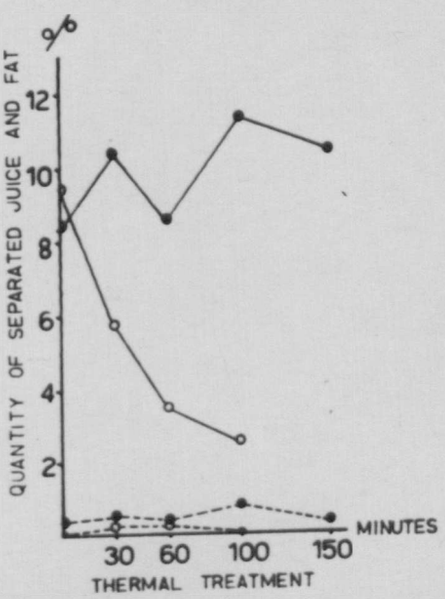


FIG.7. INFLUENCE OF ADDED SUSPENSIOS AND EMULSIONS /PREPARED FROM VARIOUSLY THERMAL TREATED PIG SKINS AND BEEF TRIPE/ TO CURED COMMINUTED PORK ON THE QUANTITY OF SEPARATED JUICE AND FAT IN STERILIZED /113°/120 MINUTES/CANS



JUICE SEPARATED BY ADDITION OF SUSPENSION OF PIG SKINS
FAT SEPARATED BY ADDITION OF SUSPENSION OF PIG SKINS
JUICE SEPARATED BY ADDITION OF SUSPENSION OF BEEF TRIPE
FAT SEPARATED BY ADDITION OF SUSPENSION OF BEEF TRIPE