VERGLEICH ÜBER WASSERBINDUNGSVERMÖGEN IN SCHNELL GEKÜHLTEM FLEISCH UND IN FLEISCH,GEKÜHLT NACH EINER VERZÖGERUNGSPERIODE.

OLE SIGMUND BRAATHEN,NORWEGISCHES FLEISCHFORSCHUNGS-LABORATORIUM, OSLO.

ZUSAMMENFASSUNG.

Die Wichtigkeit,eine kalte Zusammenziehung zu verhindern und damit wiederum,Zähigkeit des Fleisches zu verhindern, ist mehr und mehr klar geworden. Die Zähigkeit der Schlachtkörper kann dadurch umgangen werden, indem man sie in einer Konditionierungsperiode bei einer Temperatur von +12 - +19°C in ca. 24 Stunden hält, bevor sie zum Zerlegen abgekühlt werden.

Das Wasserbindungsvermögen in Fleisch, das eine Konditionierungsperiode durchlaufen hat ist von grossem Interesse die Wurstfabrikation. Über diese Frage findet sich sehr wenig in der Literatur.

Nachdem bei mehr als 40 halben Schlachtkörpern Konditionierungsperioden durchgeführt wurden, haben die Resultate gezeigt, dass eine verspätete Abkühlung effektiv Kälteverkürzung verhindert. Daraufhin wurden 8 Schlachtkörper von jungen Bullen ausgewählt, um das Wasserbindungsvermögen von raschem und verspätet abgekühltem Fleisch festzustellen.

Die Resultate von Analysen im Labor und auch von praktischen Versuchen zeigten, dass das Wasserbindungsvermögen genau so gut ist Fleisch, das nach einer Verzögerung abgekühlt worden ist. Hierüber war man seither nicht so sicher.

Bakteriologisch wurden keine Unterschiede festgestellt.

COMPARISON OF THE WATER HOLDING CAPACITY OF QUICK CHILLED BEEF AND BEEF CHILLED AFTER A CONDITIONING PERIOD.

OLE SIGMUND BRAATHEN,NORWEGIAN MEAT RESEARCH LABORATORY, OSLO.

Summary.

The importance of preventing cold shortening in order to prevent toughness of meat has become more and more evident. The prevention of toughness of the carcasses is obtained by holding them for a conditioning period lasting for about 24 hours at a temperature between 12° and 19°C before they are chilled for cutting.

It is of importance in the sausage manufacture to know the water holding capacity of the meat that has been conditioned. Very little is found in the literature concerning this question, and it was supposed that a conditioning process reduced the water holding capacity.

Having carried out conditioning tests with more than forty beef carcass halves in which the results indicated that a delayed chilling effectively prevented cold shortening, eight bull carcasses were selected for examination. The effect of conditioning on the water holding capacity was especially considered.

The water holding capacity of beef carcass halves which had passed a conditioning process was measured and related to the water holding capacity of beef from corresponding carcass halves which had been quick chilled as done today.

Laboratory methods as well as production tests where sausages were produced, gave results which indicate that conditioned beef has at least as good water holding capacity as quick chilled beef.

Bacteriological examinations showed no difference in total count and number of lactobacilli on the carcass surfaces, in the sausages made from quick chilled and conditioned beef and in vacuum bags containing cuts from the same carcasses.

Сравнение водосвязывающей способности в быстро охлаждённом мясе большого рогатого скота и мясе охлаждённом по способу кондиционирующего периода (период задерживания).

Работа: Уле Сигмунд Бротен.

Вывод

Всё более и более явной становилась важность воспрепятствовать холодному сжатию, чтобы этим воспрепядствовать тягучести мяса. Воспрепядствование тягучести в тушах достигается при хранении их в кондиционирующем периоде, длящемся около 24-х часов при температуре от +12 до +19°C до их охлаждения для разделки.

Водосвязывающая способность мяса, которое прошло кондиционирующий период, имеет большое значение для колбасного производства. Об этом вопросе очень мало найдено в литературе.

После произведённых кондиционирующих опытов более чем на 40 половинных тушах большого рогатого скота, результаты которых показали, что задерживание охлаждения эффективно воспрепядствовало сжатию от быстрого охлаждения, было выбрано 8 быков для опытов при которых специально измерялся эффект кондиционирования водосвязывающей способности.

Водосвязывающая способность в мясе от половинных частей туш которые прошли кондиционирующий процесс, была измерена и сравнена с водосвязывающей способностью в соответствующих половинных частях туш (правая и левая были сравнены) которые были охлаждены обычным быстрым способом.

Лабораторные методы, так же как проверка при вырабатывании колбасы, дали результаты указывающие, что мясо при задержанном охлаждении имеет такую же водосвязывающую способность, как быстро охлаждённое мясо, что раньше не было известно.

Не было найдено никакой разницы в отношении количества бактерий ни на поверхности туш ни в той колбасе, которая была выработана соответственно из быстро охлаждённых или задержанно охлаждённых половинных частей туш.

Introduction.

In the literature very little is found dealing with the water holding capacity in meat chilled after a delay period. It is very important to the meat industry to know the water holding capacity (WHC) of the raw materials. Therefore it was of interest to compare the water holding capacity in beef that has been chilled after a conditioning period and the water holding capacity of similar beef chilled the normal quick way used in Norway today.

Before these tests it was supposed that the conditioning process reduced the water holding capacity. The very positive effect of conditioning on the tenderness of meat and the lack of information about the water holding capacity of such beef made this work necessary.

Materials and methods.

In this investigation eight bull carcasses were dealt into two halves. The left carcass halves were chilled the normal quick way at ± 0°C. The right carcass halves were first placed at +12°C for 24 hours before they were chilled at ± 0°C.

During the conditioning and chilling period the weight losses of the carcass halves were measured.

To determine the water holding capacity of the meat, the laboratory method of Dr.Matti Pohja,Finland, was used as well as practical processing tests.

In the laboratory method a meat emulsion simulating a sausage mix is prepared of meat, lard,water and salt in the cutter. It is always necessary to "over-water"and "over-lard" the emulsion becauce otherwise the maximum binding capacities cannot be elicited. A given quantity of the completed mix is weighed into a centrifuging tube (35 mm dia), which is heated at 75°C for ½ hr. The tube is weighed to determine the quantity of water evaporated. After the heating, the detached water and molten fat are poured into a graduated 25 ml measuring glass. The quantities of detached water and fat are measured. It is possible by this procedure to calculate how much water the heated meat or meat assortment is able to bind and how much fat it is able to emulsify.

In addition to the analysis carried out by means of the above mentioned method sausages were made from the right and left carcass halves to determine if the was any difference in water holding capacity under practical conditions.
Knockwurst type sausages were made and the following raw materials was used:

Bull meat (72% water)	38% (Frozen after 6 days)
Pork trimmings (73% fat)	20%
EMHV (Sodium caseinate)	1,49%
Skimmed milk powder	1,28%
Water	32,7% (in No.IV 40%)
Spices,salt,onion,potato starch	6,5%

Surface bacteria counts of the carcass halves were determined by means of the agar sausage method (ten Cate). Also the total count as well as the number of lactobacilli in the meat juice in the vacuum bags containing this beef for ripening were evaluated. The same bacteriological tests were also carried out on the sausages made from the two types of beef. 3

RESULTS.

Weight loss registrations.
The weight of the eight carcass halves varied from 124,2 to 136,7 kilograms.

The total weight loss of the carcass halves determined 24 and 48 hours after slaughtering are seen in the table below.

Carcass No:	Conditioned halves 24 hours	Conditioned halves 48 hours	Quick chilled halves 24 hours	Quick chilled halves 48 hours
I	3,02%	1,27%	1,65%	0,08%
II	3,63%	1,85%	2,20%	0,63%
III	3,38%	1,62%	2,18%	0,65%
IV	3,53%	1,61%	1,93%	1,16%
Average weight loss	3,39%	1,58%	1,99%	0,63%

The average differences in favour of quick chilled are: 1,4% after 24 hours and 0,85% after 48 hours.

It is seen from the table above that there is an increase in weight from 24 to 48 hours after slaughtering. This may be due to the uncontrolled air humidity during the process.

The relative humidity was only about 55% because a chilling room in the slaughterhouse was used. The lack of insulation between the different chilling rooms and the lack of a humidifier are eliminated after this work was carried out. The number of registrations are limited.

Laboratory tests.

The results of the excess water measurements in the laboratory tests showed no significant difference:

Bull No:	Inside quick	Inside cond.	Shoulder cold quick	Shoulder cold cond.	Strip loin quick	Strip loin cond.
I	25,1%	26,3%	23,0%	25,7%	27,7%	25,9%
II	25,0%	24,5%	24,6%	25,9%	26,9%	27,8%
III	22,4%	22,8%	26,5%	26,2%	26,9%	26,3%
IV	24,0%	26,9%	28,6%	28,9%	32,6%	31,7%
Average	24,1%	25,1%	25,6%	26,7%	28,5%	27,9%

pH measurements. 4

pH measurements were carried out in the carcass halves (M.Semimembranosus) at different times after slaughtering and are listed in the following table:

Bull No:	Conditioned halves 24 hours	Conditioned halves 4 days	Quick chilled halves 24 hours	Quick chilled halves 4 days
I b	5,6	5,4	5,7	5,5
II b	5,6	5,5	5,8	5,6
III b	5,5	5,5	5,6	5,4
IV b	5,7	5,4	5,6	5,6

Sausage made from beef from:

Bull No:	Weight loss during smoking, cooking, chilling	Total weight loss 24 hours after cooking	pH in the forcemeat before stuffing	pH i the finished sausage
I quick	11,4% (?)	12,7% (?)	5,8	6,0
I cond.	4,3%	5,7%	5,8	6,1
II quick	6,7%	7,8%	6,0	6,1
II cond.	6,8%	7,1%	6,0	6,2
III quick	7,9%	8,6%	6,0	6,1
III cond.	5,8%	6,5%	6,0	6,2
IV quick	4,1%	6,7%	5,9	6,1
IV cond.	2,4%	4,5%	5,9	6,0

quick = quick chilled
cond. = conditioned

Both No. IV added 40% water.

The pH of the sausages made from conditioned beef showed a slight higher value than the pH of sausages made from quick chilled carcass halves. We have no explanation for this difference.

Bacteriological examinations.

There was no difference in bacteria counts on the left and the right bull halves when looking at the surface bacteria counts evaluated by the agar sausage method. The same bacteria load was also found in the meat juice in the vacuum bags used for ripening the beef. The conditioned beef showed the same good shelf life as quick chilled beef. The reason for this is not clear, but at the moment it is worked further on with this question at The Norwegian Meat Research Laboratory. 5

Organoleptic tests.

Organoleptic tests carried out showed no difference in organoleptic quality between the sausages made from the two types of raw materials. The conditioned beef showed a better tenderness than the quick chilled.

Discussion of the results.

Before the tests mentioned in this report were carried out it was supposed that the water holding capacity of conditioned beef was lower than that of quick chilled beef.

The results in this report show that there is no difference in favour of the quick chilled beef concerning the water holding capacity when the method of Dr.Matti Pohja is used.

When the bull meat is used for producing sausages the results of the weight loss measurements are in favour of the conditioned beef. This is probably due to a slight higher pH-value in the sausages made from conditioned meat, but it must be stressed that the the differences are small and that the results are based upon a limited number of tests.

The small difference in weight loss may be explained by looking to the water loss of the carcass halves. There was a higher water loss in the carcass halves that were chilled to $\pm 0^{o}C$ after a delay period at $+12^{o}C$ than in the quick chilled halves.

Conclusion.

The results in this work indicate that conditioned beef seems to have the same water holding capacity and the same bacteriological quality as quick chilled beef. The conclusion is based upon a limited number of test samples.

References.

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