

Untersuchungen über den Einfluss des Regimes vor der Schlachtung auf die Fleischfarbe von im Freien aufgezogenen Jungbullen.

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Es wurde der Einfluss der Schlachtung ohne Ausruhezeit auf die Fleischfarbe von frei aufgezogenen Jungbullen untersucht. Dabei wurde festgestellt, dass Kälber, die ungefähr 24 Stunden im Fleischkombinat verweilten, einem bedeutend grösseren Stress ausgesetzt waren. Dies führte zur Verminderung des Glykogengehaltes im Muskelgewebe, was höhere pH-Werte und eine dunklere Farbe des Fleisches zur Folge hatte. Bei einer Schlachtung ohne Ausruhezeit nach einem bis zu 1 1/2-stündigen Transport und bei einer Entfernung bis zu 50 km wird der ungünstige Einfluss der Stressfaktoren in bedeutendem Ausmasse vermieden.

Studies on the effect of pre-slaughter treatment on the colour of meat from untied steers

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A study was made on the effect of slaughter without pre-slaughter rest on the colour of meat from steers reared free, without tying. It was found that steers that stayed about 24 hours at the meat packing plants were subjected in a considerably greater measure to stress effects what lead to a decrease in the amount of glycogen in muscle tissue, resulting in high ultimate pH value and dark meat colour. In the slaughter without pre-slaughter rest, after a transportation for up to 1 1/2 h. over distances of up to 50 km., the unfavourable effect of stress factors is avoided to a considerable degree.

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### Etude sur l'influence du régime d'avant l'abattage sur la couleur de la viande de taurillons, élevés librement

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On a étudié l'influence de l'abattage sans repos sur la couleur de la viande de taurillons élevés librement. On a établi que les veaux qui avaient passé 24 heures de repos dans les combinats à viande, avaient été soumis à des effets de stress dans une mesure beaucoup plus grande ce qui avait amené à l'abaissement de la quantité de glycogène dans le tissu musculaire dont les résultats étaient: la valeur élevée du pH et la couleur foncée de la viande. Lors de l'abattage sans repos après un transport de 1,5 h. et à une distance de 50 km au plus, l'influence défavorable des facteurs de stress a pu être évitée jusqu'à un degré très important.

### Изучение влияния доубойного режима на цвет мяса от свободновыращиваемых бычков

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Изучено влияние убоя без доубойного отдыха на цвет мяса от свободновыращиваемых бычков. Установлено, что бычки, простоявшие около 24 часов на мясокомбинатах, были подвергнуты в значительно большей степени стрессовым воздействиям, что привело к уменьшению количества гликогена в мышечной ткани, вызывающему высокое конечное значение pH и темный цвет мяса. При убое без отдыха после транспортировки в течение не более 1 1/2 часов и на расстоянии до 50 км неблагоприятного влияния стрессовых факторов можно избежать в значительной степени.

Studies on the effect of pre-slaughter treatment on the colour of meat from untied steers

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In recent years, the occurrence of dark meat upon the slaughter of noncastrated steers became a frequent phenomenon in this country. The undesirable dark meat colour began to exert an unfavourable effect on trade, especially the one dealing with pre-packaged meat.

The intensity and duration of stress effects before slaughter condition the colour of the meat obtained in the utmost degree. This is why we directed our attention to providing the pre-slaughter period conditions causing the least possible physical and nervous strain in the animals. In this connection, we aimed to study the effect of the duration of pre-slaughter stay on the colour of meat from steers reared freely, without tying.

Material and Methods

Studies were carried out on Bulgarian Brown steers at the age of 15-16 months and a body weight of 450-480 kg. The animals came from farms located at distances of up to 50 km from the meat packing plant, and were transported by special trucks for no longer than 1 1/2 hours after their loading on the farms. Part of the animals were slaughtered within two hours from their arrival, and the rest, after the regulation-established 24-hour pre-slaughter period.

The meat obtained was cooled at an air temperature of 0-4°C. Samples for the spectrophotometric analysis were taken from the cut surface of the long back muscle in the region of the 6th/7th rib. The spectral curves were recorded on a Beckman DK 2A spectrophotometer. Determinations were made of lightness - L, from Hunter's colour system (3), and the difference between the reflection percentages at wavelengths of 630 nm and 580 nm (2) 48 hours post mortem.

The reading of pH was done in a meat homogenate in distilled water (1:10).

The histochemical determination of glycogen in muscles 1 hour post mortem was done by the method of Shiff - iodic acid (1).

Results

The results of the visual determination of the colour of meat from the experimental groups of animals 48 hours post mortem are presented in Table 1. It is obvious that the per cent incidence of light colour meat is much higher in the slaughter of animals without stay, when compared to that after 24 hours.

Table 1. Percentage of the cases of light and dark colour meat

Meat Colour	Without a stay		After a stay	
	Number	%	Number	%
Light	40	83,3	10	24,4
Dark	8	16,7	31	75,6
Total	48	100,0	41	100,0

The data on the values of the colour indices determined spectrophotometrically are shown in Table 2. The results were processed after removing the cases of dark meat from the animals killed directly, and also of the cases of light meat from the animals killed after a 24-hour period.

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Table 2. Values of the indices L, %R630 nm - %R580 nm and pH<sub>48h</sub>.

Indices	Without a stay			After a stay		
	n	$\bar{X}$	$\pm \Delta \mu$	n	$\bar{X}$	$\pm \Delta \mu$
L	40	29,71	0,44	31	25,98	0,53
R630 - R 580	40	17,75	0,77	31	10,55	0,59
pH	40	5,77	0,03	31	6,83	0,04

The arithmetical means of the colour indices studied are markedly higher in the meat of animals slaughtered without pre-slaughter rest. The results are significant at  $P < 0,001$ . The pH value of the muscles of animals killed without pre-slaughter stay is in the range of standard values. Alternatively, the pH value of the meat of animals killed after a 24-hour stay is considerably higher.

A high glycogen content was found in the histochemical analyses of cross sections and longitudinal sections through samples from the long back muscle of animals killed without pre-slaughter rest, while we found a low glycogen content, if any, in muscle sections from animals killed after a 24-hour stay.

### Discussion of results

Recent years brought changes in the technology of fattening young animals intended for meat production in this country. Till 1969, animals were reared tied in covered houses on almost all farms, but since there has been a gradual transition to free rearing in cubicles on slat floors. This is how more than half the calves reared in Bulgaria were fattened in 1976, with a constant trend to increasing their number.

Our observations showed that the altered manner of fattening affects the course of the animals' pre-slaughter rest. The lots prepared for handing over to meat packing plants are usually formed of animals reared in different cubicles. In this way, a disturbance occurs in the established hierarchy, in which some dominate and others obey. The unfavourable effect of transportation stress is added further. On reception and accommodation into the meat packing plant pens, mass jumping onto one another and wrestling begin among the animals and continue through to their handing over to the kill floor. Unlike the steers which are reared tied, the untied-reared steers complicate the situation considerably, because of the impossibility to tie them in the pens during the pre-slaughter stay and thus to provide a normal rest.

The data from the studies carried out show that during the 24-hour stay, steers are subjected to stress effects to a considerably greater extent, compared to those slaughtered directly. This leads to a decrease in glycogen level in muscle tissue, resulting in a high ultimate pH value and dark meat colour.

These studies and the experiments carried out in addition with a great number of animals at several meat packing plants justified making amendments in normative documents in force and permitting slaughter without any stay in steers under 2 years of age.

### References

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