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ANTI-AUTOLYTIC NON-ADDITIVE PROCESS FOR PRESERVATION AND TENDERIZATION OF MEAT UNDER VARIOUS STORAGE CONDITIONS*)

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The deterioration of meat is closely connected with autolysis and surface microbial contamination phenomena.

The problem to solve in a first period was to find a process which should counteract autolysis phenomena in muscle and would not alter or even enhance its organoleptic properties on the one hand, and should by no means be noxious to public health on the other.

A number of the properties of Epinephrine, which characterize its action at the level of the intermediary metabolism of the muscle, have made it possible to meet these requirements and thus to ensure better preservation and a genuine improvement of the organoleptic properties, particularly the tenderness.

This paper deals with the effect of ante-mortem administration of Epinephrine on the metabolism, with the structure of the skeletal muscle stored in the dark under aseptic and anaerobic conditions, and with its consequential effects on the preservation and the organoleptic properties of meat.

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Muscles (longissimus dorsi) of laboratory and slaughter-house animals have been investigated (rat, rabbit, lamb, pig, heifer, etc.) immediately post-mortem and subsequent to several weeks storage, at freezing (4°C), normal (25°C), and tropical (38°C) temperatures.

The comparative study of non-adrenalized and adrenalized skeletal muscle shows :

(i) in the non-adrenalized samples, the presence of intensive exudative and disintegrative phenomena.

The first phase of predominantly exudative phenomena is characterized by a drop of the pH (towards 5.5), glycogenolysis, high lactic-acid level, much exudate (high protein level and high quotient K^+ / Na^+), a rigor contrast phase appearance, and toughness.

The second phase storage of predominantly autolytic disintegration phenomena, is characterized by metabolic, structural, and organoleptic modifications, leading to gradual disruption of the myofibrillar framework and to organoleptic spoiling.

(ii) that in the adrenalized samples the biochemical structural and organoleptic modifications are characterized by a strong inhibition of both exudation and disintegrative phenomena.

The first phase points out a "glucidic-lactic acid" level depression, a pH drop inhibition, an exudation prevention, and a fresh muscle contrast-phase appearance. The organoleptic characteristics seem to be stabilized and moreover improved, especially the appreciable tenderness of cooked meat (statistically evaluated).

In the second phase storage the metabolic and structural disintegration modulus appears to be stopped or strongly reduced. Physiological pH, turgescency, and structural integrity at fibre and myofibril levels, are observed as well as an improvement of organoleptic characteristics which will keep even at tropical temperatures. Amino-acid genesis is also reduced, and glycine-soluble-protein electrophoretic diagrams do not show characteristic new protein sub-unit peaks comparable to those of the non-adrenalized muscles.

The use of the anti-autolytic non-additive Epinephrine process in strict conjunction with some adequate antimicrobial technique (ionizing radiations, antibiotics, etc.) and suitable protective packing, is considered.

Additional data are presented in connection with a process which combines β-irradiation and Epinephrine anti-autolytic effect under the same storage conditions.

By inhibition of the autolytic phenomena and the surface microbial contamination, the combined process would allow a better preservation of the meat and meat products under freezing, normal, and even tropical temperatures, and would insure a more efficient meat distribution.