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PRE-SLAUGHTER FACTORS WHICH INFLUENCE THE LIVESTOCK MEAT QUALITY

This article provides an analytical overview of lifetime factors affecting the quality of the meat of farm animals [1, 2]. These short-term factors have an impact on the yield of carcasses (loss of body weight), carcass defects (bruises, sprains and broken bones), microbiological contamination of carcasses and metabolic capabilities of muscle. In recent years, exacerbated the problems associated with food poisoning and infections, which makes the company's rearing farm animals to devote more attention to conditions that in the final result, will satisfy the principle of food safety "from farm to table" [8,12].

Keywords: meat quality, food safety of meat, keeping livestock.

В данной статье проведен аналитический обзор прижизненных факторов, влияющих на качество мяса сельскохозяйственных животных. Эти кратковременные факторы оказывают влияние на выход тушек (потери живой массы), дефекты тушек (кровоподтеки, вывихи и переломы костей), микробиологическую контаминацию тушек и метаболические возможности мышц. В последние годы обострились проблемы, связанные с пищевыми отравлениями и инфекциями, что заставляет компании по выращиванию сельскохозяйственных животных уделять все большее внимание условиям содержания, чтобы в конечном итоге удовлетворить принципу безопасности продуктов «от фермы до стола».

Ключевые слова: качество мяса, безопасность мясных продуктов, содержание сельскохозяйственных животных.

The quality of meat depends on the composition and properties of both materials used and conditions of processing. The quality of derived meat can vary under the influence of environmental factors, conditions of cultivation and transportation, livestock slaughter conditions and initial processing, refrigeration and storage options as well [6,8].

The factors influencing the quality of meat and meat products.

The quality of the finished production depends on the composition and properties of the materials used and the conditions of the technological processing [4, 11]. The quality of the obtained meat can be changed under the effect of the natural factors, the conditions of breeding and transporting, pre-slaughter keeping livestock of animals, the conditions of slaughtering and preliminary processing, the parameters of preserving in refrigerators. The factors, influencing the quality of the meat are as follows:

- pre-slaughter keeping livestock;
- the technology of slaughtering;
- the technique of processing preparation;
- cooling, ripening;
- species;
- breeding of young animals.

Breeding and raising of the animals

The factors which influence the quality of the meat during breeding and raising of the animals, are shown in table 1.

Influence of the animal species

Depending on the species peculiarities, chemical composition and properties of the meat productive animals differ. The pork has got more tender consistence, increased content of the fatty tissue, specific pleasant

taste and aroma. Due to this fact, the industrial importance of pork is determined by content both muscle and fatty tissue [9, 2]. Beef is represented by more coarse muscle fibres, has bright colour, includes less extractive substances, refractory fat; the technological importance of beef consists in presence of water- and salt-soluble proteins.

Table 1
The factors, which influence the quality of the meat at the stage of breeding and nurturing of the animals

№	The factor	Influence of the factor on the meat quality
1	2	3
1	Animals species	Pigs – excellent organoleptic indices, high emulsifications of the fat, tender muscle tissue. The cattle – the advantage of muscle tissue, bright colour.
2	Strains	The cattle of meat strains gives higher output of muscle tissue; the meat is juicier, tender and delicious.
3	Genetics	Heredity influences the tenderness of the meat, its pH, degree of the development of muscle fibres, susceptibility to stress.
4	Sex	The females' meat is faller, tender and light. The meat of neuters has got the pattern of "marbling". The meat of the animals which are not gelded has got the specific smell.
5	Age	With getting in years the tenderness of the meat is reduced, the content of fat and conjunctive tissue is raised.
6	The daily diet of feeding	Lack of feeding stuff and absence of balance in its composition results in decrease of protein and fat content and increases of toughness of the meat.
7	Conditions of keeping livestock	
	- industrial complexes	Provide getting of the animals of meat state of nourishment. Stressful situations cause appearance of specific taste and aroma in the meat
	- climate	The meat of the animals in hot regions has got more muscle tissue and less content of fat
	- diseases	Reduce the quality of the meat

Influence of strain

The animals of different strains have significant differences both in live weight and in quality of the meat. The cattle of meat strains have got well developed muscle and fatty tissue such meat is juicier, tender and delicious [5, 11]. The meat, obtained from milk and meat and milk strains, is characterized by the increased content of bone and conjunctive tissue, less amount of intermuscular fat, worse organoleptic indices.

Influence of sex

Sex of the animal influences the quality and amount of the obtained meat. Sex of the animals, conducting of gelding, influence both the velocity of growth and the efficiency of digestion of the feeding by animals, as well as the meat output. Sexual differences of the young animals meat are less observable. When the animals are getting in age the males' meat contains more moisture and simultaneously reduced content of protein and fat in comparison with the females' meat. Simultaneously the bulls' meat contains increased amount of the conjunctive tissue, dark colour appears [3,7,8]. The gelded animals develop slower, but the meat, has typical pattern of "marbling".

Influence of age

When the animals are getting in age, their meat becomes tougher at the expense of thickening of muscle fibres, increase of the amount of elastic fibres in the conjunctive tissue and strengthening of collagen fibres [1, 2, 3]. The degree of hydro-thermal decomposition of collagen from animals' meat at the age of twelve months equals 40,6 %, at the age of 8 - 10 years – 21,5 %. The chemical composition of the meat is changed the content of fat is increased, the amount of water is decreased at the age of 12 - 18 month, the correlation of the main components of cattle meat is the best for its quality. The optimum qualitative characteristics of the pigs are formed till eight month.

With the purposes of providing the identity of qualitative indices of the raw material, which is used in sausage production, the cattle. When slaughtering is divided into such groups: animals, which are older than 3 years (meat of growth up animals) and animals of the age from 3 month till 3 years (meat of young animals).

Influence of the daily diet of feeding

The daily diet of feeding influences the qualitative characteristics of meat. The correlation of course feeding stuff and concentrated in the diet, the degree of its balance according to macro – and micronutritious components, high energetic value determine forming of high gustatory qualities of meat, its technological properties. Lack of rations of feeding is shown in reducing of the nourishment of the animal, increase of the water content in the meat, shrinkage of muscle fibers, increase of toughness.

Change in the composition of the ration of feeding allows to get the meat with the necessary character-

istics'. The colour of the pigs muscle tissue, which have received the ration from corn and barley, is more intensive than during the ration consisting of only corn [1, 7, 8, 9, 11].

Influence of conditions of animals keeping livestock

The conditions of the cattle's maintenance which include the technique of breeding the animals, climatic and weather conditions, also influence the quality of the meat. The pork, which comes from the industrial complexes, contains a great amount of muscle tissue and meets the requirements of meat state of nourishment. But as result of violation of the composition of feeding ration, as well as, as a result of increased susceptibility of animals to stress during mass maintenance, the raw material, in some cases, can have much lower qualitative indices, that is expressed in presence of the specific smell and taste (fish, oil) due to the introduction of fish flour and protein additives of microbiological origin into the fidders.

The climatic conditions, in which the cattle was bred, determine the peculiarities concerning muscle, fatty and conjunctive tissues: the meat of the animals which were bred in the regions with hot climate, has got less content of fatty tissue and more muscle tissue [10, 1, 3, 4].

Abrupt changes of the weather conditions (during transportation), the animals diseases, worsen the quality of meat.

CONCLUSIONS

Main goal of selection and other measures in animal breeding is to increase the quantity of major meat sections in carcass sides but with preserved quality of meat, i.e. that adequate hygiene-toxicological, technological, chemical and sensory traits are maintained. Quality of meat carcasses has effect on competitiveness of production and market demands. Research was carried out in order to investigate the effect of sire breed and sex of progeny on quality of carcass and meat. Based on the research it can be concluded that investigated factors can have significant effect on certain traits of carcass quality, as well as on technological and biological traits of meat For investigated chemical traits of meat no effect of investigated factors was established.

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DESIGN OF A MASK FOR IMPROVING THICKNESS UNIFORMITY OF VACUUM COATINGS ON LARGE MOVING SUBSTRATES

A new method has been developed to improve thickness uniformity of thin films and coatings deposited on plane moving substrates of large area such as polymer films, paper or steel strips. The technique is applicable not only for physical vapor deposition processes but also for sputtering, ion plating, etc. The principle of the method is in a controllable partial screening of the vapor stream by a specially designed mask. A precise procedure is proposed to optimize a profile of the mask so as to obtain the best thickness uniformity of the coating at any evaporator - substrate geometry. Experimental results confirm the high efficiency of the technique which can be used not only at newly designed plants but also at already working ones.

Keywords: evaporation, vacuum coatings, thickness uniformity.

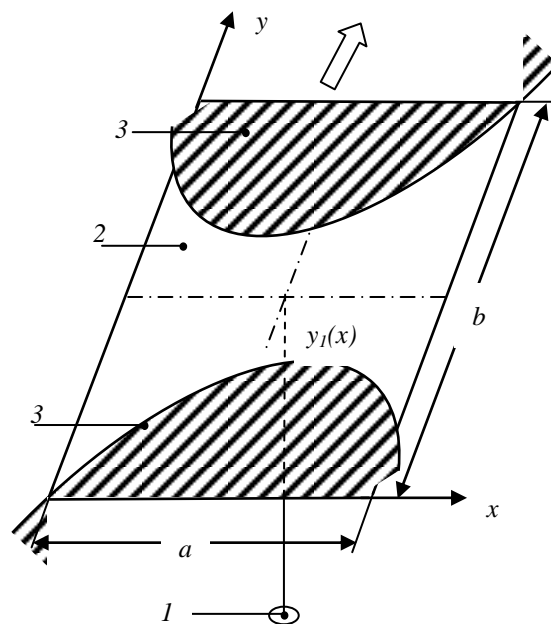
Разработан новый метод для улучшения равномерности толщины тонких пленок и покрытий, нанесенных на плоские движущиеся подложки большой площади, такие как полимерные пленки, бумага или стальные полосы. Этот метод можно использовать не только для испарения в вакууме, но и для распыления, ионного осаждения и т.п. Принцип метода состоит в контролируемом частичном экранировании потока пара специально разработанной маской. Предложена процедура оптимизации профиля маски так, чтобы получить наилучшую равномерность толщины покрытий при любой геометрии испаритель - подложка. Экспериментальные результаты подтверждают высокую эффективность метода, который может быть использован не только в новых установках, но и на уже работающих.

Ключевые слова: испарение, вакуумные покрытия, равномерность толщины

INTRODUCTION

Electrical, optical, anti-corrosion and other properties of thin films and coatings deposited by thermal evaporation in vacuum are sensitive to their thickness. At the same time, the thickness is in principle non-uniform, since the coating is always thicker in the middle of the substrate than at its edges, as it follows from Knudsen's law of evaporation. Thickness non-uniformity is particularly noticeable in the case of vacuum metallization of moving roll substrates such as steel, paper, polymer films in semi-continuous processes where substrates even of 2 m width are often used.

Several methods were described on how to improve thickness uniformity on moving substrates [1-7], but the problem still remains of present interest. In the method presented in this paper, a specially designed mask placed near the substrate is used to modify the original distribution of vapors emitted by the evaporator. High efficiency of the method is proved experimentally.



1 – evaporator; 2 – moving substrate; 3 – mask.

Fig. 1. Schematic diagram showing a continuous coating system

PRINCIPLE OF THE METHOD

Geometrical arrangements are shown in Fig. 1. A horizontal mask consisting of two symmetrical parts is placed very close under the substrate so that evaporated atoms arrive at the substrate only in the area not shaded by the mask and called the area or zone of condensation. The zone is narrow in the middle of the substrate, but remains as wide as possible at the edges. Deposition time proportional to the length of the condensation zone decreases gradually in the direction from the edge of the substrate to its central axis. Since the deposition rate increases in the same direction, their product proportional to the thickness of the coating can be made constant throughout the surface of the substrate. Therefore, a properly designed mask reduces the vapor stream going to the central part of the moving substrate, but does not hinder deposition of the coating at its edges.