STUDY CONCERNING THE FACTORS THAT INFLUENCE GLOBAL QUALITY IN PORK

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Abstract: *Global quality in pork is influenced by a series of both technological and hygiene factors that can make it improper for consumption. Pork has a high digestibility since proteins rank first in quality. The value of pork pH vary during the post-processing period between 7.0 and 5.4, the water holding capacity being influenced by the pH values of the pork before maturation and rigor.*

Keywords: *global quality, pork, swine, factors, pH*

INTRODUCTION

Meat is made up of dry matter that concentrates all the nutrients and water; therefore, meat quality is defined by the ratio between water and dry matter: in high quality meat, it is not above 1: 3. From a chemical point of view, meat is made up of water, nitrate substances of protein nature, lipids, sugars, minerals, vitamins, and enzymes (Table 1). The nutritious value of pork is given by the amounts of proteins, lipids, sugars, and minerals.

Table 1.

Chemical composition of pork

Species	Anatomic area	Water (%)	Proteins	Fats	Ashes	Water: protein ratio
Swine	Boned pork	46.00	12.23	41.00	0.80	3.68
	Leg	60.66	15.20	23.36	0.76	3.99
	Cutlet	55.66	16.66	26.56	0.77	3.53

Source: different authors

- ***Lipids*** are important mainly for their energy supply. Qualitatively, meat lipids are inferior to vegetal oils because they have a low content of essential fat acids (linoleic, linolenic, arachidonic). Meat lipids belong to the 2nd quality class because they do not contain the necessary poly-unsaturated fat acids.
- ***Proteins*** are an important source of nitrate substance with high biological value. When judging meat protein quality, we need to take into account their digestibility and high biological value (~ 90%): meat proteins belong to the 1st quality class. The biological value of pork proteins is given by the content of amino acids, mainly essential, and by their ratio:
  - *phenylalanine* is a precursor of tyrosine;
  - *leucine* is necessary for its ketogene function: leucine deficiency hinders normal growth and leads to body weight loss and to negative nitrate balance;
  - *lysine* is necessary for both body growth and the development of red globules;
  - *methyonine* supplies the sulphur necessary for the biosynthesis of cysteine and contributes as a donor of methyl groups;
  - *treonine* is a liotropic agent that prevents the accumulation of fat in the liver ; due to its degrading substances, it participates in the synthesis of porfirin;

- *tryptophan* stimulates NAD and NADP synthesis: it is necessary for the growth of young bodies and for the maintenance of the nitrate balance; it also controls niacin avitaminosis because it acts as a precursor;
- *valine* is necessary to maintain the nitrogen balance.

- ***minerals*** such as iron, natrium, potassium are abundant in meat, but calcium is rather scarce. Phosphorus, sulphur, and chlorine are also abundant, which makes meat act as an acid in the human body. Meat also contains other minerals such as cobalt, aluminium, copper, manganese, zinc, magnesium, etc. due to extractive substances; meat has a stimulating effect of gastric and intestinal secretion and develops a sensation of satiety.
- ***vitamins*** of the group B are abundant in meat: pork content in vitamins depends on the feed fed to the living animal. In ruminants, intestinal flora can synthesise B group vitamins though they cannot be found in the fodder ingested.

MATERIAL AND METHOD

To determine the technological and hygiene factors that influence the global quality of pork, we have determined, on the pig carcasses slaughtered in the slaughterhouse, the pH values in the ante rigor maturation and rigor phases, as well as the hygiene factors that influence pork quality depending on the conditions on the slaughtering site.

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RESULTS AND DISCUSSION

The technological factors that influence global quality in pork are as follows:

- hydrating capacity, which is influenced by:
  - the pH, which determines net electric load;
  - the ratio between muscular: fat: conjunctive tissues;
  - the thermal state of the meat (warm, refrigerated);
  - the muscle type;
- water holding capacity, which depends on the last meat pH;
- meat pH, which depends on the post-slaughtering period of the meat (Table 2):
  - ante rigor (pH = 7.0);
  - maturation (pH = 5.6-5.8 and even 6.0);
  - rigor (pH = 5.3-5.4).

Table 2.

Pork pH values in different phases

Post-slaughter phase	pH value
Ante rigor	7.0
Maturation	5.6-5.8
Rigor	5.3-5.4

Hygiene (inocuity) factors concern the following:

- possible parasitic infestation;
- the degree of contamination of the meat by alteration and pathogen micro-organisms;

- the presence of poly-cyclic condensed hydrocarbons as a result of live animal contamination by polluted air or by fodder contaminated with condensed poly-cyclic hydrocarbons;
- the presence of oestrogen hormones and of β-agonists that are used in some countries for economic purposes;
- the presence of heavy metals (Mg, Pb, As, Cu) because of the fodder contaminated by pesticides containing heavy metals or because of the processing of the meat with improper equipment;
- the presence of mycotoxins (particularly aflatoxins) because of the fodder infested by toxicogenic moulds;
- the remanence of antibiotics used in the treatment of live animals.

Physiological conditions include lack of enough food, high age followed by the damaged masticator apparatus and by disturbances of the digestive function; foetal state, beef from calves that are too young, and meat from advanced pregnancy cows:

- Meat in foetal state. This type of meat is not accepted in Romania because of its low nutritious value: it contains a large amount of water and is, therefore, ready decaying, with unpleasant aspect and repulsive for the consumer' eyes.
- Meat of calves that are too young. Romanian regulations do not allow the slaughter of calves below 21 days of age. Calves that are too young have a poor muscular mass, no fat, with a high water content, which makes it tasteless and readily decaying.
- Meat from advanced gestation cows. Advanced gestation refers to the last quarter of gestation (above 7 months in cows and 3 months in sows). In this state, animals are often oedematic in the rear train with muscular infiltrations. When slaughtered by necessity, they confiscate the parts of the carcass that have oedemas or infiltrations.

We should also mention the following types of meat:

- Meat of febrile animas. In this case, they recommend retaining the meat for 24 hours, after which it is re-examined.
- Meat of tired animals. In tired animals, there are large amounts of meolic products in the blood. The glycogen reserve is low, which hinders good maturation and conservability. Meat from tired animals is hard to process because of the diminution of the hydrating capacity and of water linking because of the change of colloidal state of the proteins.
- Meat of animals that are too slim. The meat of animals that are too slim are characterised by the almost total lack of fat and by changes in the muscles. Lean meat is the consequence of physiological or pathological factors.
- Meat that has unusual colour because of:
  - the feeding: getal pigments;
  - the medicines administered: methyl blue, picric acid;
  - the pigmentation: exogenous and endogenous pigments;
- Meat that was not completely cleaned of the blood. Animals that are too tired, febrile, and slaughtered by necessity because in agony cannot eliminate all the blood from their system.
- Meat with strange odours. Normal meat has, right after slaughter, a characteristic odour depending on the species. Strange odours can come from live animals or from their meat after slaughter. Live odours have physiological causes (exaggerated odour of sex) and pathological (uraemia, vitular fever, piemia, etc.). Odours acquired after slaughter can come from the lack of meat

aeration or from meat aeration in improper areas (places smelling like mould, rats, oil, etc.).

CONCLUSIONS

Pork has a high digestibility: it is rich in minerals and vitamins, whose amounts depend on the quality of the feed during the finishing period.

Global pork quality is influenced by a series of technological and hygiene factors such as hydration capacity, water holding capacity, and pH; inocuity factors during slaughtering and storage make it improper for consumption.

The water holding capacity is influenced by the last pH depending on post processing period when it can reach 7 in the ante rigor phase, 5.6-5.8 in the maturation phase, and 5.3-5.4 in the rigor phase.

Hygiene factors concern the degree of contamination by decay and pathogen microorganisms.

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