A STUDY UPON THE INFLUENCE OF AGE AND WAY OF FEEDING UPON THE QUALITY OF THE RABBIT MEAT

Amelia Buculei, I. Gontariu, Ioana Rebenciuc

Ştefan cel Mare University of Suceava, Faculty of Food Engineering, Suceava
e-mail: ameliab@usv.ro

Abstract

In this study we establish if the age and rising conditions of the animal have a significant effect upon the quality of the analyzed meat (pH, texture, colour, freshness). We led the studies in controlled commercial conditions including the same rabbit species of different ages and with different ways of feeding. The solving of the freshness inconsequence problem is a priority in the meat industry. The satisfaction obtained while eating is the result of the interaction of this trait with other factors such as the taste and juiciness. The analyzing methods used in our study were the determination of the mineral substances with the X rays spectroscope (EDX- 960HS), the determination of the pH and of the acidity and humidity of rabbit meat. The animal's age and degree of fatness influence a lot the meat consistency. In this way the young animal's meat is less consistent than that of the adult animals and so the fat meat has a finer consistency than the light meat in the latter the conjunctive tissue between predominating muscular fibers or different muscles. The juiciness of the meat depends on the species, race, age and degree of fatness of the animal. The young animals have a more juicy meat in comparison with the adult animals due to the fineness of the muscle fibers and the high water consistency.

Key words: rabbit meat, meat quality, tenderness, X rays spectroscopy, determination, colour

INTRODUCTION

The rabbit meat belongs to the class of white meats being a very light one. It presents some organoleptic, physico-chemical and nourishing characteristics that confers it special qualities by the high protean content and the relatively low lipid percent in the conjunctive tissue. [1, 2]

The tenderness and texture of the meat are important factors for the consumers for they determine the commercial value of the meat and the way it will by cooked, tendered or processed. The texture is a complex process that includes three different factors including fibrousness, cohesion, chewability and tenderness. The texture can be perceived by the taste or by analysis devices and it is influenced by three factors: the length of the sarcomere muscle, the quantity of the conjunctive tissue and the degree of proteolytic changes that take place during the post-mortem conditioning. Large quantities of the intramuscular fat (which in the case of rabbit meat is insufficient) determine as well the tenderness. [3, 4, 5]

There are several procedures and working condition used for analyzing the role played by each structure of the whole mechanic behaviour of the meat. These methods were created by the linking of the mechanical properties with a series of characteristics of the analyzed structure. The conjunctive characteristics (linking characteristics) and the myofibrilar ones can be mechanically quantified by stress testing at high and low compression speeds in the row meat.

Waner-Bratzler uses as an alternative the shear forces for evaluating the cooked meat. Both methods can be considered to reflect the myofibrilar and conjunctive (linking) tissues. In the case of Waner-Bratzler the shear force is accepted as a good indicator for the tenderness sensorial observed and can be used as a criteria of quality of meat not only in case of the rabbits. The rabbit meat lack of fatness increases the importance of the tenderness for the rabbit meat quality. [6]

One of the most important properties of meat appearance is the colour that is generally used by the consumer as an

indicator of quality and freshness. The myoglobin quantity existent in the muscle determines the colour.

The myoglobin ratio is reduced and oxidized giving a subjective idea of freshness. The oxidized myoglobin is (grey-brownish) and called metmyoglobin and is unwanted. The colour stability can be associated with the term of pre-sacrificing. [7, 8]

The metabolic type influences the myoglobin concentration that varies from simple to double in the case of the muscles coming from the same body. The thickness of the superficial layer of red-wine colour is in inverted ratio with the breathing activity of the muscle.

The colour stability depends on the metabolic type the MMb and Mb formation depending on:

-the O_2 diffusion speed and consumption;

- the Mb auto oxidizing in the presence of O_2 ;

- the MMb enzymatic reduction whose speed increases with the metabolism intensity.

The tenderness of the meat is determined by the species, age, state of fatness which at their turn influence the fat and conjunctive tissues ratio as well as the muscular fiber quality (the sarcoplasm and myofibrils ratio). [9]

The tenderness evolution in the post sacrifice period is parallel with the biochemical evolution of the myofibrilar system respectively the myofibrilar roughness that increases along with the elasticity lost and the increase of the hardening degree of the muscle that accompanies the muscular rigidity, the final pH. [10]

MATERIAL AND METHOD

The following analyses were led:

1. PH determination

The working principle differs according to the applied method.

a)The potentiometric method

This method has as principle the measuring of the potential differences between a reference electrode and a sample introduced glass electrode.

b) The indicator paper method

The pH value is appreciated according to the indicator pH paper after its moisturing with the water extract of the analyzed sample.

2.The humidity determination

The principle of the method. The working sample is exposed at a heat source till it reaches a constant weight. The weight loss percent calculated represents the water content.

3. The slightly hydrolysable nitrogen determination (indirect titration)

The slightly hydrolysable nitrogen under the form of ammonia is determined by releasing it with the aid of a light base and the water vapors and trapping it in an acid solution that is titrated with a sodium hydroxide solution.

4. Acidity determination (Visual method)

The principle of the method. The water extract of the sample is titrated with 0.1n sodium hydroxide solution in the presence of phenolphthalein as an indicator.

5. The total mineral substances determination (ash determination)

It consists in fact of a quantitative appreciation of the mineralizing degree of a product the resulting ash being the organic residue after the combustion of the organic material.

The ash can be obtained by several procedures but the simple calcination is the most spread method.

The mineral substances as individual elements determination

The results obtained at the total mineral substances determination with the aid of X rays spectroscopy (EDX- 960HS):

Sample : Rabbit ash

Comment : sample cell 6um mylar

Group : powder_air

Measurement Condition

Instrument: EDX-900

Atmosphere: Air Collimator: 10(mm) Spin: Off

Analyte TG kV uA FI Acq.(keV) Anal.(keV) Time(sec) DT(%)

Na-U Rh 50 1000-Auto -0 - 40 0.00-40.00 Live- 100 5

Analyte Result (Std.Dev.) Proc.-Calc. Line Int.(cps/uA)

No. 1 Layer

6.000 um C10H8O4 100.000 %

No. 2 Layer- Base

K- 69.444 %- (0.096)- Quan-FP- K Ka - 5.6858

P- 26.790 % -(0.182)- Quan-FP- P Ka- 0.3174

C- 1.411 % - (0.051)- Quan-FP- CaKa - 0.0795

S- 1.261 %- (0.048)- Quan-FP- S Ka- 0.0312

Zn- 0.425 %- (0.002)- Quan-FP- ZnKa- 0.5647

Fe- 0.290 % - (0.003)- Quan-FP- FeKa- 0.1649

Rb- 0.285 %- (0.001)- Quan-FP- RbKa- 0.7789

Cu- 0.061 %- (0.001)- Quan-FP- CuKa- 0.0688

Br- 0.033 %- (0.001)- Quan-FP- BrKa - 0.0748

RESULTS AND DISCUSSIONS

We led our studies in commercial controlled conditions including the same rabbit species but of different age and different type of nourishment. At industrial level the fundamental pH is the main parameter used at the meat quality measurement.

Species: Giant white

Colour: bright white, injected eyes because of the pink coloured blood vessels;

Dimensions: long body, 55-65cm, weight 5-6 kg at the age of 8 months;

The age of the analyzed rabbits was of 2.5 months and respectively 4 months.

Immediately after sacrificing the muscular metabolism is altered the glycosine becoming the only way through which the muscular tissue can still use its energetic resources.

Becoming the main energy source the glycogen is decomposed till lactic acid which gradually accumulates in the muscular tissue causing its progressive acidification that results in the pH decreasing (initial pH = 7), until a value known as final pH is reached. The final pH has also an effect upon the absorption spectra of the pigment sat a high final pH the maximum of absorption sliding towards red. But the most important factor in the variation of the muscle colour is the variation of the meat colour according to the age and species. The final pH influences significantly the meat flavour which is maximum at a pH between 5,8 – 6,0. At a pH › 6,2, at which the free water quantity is immobile the meat flavour is less intense for it takes place a dilution of the water soluble compounds. Generally the meats which after maturation present pH values of 6.4 are undoubtedly fresh.

The humidity determination is done for various purposes:

- the appreciation of the nutritive value of a product (the higher the water content is the lower the nutritional value is);

- the appreciation of the conservation power (the lower the water content is the higher the conservation is);

- the determination of the technological traits for using them in the fabrication process.

From the quantitative point of view the water represents the main raw meat component and so the humidity in the rabbit meat extract. The water loss is due to the protean altering in time.

Immediately after sacrificing the meat is translucent and it has a relatively dark colour for a great part of the light is absorbed and diffused and only a small part of it is reflected. As the acidification of the meat takes place its structure becomes darker, the water appearance in the inter and extra cellular spaces is favoured, the percent of the reflected light increases and all these influence the meat to become lighter in colour.

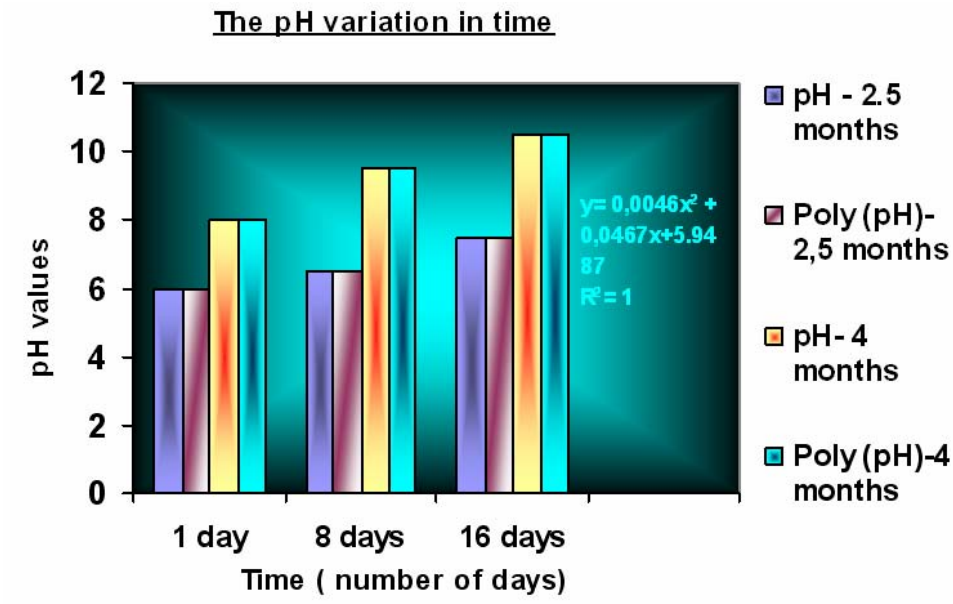

Fig.1. The pH variation in time

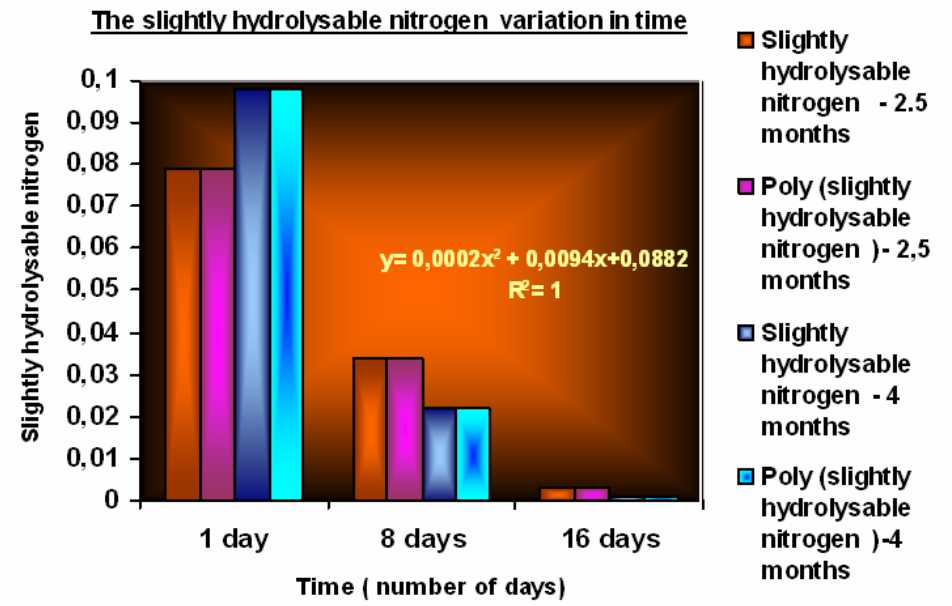

Fig.2. The slightly hydrolysable nitrogen variation in time

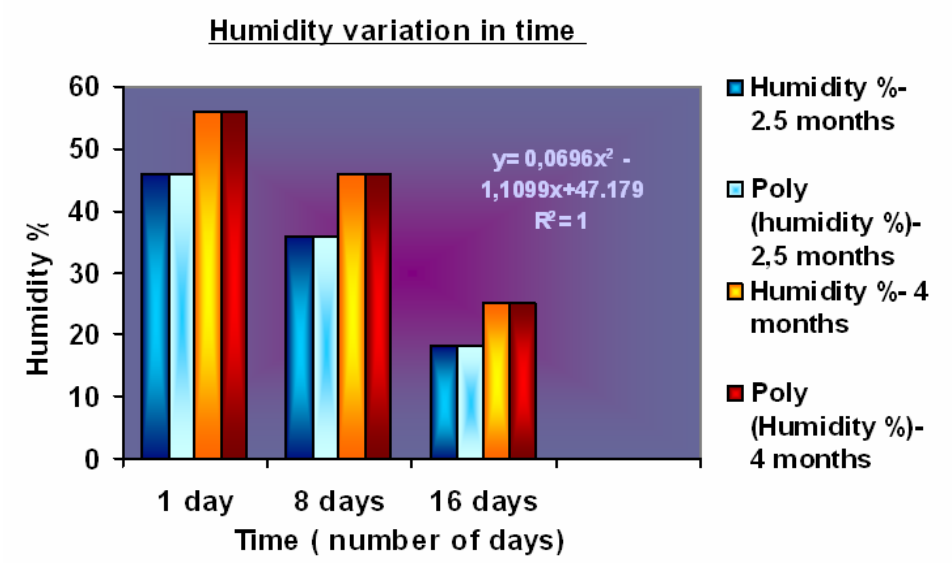

Fig.3. Humidity % variation in time

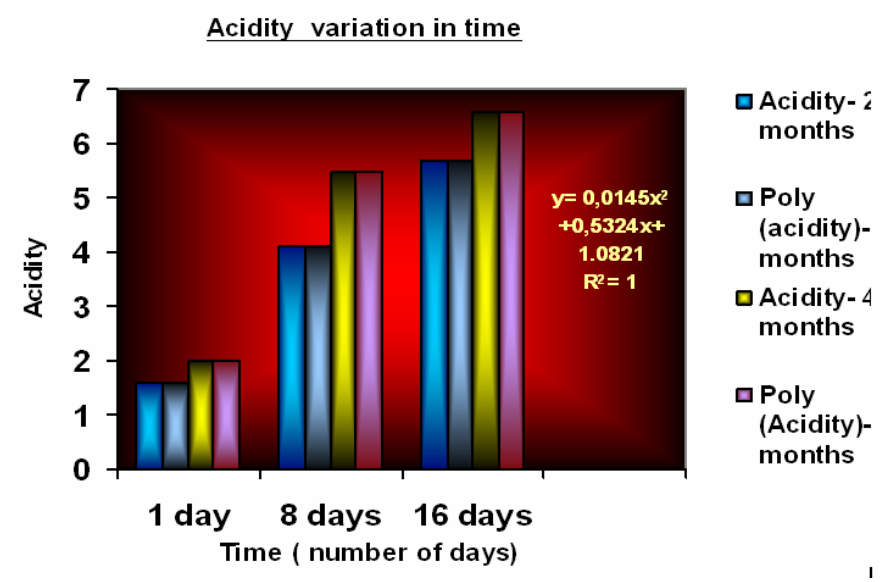

Fig.4. Acidity variation in time

CONCLUSIONS

The animal age and degree of fatness influence greatly the consistency of the meat. Thus at the young animals the meat is less consistent than at the mature ones in the same way the fat meat has a finer consistency than the light meat (in which there is less conjunctive tissue between the muscular fibers or the different muscles). The juiciness of the meat depends on the species, race, age and degree of fatness of the animal. The nourishment of the animal influences the

taste and smell of the meat by the lipids that it contains. The degree of maturation of the meat increases its content in substances responsible for the taste and smell.

The young animals have a more succulent meat than the mature ones duet o the fine muscular fibers and the large quantity of water. This trait also depends on the muscle type increasing along with the intensity of the oxidative metabolism. When chewing the first impression of the juiciness is determined by the water quantity released. At a prolonged chewing it takes place a stimulation of the saliva by the fat in this case the impression being prolonged.

The meat pH determination can give hints upon the degree of freshness of meat but only if the animals were sacrificed in corresponding conditions (it must be taken into account the influence of the technological factors upon its pH before slaughter and after it when processing the meat). In conclusion it can be said that this type of rabbit meat should be consumed between 4 and 7 months being a light meat. It presents some organoleptic, physico-chemical and nutritional characteristics that confer it extraordinary qualities by the high protean content and the relatively low lipids content in the conjunctive tissue.

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