

## MICROBIOLOGICAL AND SENSORY INDICES OF DOMESTIC RABBIT MEAT

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### Summary

The paper presents the results obtained from the assessment of sensory and microbiological indices of rabbit carcasses of different origins. The studied carcasses were purchased from a specialized store, from the market and from a farm. The obtained data indicate an increased bacterial load in the carcass from the market both on the surface and in depth, and the carcass from the specialized store fell into the category of fresh meat according to sensory and microbiological indices.

**Keywords:** rabbit meat, microbiological indices, microflora.

Rabbit meat is very good for the human diet, due to the fact that its fat is not deposited on human muscle fibers; it contains such minerals as zinc, sodium, potassium, calcium, magnesium and iron (2, 6).

Rabbit meat has the fewest calories, for example 450 g of homemade rabbit meat has 795 calories, and the same amount of chicken contains 810 calories (3, 4).

The consumption of rabbit meat varies a lot from one country to another, from one region to another, it is quite appreciated in France, Holland, England, Austria, Italy, but if compared to the Republic of Moldova the consumption of rabbit meat is quite low here (1, 7).

The human body assimilates protein from rabbit meat in a proportion of approx. 90%, at the same time it assimilates beef protein only up to 62% (5, 8).

Due to its complex composition, rabbit meat is also a favorable environment for the intense development of various microorganisms harmful to consumer's health (10, 14).

The following groups of dangerous pathogens can be found in rabbit meat: viral, bacterial, parasitic (9, 11).

At a correct cooling and maturation regime, a dry film is formed on the meat surface that prevents the microorganisms from penetrating the meat (13, 15).

The maximum term for keeping the carcass / sliced meat, refrigerated and stored at  $t_0 = + 2 + 4$  °C is for rabbit meat - 5 days, according to GD no. 696 of 04.08.2010 (17, 19).

The evaluation of rabbit carcasses quality is done subjectively and objectively.

Subjective evaluation is based on the appearance, the colour of the meat in the carcass, the state of fattening. On the outside, the carcass must not have any ruptured tissues, any hairs, traces of blood or intestinal contents. The colour of the

meat must be pale pink, and the state of fattening must be followed by the uniformity of the fat layer on the surface of the carcass.

The objective evaluation is made according to the meat weight and quality. The quality of the meat is assessed through chemical and bacteriological examination. Chemical control should not exceed 32 mg per 100 g meat of nitrogen in hydrolysis. Bacteriological examination means taking smears (maximum 3-4 cocci are allowed per field). Meat containing pathogenic or facultative pathogenic bacteria is not produced and marketed (20).

The criteria for the sensory evaluation in establishing meat freshness are: the external appearance, colour, consistency, odour and appearance of the bone marrow. According to the evaluation, meat can be: fresh, relatively fresh and spoiled (16, 18).

The bacterial load on the meat surface increases progressively, depending on the temperature, the duration and the storage conditions of the meat (12, 14).

By following the hygiene steps when slaughtering animals, the risk of meat contamination is reduced by over 90%, these steps are: strictly healthy animals, observance of hygienic norms, equipment cleaning, water quality, etc.

Thus, the purpose of the investigations is to study sensory and microbiological indices of commercial rabbit meat and carcasses and to assess compliance with the rules in force.

### **Materials and methods**

The biological material used was rabbit carcasses from different sources:

- the rabbit carcass purchased from a specialized shop;
- the carcass purchased from the central market in a simple hall arranged for the sale of the meat of different species of animals;
- the carcass procured from a farm which raises rabbits for family purposes.

In order to obtain a conclusive result, the work instructions according to GOST 26668-85 regarding the collection of meat samples were observed, as the conclusion of the laboratory examination depends on this operation.

The research was carried out in the microbiology and immunology laboratory of the Faculty of Veterinary Medicine.

In laboratory conditions, some sensory and microbiological indices of rabbit carcasses and meat were evaluated.

### **Results and discussions**

The sensory indices taken into account when evaluating meat are perceived with the help of the sense organs: colour, smell, consistency and taste. The sensory properties of meat depend on its structure and composition, on the mode and physiological state of the animal at the time of slaughter, the pathological condition and the state of freshness.

The colour of the meat is influenced by the colour of the muscle fibers varying from one colour to another. The colours can be from white to grey, the coloration in red with different shades depends on the content of myoglobin and haemoglobin, to which is added the colour of the connective and adipose tissue. Meat colour can change when contacting with air, or by the way it was obtained.

Normal meat has an elastic, fine and juicy consistency.

The odour of the meat differs from one species to another; odour evaluation is made on fresh meat. The odour depends on the diet, the age of the animal, the physiological condition, etc.

The taste of the meat is influenced by the tenderness, fineness, juiciness of the muscle fibers, the distribution of fat and the quality of the feed.

The studied rabbit carcasses were assessed for the determination of freshness, and the results are presented in the table (Table 1).

Table 1

**The results of the sensory evaluation of rabbit carcasses**

Studied indices	Origin of the studied carcasses		
	from a specialized meat store	from the Central Market	from the farm
Exterior appearance	The surface of the meat has a dry film, normal consistency, characteristic of the rabbit species	Dry surface, unpleasant appearance of old meat, matte meat, rancid odour	Wet surface, with partially sticky mucus, fat with a matte appearance
Colour	Pink-red specific to the species, the section is glossy and slightly moist	The surface of the carcasse is grey	Light pink, moist
Consistency	It is firm and elastic, no hardening is formed when pressed with the finger.	When pressed with the finger shallows appear on the surface which doesn't return to its original state	Soft to the touch, when pressed with the finger, the meat returns to its original state
Odour	Pleasant and characteristic of the rabbit species	Unpleasant, stale	Slightly acidic, with a strong odour of unventilated meat
Freshness degree	Fresh	Altered	Relatively fresh

Having carried out the sensory evaluation of the rabbit carcasses from various places, we have noticed that the carcass purchased from the specialized store according to the degree of freshness can be included in the fresh category, the carcass from the farm- relatively fresh, and the one from the market was altered.

The quality of any meat is influenced by the number of microorganisms and their type. This is due to non-compliance with hygiene requirements during slaughter, processing or handling of carcasses. The presence of bacteria in meat limits its shelf life, and if there are also pathogenic germs then they endanger the consumer's health.

In conditions of temperature and high humidity above the permissible limits, the meat is spoiled. Depending on the type and mode of meat alteration, aerobic and anaerobic bacteria are distinguished.

The longer it takes for the animal to be slaughtered, the greater is the chance of microbes multiplying and penetrating.

Aerobic bacteria grow on the meat surface, they multiply in the connective tissue, and then they attack the muscle fibre. As degradation progresses, anaerobic bacteria appear.

Following the microbiological study, the sold meat is divided into 3 categories:

- fresh meat, where the microflora constitutes up to 10 cocci,
- meat of dubious freshness, where the bacterial microflora constitutes more than 30 cocci under microscope
- altered meat, where the bacterial microflora constitutes more than 30 cocci, and some rod shaped bacteria are also present.

The results of the microbiological study of the studied rabbit carcasses are reflected in the following tables.

The data from the table indicate some quantitative aspects of the bacterial microflora of the number of colonies on agar plates, thus we can observe that there were detected in the superficial layer of the carcass approx. 80 bacterial colonies of microflora for the rabbit carcass purchased from the farm, 75 colonies for the rabbit carcass from the market and 7 colonies for the carcass from the store, respectively. In depth, 35 colonies were found in the carcass from the farm, 31 in the carcass from the market and one colony in the carcass from the store (Table 2).

In the agar test tubes, the number of observed colonies was higher in the carcass from the farm - 30, in the carcass from the store - 10, and in the carcass from the market - 3 bacterial colonies.

Following the examination of microbial smears, the number of microorganisms on microscopic field was determined in (Table 3).

Thus we can notice that: in the carcass from the market, the superficial microflora constituted 70 bacteria (cocci, gram positive) on the microscopic field and in the other carcasses there were 30 colonies in each. The microflora in the depth also denotes a larger amount of bacteria in the market carcass - 50 colonies on the microscopic field.



Table 2

**Comparison of the amount of bacterial microflora by culture media of rabbit meat according to origin, colonies**

Culture media		Carcass from the store		Carcass from the market		Carcass from the farm	
		Microflora		Microflora		Microflora	
		superficial	depth	superficial	depth	superficial	depth
Plates	agar	7	1	75	31	80	35
	endo	0	0	0	0	0	0
Tubes	agar	10	1	3	1	30	12
	broth cultural aspects	turbidity, sediment	film, clear ring	turbidity, sediment	film, clear ring	turbidity, sediment	film, clear ring

Table 3

**Comparison of the amount of bacterial microflora on smears of rabbit meat by origin, colonies**

On the microscopic field	Carcass from the store		Carcass from the market		Carcass from the farm	
	Microflora		Microflora		Microflora	
	superficial	depth	superficial	depth	superficial	depth
Number of microorganisms	30	10	70	50	30	23
Bacterial morphological aspects	Cocci, gram positive	Cocci, gram positive	Cocci, gram positive	Cocci, gram positive	Cocci, gram positive	Cocci, gram positive

These aspects indicate that the rabbit carcass purchased from the specialized store is fresh compared to the other studied carcasses, which indicated a dubious or obsolete freshness.

### Conclusions

According to the carried out investigations, we can draw the following conclusions:

The studied rabbit carcasses showed a varied number of coccyx microorganisms both in the surface layers and in the depth of the meat depending on the origin.

The rabbit carcass purchased from the specialized store falls into category I by freshness; the other carcasses have a dubious or obsolete freshness.

The number of microbial colonies detected in the studied carcasses varied, the carcass from the store contained 7 colonies, the one from the market - 75 colonies and the carcass from the farm - 80 colonies on the superficial surface of the carcass.

The microbial colonies detected in the depth of the meat of the studied carcasses are in smaller quantity, namely, in the carcass from the store - 1 colony, in the carcass from the market - 31 colonies and in the carcass from the farm - 35 colonies.

The bacterial microflora determined on smears indicates the following data: on the surface of the rabbit carcass from the store and from the farm – 30 colonies, on the carcass from the market 70 colonies, and in depth respectively 10, 30 and 50 colonies.

### References

1. **Banu, C.**, Tratat de industrie alimentară, Ed. ASAB, 2010.
2. **Bogdan, A., Țogoe, Iu., Cîmpeanu Gh.**, Microbiologia alimentelor, Vol.2, Ed. Asclepius, București, 2011.
3. **Bogdan, A., Țogoe, Iu., Cîmpeanu, Gh.**, Microbiologia alimentelor, Vol.1, Ed. Asclepius, București, 2011.
4. **Bud, I., Vlădău, V., Petrescu-Mag, V.**, Raising rabbits, Ed. Ceres, Bucharest, 2011.
5. **Carp-Cărare C.**, Microbiologie generală, Ed. Ion Ionescu de la Brad, Iași, 2014.
6. **Dan, S., Mihaiu, M., Dalea, I.**, Researches regarding the psychrotrophe microbial load and configuration from meat products, Buletin USAMV-CN, 2006, 64, 251-256.
7. **Dan, V.**, Microbiologia alimentelor, Ed. Alma, Galați, 2001.
8. **Darie, N.**, Biochimia alimentară dinamică, Ed. ULB, Sibiu, 2001.
9. **Golban, R.**, Microbiologie alimentară, Curs de prelegeri, UASM, Chișinău: 2015.
10. **Guguianu, E.**, Bacteriologie generală, Ed. Jenus, Iași, 2002.
11. **Josan, N.**, Microbiologie și imunologie, UASM, Chișinău, 2002.

12. **Oprean, L.**, Microbiologia produselor alimentare, Vol. 2, Ed. Univ. „Lucian Blaga”, Sibiu, 2002.
13. **Răpunțean, Gh., Răpunțean, S.**, Bacteriologie veterinară specială, Ed. Academic Pres, Cluj-Napoca, 2005.
14. **Stănciulescu, M., Sârbulescu, V.**, Animal productions, Ed. Ceres, Bucharest, 2012.
15. **Sunde, M., Norström, M.**, The prevalence of, associations between and conjugal transfer of antibiotic resistance genes in *Escherichia coli* isolated from Norwegian meat and meat products, *Journal of Antimicrobial Chemotherapy*, 2006, 58, 4, 741-747.
16. **Tașbac, B.**, Bacteriologie veterinară specială, Ed. Larisa, Câmpulung, 2016.
17. **Tașbac, B.**, Microbiologie generală alimentară, Ed. Larisa, Câmpulung Muscel, 2018.
18. **Tașbac, B., Țogoe, I.**, Microbiologia alimentelor, Ed. Larisa, Câmpulung Muscel, 2018.
19. **Government Decision no. 696 of 04.08.2010**, regarding the approval of the Technical Regulation “*Meat - raw material. Production, import and marketing*” for the approval of the Requirements for the production, import and placing on the market of meat - raw material.
20. **GOST 26668-85 – 1985**, Food and taste products. Sampling methods for microbiological analysis, Moscow, Iz. Reprint, 2008.