RAW CHICKEN LEG AND BREAST SENSORY EVALUATION

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Abstract
In the paper we presented a method of sensorial evaluation for chicken meat (red and white). This is a descriptive method of analysis. It was perform with trained assessors for chicken refrigerated raw meat organoleptical evaluation. The sensorial attributes considered were: external aspect of anatomical part of chicken analyzed by slime, the surface odor, the skin and muscle color and muscular elasticity. Color was determined for the skin and white and red muscles. Our scale of analysis is formed by three values that characterize each quality attribute. The trained assessor appreciated the sensorial quality of raw anatomical part of chicken as excellent, acceptable and unacceptable. The objectives were: to establish the sensorial attributes to be analyzed for each type of muscular fiber, to describe the quality of each considered attribute and to realize a sensorial scale of quantification for the considered sensorial attributes. Our purpose was to determine the quality of the red and white refrigerated raw chicken anatomical parts (respectively for legs and breasts) after one week of storage.

Keywords: refrigeration, slime, odors, skin, muscular fiber, quality, muscular elasticity.

1. INTRODUCTION

According to Wrick [4], the expectation of the consumer for meat is that it should be healthy, rich in protein, low in fat, tender, and have a typical flavor.
One of the most important quality criteria of raw chicken meat for consumers is the sensory quality, characterized by color, texture and flavor. The sensory analysis included the evaluation of raw meat characteristics (color, structure and odor). [2].
Chicken muscles can be classified by color and enervation type. Two main muscle types are distinguished: red muscle (with high myoglobin content, aerobic oxidative metabolism and abundant blood irrigation) and white muscle (low myoglobin content, anaerobic metabolism and low blood irrigation). White muscles undergo a fast contraction whereas red muscles may present fast or slow contractions. Slow contraction muscles use, in addition to glucose, fatty acids in the presence of oxygen. The slow contraction muscles have more abundant blood irrigation. In general, red muscles are those involving energetic movements.[7]
Romanian legislation contains a STAS 7031-83 A1: 1997 pct. 4, which is referring to acceptable conditions of refrigerated raw chicken meat for marketing and human consumption. The terms are very general and there is no quantification of the sensorial characteristics. This standardization of chicken meat was valid until 2008. Since 2008 it suffered a replacement with another standard called SR 7031 from 2008, referring to fowl meat and dealing with organoleptical characteristics of fowls, as a general term. This is why we decided to make a proposal for sensory analysis of chicken raw meat based on sensorial attributes quantification. The objectives were:
-to establish the sensorial attributes to be analyzed for each type of muscular fiber,
-to describe the quality of each considered attribute,
-to realize a sensorial scale of quantification for the considered sensorial attributes.
Our purpose was to determine the quality of the red and white refrigerated raw chicken anatomical parts (respectively for legs and breasts) after one week of storage.

2. MATERIALS AND METHODS

The anatomical parts to be analyzed were purchased directly from one slaughterhouse

packed as follow: the legs four pieces in a plastic bag and the breasts two pieces in polyethylene tray and stretch film. The storage of those anatomical raw chicken parts was aerobically. They were stored in a refrigerator at 4±1ºC for one week. The sensorial attributes were determined at 1st, 3rd, 5th, and 7th day of refrigerated storage.

2.1.Sensory analysis

The process of specific training, the selection and definition of the descriptors, and the quantification of the final sensory profile was carried out according to procedures of the World's Poultry Science Association [3].

Five trained assessors from the Research and Development Institute for Horticultural Products Processing and Marketing of the Horticultural Products "HORTING" Bucharest were trained in the methodology of these tests on chicken raw meat. Also, at Food Science and Engineering Faculty from Galati, another five trained assessors re-tested the proposed organoleptical method of raw chicken meat analysis.

In order to familiarize the panel with different intensities for the different sensory properties of raw chicken meat, and to assimilate the scoring scale to be used, two sessions of 1.5 h each were carried out.

The sensory profile used was obtained from two previous open sessions.

Evaluations were conducted in a sensory testing room equipped with positive air pressure, individual stations, and proper light [5]. The different attributes were quantified on a rating scale from 1 to 3. The sensorial attributes analyzed were: visual look (skin and meat color), meat consistency and elasticity and the odor.

Sensorial scale of raw chicken leg

The tables that highlights the sensorial attributes and organoleptical characterization of raw chicken meat are presented as follows:

Table 1. Sensorial attributes and quality of raw, refrigerated chicken leg

ATTRIBUTES					SENSORIAL QUALITY
External aspect	***Odor***	***Color***		***Muscular elasticity***	
Slime		*skin*	*muscle*		
Without slime present on skin	Characteristic	White-yellowish	Pink to light red	Fast return	Excellent
Slime present in some parts of the skin	Off odors (slight sulphurous or ammoniacal)	Light cream	Garnet to slight brown	Slow return	Acceptable
Slime present on all surface	Foreign (rancid, acid, putrid)	Gray or greenish	Earthly	No return	Unacceptable

Table 2. Sensorial attribute values for raw chicken leg

ATTRIBUTES		DESCRIPTION	VALUES
EXTERNAL ASPECT	Slime	Without slime	1
		Slime present in some parts	2
		Slime present on all surface	3
ODOR		Characteristic	3
		Off odors	2
		Foreign	1
COLOR	skin	White-yellowish	3
		Light cream	2
		Gray or greenish	1
	muscle	Pink to light red	3
		Garnet to slight brown	2
		Earthly	1
MUSCULAR ELASTICITY		Fast return	3
		Slow return	2
		No return	1

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Table 3. Sensorial attributes and quality of raw, refrigerated chicken breast

ATTRIBUTES					SENSORIAL QUALITY
External aspect	***Odor***	***Color***		***Muscular elasticity***	
Without slime present on skin		*skin*	*muscle*		
Slime present in some parts of the skin	Characteristic	White-yellowish	Pink	Fast return	Excellent
Slime present on all surface	Off odors (slight sulphurous or ammoniacal)	Light cream	Dark pink	Slow return	Acceptable
Without slime present on skin	Foreign (rancid, acid, putrid)	Gray or greenish	Pale pink	No return	Unacceptable

Table 4. Sensorial attribute values for raw chicken breast

ATTRIBUTES		DESCRIPTION	VALUES
EXTERNAL ASPECT	Slime	Without slime	1
		Slime present in some parts	2
		Slime present on all surface	3
ODOR		Characteristic	3
		Off odors	2
		Foreign	1
COLOR	skin	White-yellowish	3
		Light cream	2
		Gray or greenish	1
	muscle	Pink	3
		Dark pink	2
		Pale pink	1
MUSCULAR ELASTICITY		Fast return	3
		Slow return	2
		No return	1

Sensorial scale of raw chicken breast

We present in the following tables the raw meat breast sensorial attributes and organoleptical characterization

2.2.Statistical analysis

Analysis of variance (ANOVA) was performed for both microbial and sensory evaluation using the General Linear Model [6]. Statistical significance was defined as $P<0.30$, unless otherwise stated.

The main effects of variation among the attributes were studied by principal component analysis [1].

3. RESULTS AND DISCUSSIONS

After sensorial analysis took place and data were collected, we obtained the following variations:

The odor in the first day of storage had a value of three for both anatomical parts. It decreased in time, once with the development of off-odors due to microbial activity that alter the meat and produce small, volatile molecules of sulphure- and ammonia-based compounds. Those off-odors had characterized by our trained assessor as “dishrag”, “wet dog” or “canned corn”. After one week of storage, the breast had a score of 1.3 and the le g of 1.9.

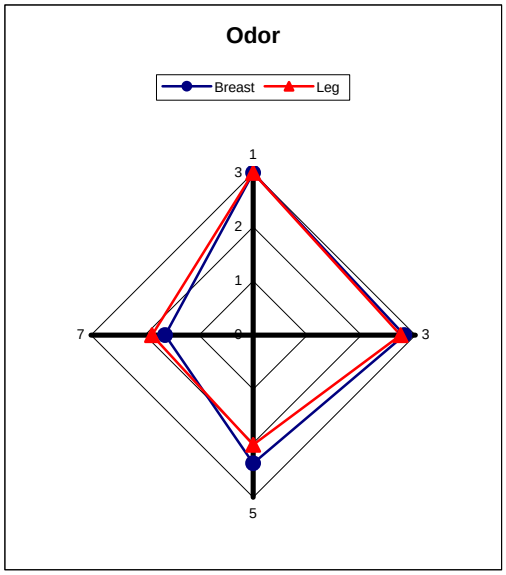

Figure 1. Odor variation of breast and leg

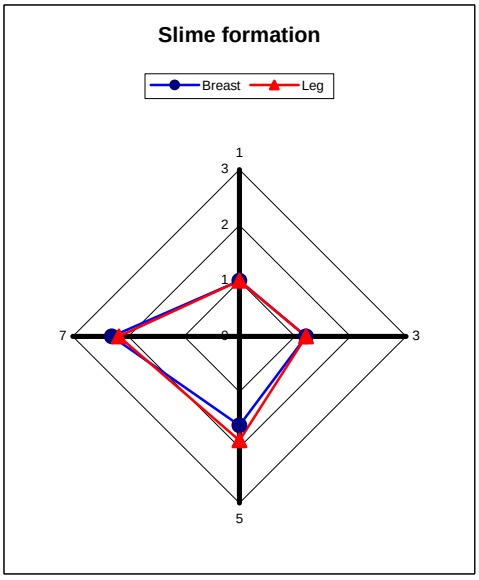

Figure 3. Slime content variation for breast and leg

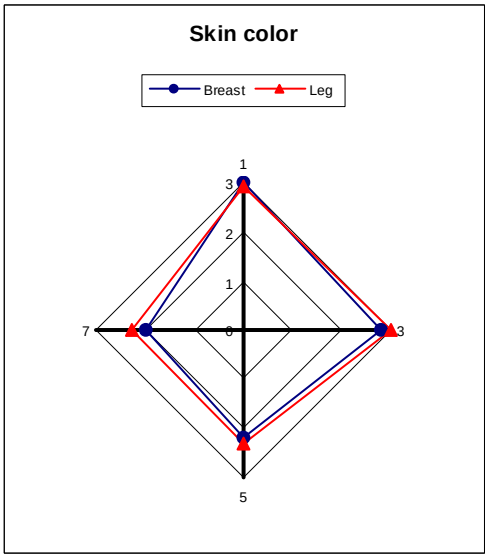

Figure 2. Skin color variation of breast and leg

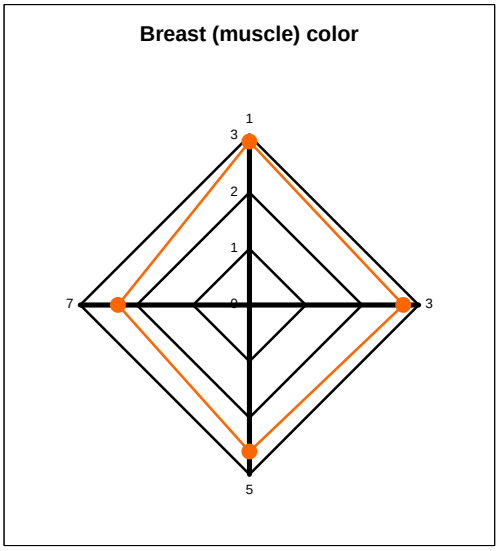

Figure 4. Variation of breast muscle color

About skin color from the breast it decreased from three to a value of two at the last day of storage. The skin color of the leg modified from 3 to 2.3 at last day of storage. Our assessors emphasized that the skin color were influenced by the slime formation.

Slime formation were none at first day on skin leg and breast, its forming is due to *Pseudomonas* activity. Since the three day it had been detected by touching the surface of skin. It appears especially between the legs and breast of chicken whole carcass. Our trained assessors detected at last day of storage values of 2.3 for breast and 2.2 for leg, which signify a large extent of slime on anatomical considered surface.

In figure 4 we can see that breast muscle color from day one to day seven modify only with a difference of score of 0.6 points, so it was a very small variation perceived by our assessors. Also, for leg muscle (figure 5) the difference of color between first and seventh day of storage were of 0.9 points.

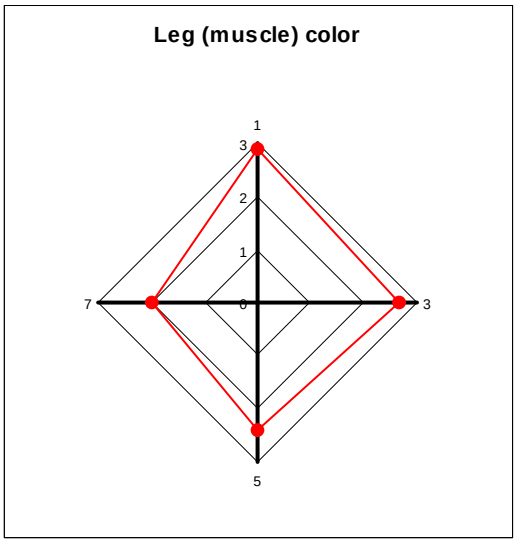

Figure 5. Variation of leg muscle color

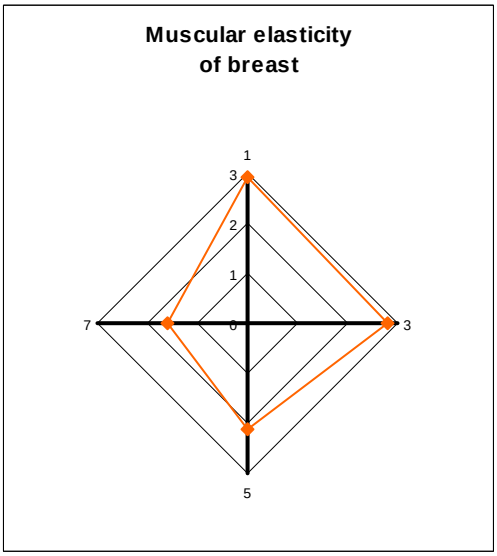

Figure 6. Variation of breast elasticity

The elasticity was determined by light pressing with the forefinger of the meat. Function of the period of return of the meat at its initial state the assessors can quantify the quality of meat. So, in figure 6 the breast elasticity score decreased in time, the difference between first and seventh day being of 1.3. According with the figure 7, the leg elasticity decrease in time, from first to seventh day with a value of 1.5.
After analyzing the score of anatomical parts of chicken meat by days, we can say that, according to table 1 and table 3 the sensorial quality is as follows:

-in day one the breast and leg quality are excellent,
-at day three the breast and leg quality are between excellent and acceptable,
-at day fifth the breast and leg quality are between excellent and acceptable,
-at day seventh the breast and leg quality are between acceptable and unacceptable.
At seventh day of storage the meat were placed between acceptable and unacceptable due to odor and slime formation attributes

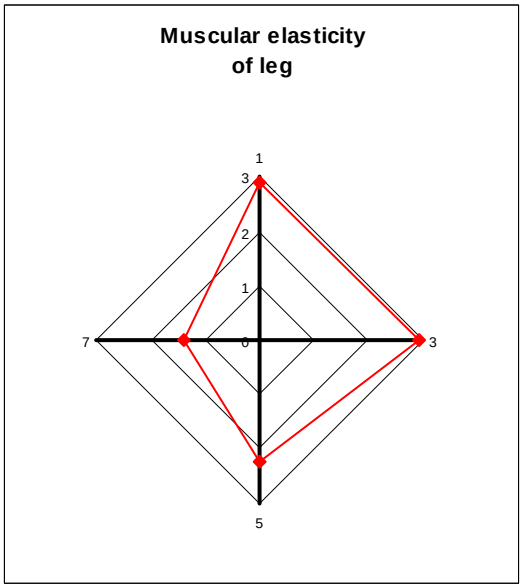

Figure 7. Variation of leg elasticity

4. CONCLUSIONS

Some of the sensorial attributes are common for raw anatomical chicken parts of leg and breast such as odor, skin color, and muscular elasticity. Other is characteristic to muscular fiber such as muscle color.
The most sensitive attributes for our assessors were odor and slime formation.

5. REFERENCES

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