

STUDY CONCERNING THE FEATURES OF BROILER CHICKEN DEPENDING ON FRESHNESS DEGREE

TURC B.¹, PETROMAN I.¹, FRAIU GIANINA¹, PETROMAN CORNELIA¹,
MARIN DIANA¹

¹ *Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timișoara, Faculty of Agricultural Management
e-mail: turcbogdan@yahoo.com*

Abstract: *Broiler chicken has a thin-sarcolema muscular fiber and a fine grain, and a little developed conjunctive tissue, which makes it very demanded on the market due to the high percentage of proteins (18.88-23.85%). Depending on the freshness degree, the broiler chicken meat pH varies within 5.8-6.1 in freshly slaughtered carcass and 6.2-6.5 in relatively fresh carcass; these physico-chemical features keep the same if the storage conditions are proper until it reaches the consumer.*

Keywords: *broiler chicken, meat, freshness degree*

INTRODUCTION

After poultry slaughtering in slaughterhouses, we can assess the quality of their carcasses (Durán-Meléndez: 104) focusing mainly on the following aspects that have an influence on the yield of the commercial hybrid exploited on the chicken farm:

- *conformation*, i.e. the distribution and amount of meat determining the carcass aspect;
- *carnation*, i.e. the correlation between the meat coverage degree and the amount of meat in the carcass;
- *fat layer*, i.e. the distribution of the fat tissues all over the carcass and particularly beneath the skin;
- *feathers*, that should not be present on the carcass;
- *meat, cuts and torn portions exposed and broken bones*, characteristic to improper post-mortem manipulation and/or processing, that affect the carcass aspect and determines lower classification depending on the location and portion affected (when on the breast or legs, the classification is very poor);
- *skin decolouring*, which can be slight (pinkish), slightly hinted (reddish), moderate (dark red or bluish), and that appear when the carcass is exposed to the air and its surface dries;
- *meat decolouring and bruises*, which lead to bad classification (intense yellow is not indicative of quality);
- *freezing defects*, i.e. decolouring and dehydration of the skin during storage (frostbite) which affects the produce.

Domestic birds are raised for meat, liver, fat, eggs, and feathers. We refer, below, only to meat and egg production and, in detail, to the factors affecting meat and egg production in poultry.

In poultry processing units, energy cost represents about 65-75% of the total slaughtering costs. Each processing unit should satisfy the necessary energy demands starting with the first stages of carcass production:

- slaughtering;
- bleeding;
- feather removal,

and for the production of the hot water necessary along the technological flow and for the housework water consumption [...].

No matter the number of birds slaughtered in a processing unit, it should consist of several working points for each technological phase. The subunits of a processing unit are:

- the slaughtering unit, where the slaughtering, the bleeding, the scalding, and the feather removal take place;
- the evisceration unit, where the extirpation of the uropygic organs, the evisceration of the carcasses, the detachment and processing of organs, the removal of the throat, oesophagus, and trachea, the extraction of the lungs, the cleansing and cooling of the carcasses, and the detachment of the necks take place;
- the carcass processing subunit, where the cutting of the carcasses into pieces, the deboning, the filleting, and the packaging of the meat take place;
- the meat storage subunit, with a freezing or quick refrigeration area, a freezing storehouse and a freezing storage;
- the cold factory, where cold compressors and repair workshops are;
- the materials and package subunit;
- the administrative subunit, made up of the staff's closets, sanitary units, and canteen;
- the computer hall, where the entire technological flow is monitored;
- the waste collecting subunit;
- the wastewater processing subunit, made up of a mechanical processing area, a chemical and mechanical processing area; in some slaughterhouses, the water from the two filtering is processed biologically until it reaches 98% purification and is ready to be recycled.

MATERIAL AND METHOD

In order to carry out this research, we have studied the chemical composition of the broiler chicken meat and the meat features depending the freshness degree in 50 broiler chicken carcasses, and the physico-chemical features in six lots of broiler chickens. All this was carried out on a broiler chicken farm aiming at finding optimum solutions for the broiler chicken hybrid that is economically profitable through the prism of slaughtering results.

RESULTS AND DISCUSSION

The chemical composition of the broiler chicken differs depending on the line, hybrid type, and age, as shown in Table 1. These data concern the muscles of the breast, thighs, and legs, as well as the entire carcass, the form it is most commonly marketed. We processed these data after carrying our study on a broiler chicken farm in the analysed area, and after analysing 50 carcasses processed and cut in a broiler chicken unit.

Table 1.

Chemical composition of broiler chicken meat

Category n= 50 carcasses	Area	Components (%)			
		Proteins	Lipids	Non-nitrate extracts	Ashes
Cut broiler chicken	Breast, thigh, leg	23.85±0.24	0.97±0.37	0.63±0.49	1.27±0.14
Uncut broiler chicken	Whole carcass	18.88±0.19	14.44±0.65	1.08±0.34	1.17±0.21

Source: our own data

Compared to mammal meat, poultry meat has a thin-sarcolema muscular fiber, a fine grain, and a less developed conjunctive tissue. In broiler chickens, meat is not marbled, and it can be processed as follows:

- eviscerated carcasses without head, throat, or legs;
- stomach, liver, and heart packed and introduced in the carcass;
- neck skin not detached from the carcass and folded backwards;
- carcass cut into breast, thighs, and small parts;
- carcass with detached or non detached head and legs;
- thighs detached from the carcass;
- breast with sternum, muscle layer, fat, and skin.

Depending on the thermal state of the broiler chicken, we can monitor the organoleptic and physico-chemical features of the meat; the most important ones are:

- the aspect:
 - carcasses should be kept clean, with no remains of intestinal content or mechanical impurities;
 - frozen broiler chicken should not be deformed through pressure;
 - the carcass surface should not be moist or sticky;
- the colour of the skin, which should be pink-reddish, characteristic to the species;
- the consistency of the muscles, which should be firm, elastic, without soft portions;
- the smell, which should come from clean frozen carcasses, with no reddish colour, and with white-yellowish, transparent defrosting liquid.

Broiler chicken from slaughtering and kept in proper conditions should be, if fresh, the following features (Table 2):

- reactive with sulphured hydrogen;
- easily hydrolysable nitrogen;
- pH.

Table 2.

Physico-chemical features of broiler chicken meat depending on the freshness state

Features	Freshness state		
	Fresh upon slaughtering	Relatively fresh	Altered
Easily hydrolysable nitrogen (mg NH ₃ /100 g meat)	< 25	25-35	>35
Meat pH	5,8-6,1	6,2-6,5	>6,5
H ₂ S reaction	negative	low positive	positive

Source: our own data

In the carcasses from the slaughtering in a licensed slaughterhouse of the 6 lots of broiler chicken we studied, the pH of the meat in 100 carcasses ranged between 5.7-6.0 and, 12 hours after slaughtering, between 5.5-5.6, which makes us draw the conclusion that the broiler chickens did not benefit from the minimum 12 hours of rest period before slaughtering to reduce the lactic acid level in the muscles. This explains the low level of the meat pH (lower than admitted one because of admitted mistakes), which is also common in refrigerated carcasses 12 hours after storage.

We need birds to benefit from the minimum 12-hour rest period before slaughtering.

CONCLUSIONS

We can see that, in the measurements made on whole carcasses (25 carcasses in all), the lipid share is large (14.44 ± 0.65), while the share of protein is only 18.88 ± 0.19 compared to the measurements made on cut portions whose share is larger and that make the meat 1st quality. We see that our results differ from the results of other authors, maybe because of the different genetics of the broiler chickens, of the different nutrition, and of the exploitation technology.

The lower values of the pH upon slaughtering and in frozen meat are caused by the fact that the broiler chicken were slaughtered right after reaching the slaughterhouse without benefiting from the rest that could reduce the content of lactic acid in the muscles because of the transport and of the stress.

To produce high quality meat, we need to take special measures in slaughterhouses because, though the meat has the proper chemical composition, physico-chemical alterations occur right after the slaughtering because the technology was not observed (changes of meat pH), with negative effects on both fresh and frozen meat.

REFERENCES

1. **BĂLĂȘESCU, M., BĂLTAN, GH., DASCĂLU, AL. & VANCEA, I.** (1980). *Avicultura*. București: Editura Didactică și Pedagogică
2. **MARIN, DIANA; PACALA, N.; PETROMAN, I.; PETROMAN, CORNELIA; UNTARU, RAMONA; HEBER, LOREDANA; CIOLAC, RAMONA;** Influence of age and weight at slaughter over meat quality in conditions of optimum ambient temperature, *Lucrari Stiintifice, Universitatea de Stiinte Agricole și Medicina Veterinara a Banatului, Timisoara, Seria I, Management Agricol*, 2012, 14, 2, pp 453-458
3. **MENKEN, MICHELLE.** (2005). *Organic Meat & Poultry Processing Basics*. St Paul, MN: Minnesota Department of Agriculture.
4. North American Meat Processors Association. (2007). *The Meat Buyer's Guide: Beef, Lamb, Veal, Pork and Poultry*. Hoboken, NJ: John Wiley & Sons, Inc.
5. **PETROMAN CORNELIA,** (2007), *Procesarea produselor agroalimentare*, Editura Eurostampa;
6. Cornelia Petroman, **Ioan Petroman**, Diana Marin, Ramona Ciolac, Loredana Văduva, Frequency of consumption of meat and meat products in Timis county, *Lucrări Științifice Zootehnie și Biotehnologii (Scientific Papers: Animal Science and Biotechnologies)*, ISSN 1221-5287, Editura Agroprint Timișoara, vol.46 (1), 2013
7. **PETROMAN I., NEAGU IULIANA, CULEA C.,** (2007), *Creșterea animalelor*, Editura Eurostampa;
8. **PETROMAN I., IANCU T.,** Trends on the poultry meat market, *Lucrări științifice Management Agricol, Facultatea de Management Agricol , U.S.A.M.V.B. Timișoara*, 2004
9. **VORWALD DOHNER, JANET.** (2001). *The Encyclopedia of Historic and Endangered Livestock and Poultry Breeds*. New Haven, CT – London: Yale University Press