

AGE INFLUENCE ON TURKEY MEAT QUALITY

Amelia Buculei¹, Ioan Gontariu¹

¹ Stefan cel Mare University, Suceava, Universitatii Strett, No. 13, 720229, Suceava, Romania
ameliab@usv.ro

Abstract

In turkeys meat represents the main production. It consists both of muscular mass and skin. Their most developed muscles are the pectoral ones, followed by the haunch and shank ones. Fat depositing capacity in turkey broiler is influenced by more factors such as: breed, fodder quality and quantity, husbandry system, environment temperature, age and sex.

According to the data obtained, the ammonia content is below the limit admitted by specialized literature, turkey meat complying with the quality organoleptical requirements in view of consumption.

Fat quantity in meat plays an important part in defining its quality characteristics. Intramuscular fat influences meat taste, consistency and succulence.

The analyses made on the two types of meat, young turkey meat and grown-up turkey meat respectively, pointed out that there are differences between them depending on age. We have noticed from the samples analyzed of the two types of meat that fat content increase depending on turkey age is lower (40g) in the young one than in the grown-up one (60g). Turkeys' and turkey hens' carcass quality is appreciated depending on weight, fattening condition and skin colour. For the first quality, depending on age and breed, the weight should be of minimum 3 kg for females and 3.5 kg for males, the fat layer should be thin, uniformly distributed on breast, back and tail, and the skin should be white-yellowish and downless. From the quantity and quality point of view meat production is influenced by breed, sex, age, plumage covering rate, breeding, treatments undergone, etc. 20 weeks is the most suitable age for turkeys to be turned to account, since more than 50% of their carcass weight consists of breast and legs, and meat is of high quality. At 30 weeks, heavy breed females reach a weight of 10-11 kg, while males of 20-22 kg.

Keywords: turkey meat, fat, organoleptical characteristics

1. INTRODUCTION

Turkey hens originate from Central and North America and were brought in Europe, first in England in 1524, then in France in 1532, at the beginning being known as "Indian hens" (Tartaseanu and collab., 2007). After having been domesticated, due to environment and feed change and selection applying as well, turkey hens have undergone a series of physiological and morphological modification (figure 1):

- dimension and body weight increase;
- muscular mass increase (especially pectoral muscles);
- thinner bones;
- increase of fodder assimilating capacity;
- increase of youth breeding capacity.

Husbandry system involves turkeys' breeding at large, both during day and night time when they sleep climbed in trees, sheds or coops. They procure themselves the most part of their feed (verdures, plant seeds, insects, worms, earth worms) whereas the breeder provides

them two cereal supplements only, in the morning and evening.

The semi-intensive system involves breeding in permanent bedding shelters equipped with paddocks in the open, fenced in wire net of 1.60 -1.80 m height. From spring to late autumn turkeys can be moved to summer camps equipped with shelters for unfavorable weather and canicular days. Camps should be mobile so as to be moved from place to place, on pastures or stubble fields. (Van I., 2005).

Grown-up turkeys do not need warmed shelters; they can be bred in husbandries outside in coops. Still mention should be made that the environment temperature influences fodder consumption and meat production implicitly.

In intensive breeding system farms, of large effectives, turkeys are looked after only in permanent bedding shelters equipped with automatic feeding, watering, lighting and airing systems. Grown-up turkeys are fed depending on their reproduction season and rest period (Stefanescu Ghe. and collaborators, 1999).

Turkeys' and turkey hens' carcass quality is appreciated depending on weight, fattening condition and skin colour. For the first quality, depending on age and breed, the weight should be of minimum 3 kg for females and 3.5 kg for males, the fat layer should be thin, uniformly distributed on breast, back and tail, and the skin should be white-yellowish and downless. Pectoral muscles have a higher content of proteins and lower of fats, of 1-4 % as compared to other muscles. From the quantity and quality point of view meat production is influenced by breed, sex, age, plumage covering rate, breeding, treatments undergone, etc. 20 weeks is the most suitable age for turkeys to be turned to account, since more than 50% of their carcass weight consists of breast and legs, and meat is of high quality. At 30 weeks, heavy breed females reach a weight of 10-11 kg, while males of 20-22 kg.

2. MATERIAL AND RESEARCH METHOD

Meat building up and fat depositing capacity varies significantly with breeds, still there are differences between them. Thus, under the same breeding conditions, there are great differences in breeds, for example, there are individuals which fattening tendency is more obvious than in others.

Fat depositing capacity in turkey broiler is influenced by more factors such as: breed, fodder quality and quantity, husbandry system, environment temperature, age and sex.

An increase of internal fat deposits was noticed at high rate breeding individuals which pace decreases at the age of 19 days when muscular mass build-up takes place. Fat layer thickness on the abdomen extremes differs; there are direct correlations between the average of extremes and abdomen fat quantity, fact which allows selection to be applied in order to reduce the fat quantity in the carcass. In the case of samples with organoleptical modifications on which fresh analyses are made only (determination of easily hydrolysable nitrogen, identification of hydrogen sulphide, etc), the modified portions are processed. The analyses made on the two types of meat, young turkey and grown-up

turkey, pointed out that there are differences between them depending on age.

In both cases the turkeys were bred in extensive (husbandry) system. The feeding of the two types of turkeys was made by both cereal mixture and corn flour. Vitamins and antibiotics were not used in their feeding. The breed to be tested was the common one. Husbandry system allows pasturing which is very good for turkeys' healthy and vigorous breeding. The young turkey is 49 days, while the grown-up is 84 days.

3. ANALYZING METHODS

Easily hydrolysable nitrogen determination (Indirect Titration)

Principle. Easily hydrolysable nitrogen under the form of ammonia is determined by releasing it by the help of a weak base, water steam drawing and capturing in an acid solution which is titrated by a sodium hydroxide solution.

Equipment, glassware:

- refrigerating distillation balloon;
- stands
- burette;
- technical balance.

Required reagents:

- sulphuric acid 0.1 n;
- sodium hydroxide 0.1 n;
- calcinated Mg oxide;
- paraffin oil;
- methyl red.

Distillation

Distillation has been made for 40 minutes. The distillate is "caught" in an Erlenmeyer flask where 10 cm³ of distilled water, 5-15 cm³ sulphuric acid 0.1 n and 2.5 drops of methyl red as indicator are put into.

Titration: when distillation ceases, the superior part of the refrigerant is washed by distilled water. The liquid from the collecting container is titrated by sodium hydroxide solution 0.1 n.

Fat Content Determination (Soxhlet Method)

Method Principle. The fat from working sample is extracted out by organical solvents and after the extraction solvent has been moved away, is weighed and expressed in percentage. To ensure complete extraction, the sample is previously subjected to a moderated heat

treatment by which the membrane destruction of fat cells is made, too.

Equipment and reagents:

- continuous extraction device, Soxhlet model, with 250 ml balloon, 150 ml extractor and refrigerant;
- electrical oven adjusted at the temperature of $103\pm 2^{\circ}\text{C}$;
- receptacles or envelopes made from filter paper;
- petroleum ether or ethyl ether (petroleum ether is preferred); the solvents used at extraction should not have any higher than 0.002% residuum during evaporation;
- anhydrous sodium sulphate or sand and fat-free wadding.

Working Method

A thin band of wadding is put on a celluloid card and treated. About 5 g of the sample to be analyzed are taken and spread like a necklace on the wadding band. The exact quantity to be worked with is weighed by analytical balance and noted down. An equal or higher quantity of anhydrous sodium sulphate is added on the weighed product. Then the wadding is rolled carefully so that no particle of product is left (while the wadding is being rolled, hands should not come into contact with the product) and it is put into the receptacle or envelope made from filter paper, previously numbered in black.

The working samples are put into oven for 6 hours at the temperature of $103\pm 2^{\circ}\text{C}$. Each envelope or receptacle is introduced into the extracting device, and 150 ml of extracting solvent is put into a corresponding balloon (to ensure siphoning, it is necessary to have inside the extraction balloon a solvent quantity equal to at least one and half time the extractor capacity). The extraction plant is assembled, the continuous circuit of cold water is set in action to refrigerants and distillation is adjusted so that the dropping rate should provide 10-12 siphoning per hour. The extraction is completed after 6 hours of continuous distillation under the above mentioned conditions. Cessation of the operation can be checked by the help of a filter paper on which 1-2 drops of the siphoning solvent are dripped (after evaporation, the filter paper should not be fatty stained).

When extraction ceases the envelope is moved away from extractor and gradually the whole solvent quantity from the balloon as well. With that end in view, when the extractor is almost filled (before siphoning) the plant is opened and petroleum ether (solvent) is collected from extractor into a container.

The plant is disassembled and the balloons of extracted fat are kept for 10-15 minutes more on bath to remove away any possible solvent traces. Then the balloons are wiped dry at exterior by filter paper, and then put into oven at $103\pm 2^{\circ}\text{C}$ where they are kept for 1 hour.

After cooling in the drying device each balloon is weighed and the drying is repeated for 15-30 minutes to the constant weight. To avoid fat oxidation during drying it is recommended for this operation to be made at a temperature no higher than $103\pm 2^{\circ}\text{C}$.

4. RESULTS AND DISCUSSION

Easily hydrolysable nitrogen

$$= \frac{0,0017(V_1 - V_2)}{m} \cdot 100(\text{mg} / 100\text{gr})$$

Where:

0.0017= ammonia quantity in g corresponding to 1 cm^3 of sulphuric acid 0.1 n

V_1 = sulphuric acid volume 0.1μ introduced into collecting container in cm^3

V_2 = sodium hydroxide solution volume used at titration in cm^3

m= product mass to be determined in grams

Easily hydrolysable nitrogen determination of young turkey meat:

Easily hydrolysable

$$\text{nitrogen} = \frac{0,0017(V_1 - V_2)}{m} \cdot 100(\text{mg} / 100\text{gr}) =$$

$$\frac{0.0017(15 - 14)}{5} \cdot 100 = 0,034$$

Easily hydrolysable nitrogen determination of grown-up turkey meat:

Easily hydrolysable

$$\text{nitrogen} = \frac{0,0017(V_1 - V_2)}{m} \cdot 100(\text{mg} / 100\text{gr}) =$$

$$\frac{0.0017(15 - 14.8)}{5} \cdot 100 = 0,068$$

Easily hydrolysable nitrogen content evolution
Turkey age in days
Value of Easily hydrolysable nitrogen content

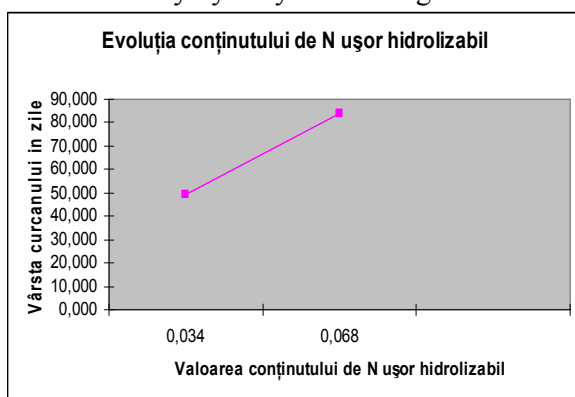


Figure 1. Easily hydrolysable nitrogen content evolution

Specialized literature considers that up to 20 mg ammonia/100 g muscular tissue the meat is fresh, whereas above 25 mg ammonia/100 g muscular tissue is at least in incipient alteration state.

In the case of the determinations of easily hydrolysable N content, made on the two meat samples, it may be noticed that easily hydrolysable nitrogen differs depending on turkey age (0.034 mg in young turkey meat and 0.068 mg in grown-up turkey meat).

According to the data obtained, the ammonia content is below the limit admitted by specialized literature, turkey meat complying with the quality organoleptical requirements in view of consumption.

Fat content is calculated correspondingly to the relation

$$\text{Fat}\% = \frac{m}{m_1} \cdot 100; \quad \text{where:}$$

➤ m = extracted fat quantity in g. This results from the difference between the balloon weight with extracted fat after drying and the weight of the empty balloon (without)

➤ m_1 = product quantity to work with. ^{s:}

Fat content determination of young turkey meat:

$$\text{Fat}\% = \frac{m}{m_1} \cdot 100 = \frac{2}{5} \cdot 100 = 40 \text{ g}$$

Fat content determination of grown-up turkey meat:

$$\text{Fat}\% = \frac{m}{m_1} \cdot 100 = \frac{3}{5} \cdot 100 = 6 \text{ g}$$

Fat content evolution
Turkey age in days
Fat content value

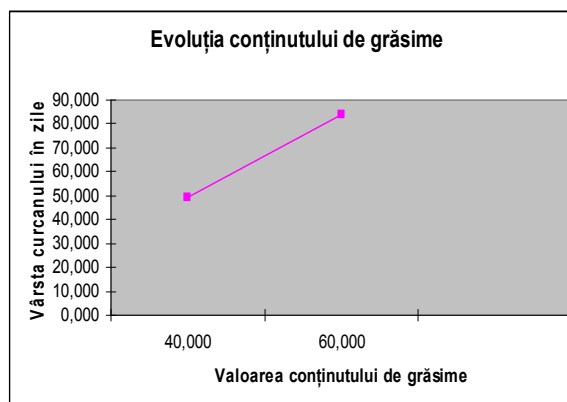


Figure 2. Fat content evolution

Fat quantity in meat plays an important part in defining meat quality characteristics. Intramuscular fat influences meat taste, consistency and succulence.

5. CONCLUSIONS

The analyses made on the two types of meat, young turkey meat and grown-up turkey meat respectively, pointed out that there are differences between them depending on age. Specialized literature considers that up to 20 mg ammonia/100 g muscular tissue the meat is fresh, whereas above 25 mg ammonia/100 g muscular tissue is at least in incipient alteration state. We have noticed from the samples analyzed of the two types of meat that fat content increase depending on turkey age is lower (40g) in the young one than in the grown-up one (60g).

6. REFERENCES

- [1] Stefanescu Ghe and collaborators, "Poultry Breeding in Small and Medium Farms", Ceres Publishing House, Bucharest, 1999
- [2] Tartaseanu R. and collaborators, "Turkeys' Breeding", Alex-Alex Publishing House, Bucharest, 2007
- [3] Van I., "Turkey Hens' Breeding", Total Publishing House, Bucharest, 2005