RESEARCH ON THE *IN VIVO* VARIATIONS OF THE pH VALUES, OXIDIZED LIPIDS AND SOLUBLE PROTEIN CONTENT OF FOOD RATIONS BASED ON TURKEY MEAT

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Abstract: *The purpose of this study is to analyze the changes of pH values, soluble protein and oxidized lipid content in diets based on turkey meat after their ingestion. The biological material used was represented by mini pigs female, bred Göttingen, which were alimented with diets that had in their composition turkey meat and after ingestion the stomach contents was collected in kinetics. Turkey meat used was represented by the Pectoralis major muscle. Analyzing the data on the pH variation between 15 and 330 minutes after ingestion, there was observed a downward trend of the values, the maximum value being achieved in the first 15 minutes (6.10) and the minimum was of 1.28 at 240 minutes. In terms of protein content it has been observed a reverse trend compared to the one of pH from 0.12 mg / ml and reaching a maximum of 0.62mg / ml. The obtained results analysis indicates that as the pH decreases the amount of soluble protein increases, the animal factor having a great influence. The content of oxidezed lipids decreases with the digestion time progress.*

Keywords: *gastric pH, protein content, oxidized lipids, diet, turkey meat*

1. Introduction

Lipids play an important role in the diet because the linoleic and linolenic acids are present as polyunsaturated [1].

Proteins are basic and functional components, influencing the textural, sensory and nutritional properties [2]. Protein solubility is one of the most important functional propertie with applications in food industry. These properties are influenced by the environmental pH and processing temperature.

The chemical composition of meat has a considerable impact on its quality because it determines the properties thar are valued by consumers.

In the current context, lipid and protein daily consumption is two times higher at the meat loyal consumer compared with the ones of diversified foods [3].

2. Material and methods

Materials

The biological matherial used was represented by 5 mini pigs females, of Gottingen breed (identified as A, B, C, D, E, F), equipped with equipped with a permanent cannula at the out of the stomach. Stomach content was harvested in kinetics at 15, 45, 90, 150, 330 minutes after ingestion.

The surgery of cannulas placement was conducted with three weeks before the experience. With 24 hours before performing the experiment food

administration was interrupted and the access to water was halted in the morning of the experience. Rations were administered after performing a stomach emptying.

The turkey meat used was the muscle *Pectoralis major* fresh, conserved 2 days in vacuum at +4° C. In order to be use the meat was subjected to grinding, weighing, vacuum operations and boiling in a *baie marie* at a temperature of 72 ± 0,3° C to achieve in the interior a temperature of 70 ± 1° C for 30 minutes. Preparation of food rations was done by mixing (15 seconds at minimum speed, 45 seconds at medium speed) various ingredients: boiled turkey meat (120g), sunflower oil (40 mL), cellulose (7 g), starch (70 g), egg yolk (3 g), pectin (1 g), water (30 mL).

pH measurements

The pH was determined using a Hanna digital pH-meter.

Soluble protein content measurement

The soluble protein content was determined through the Bradford method. The Bradford colorimetric method is based on the absorbance reading of dye Coomassie Brilliant Blue G-250 which forms a blue color in acid environment by binding with the proteins. 1 g of stomach content was stirred with 10 mL phosphate buffer 0,025 M (K_2HPO4 + KH_2PO4) and kept at +4° C for 12 hours. The prepared samples were centrifuge, 100 µL of the obtained supernatant was sampled and put in contact with 5 mL Bradford solution prepared in advance (1mL Bradford reagent + 4 mL deionized water). The reading was performed at 595 nm using a spectrophotometer against a blank consisting in phosphate buffer. Previously it will be prepared a standard range consisting in a bovine serum albumin solution of varying concentrations (0; 0.05; 0.1; 0.2; 0.5; 0.75; 1 mg/mL) to determine the extinction coefficient that will be used to determine the samples concentrations.

Oxidezed lipid content measurements

The content in oxidezed lipids was determined by the TBA test, using a spectrophotometer. This method is based on the carbonyl dosage from the decomposition of the lipid hydroxiperoxides.

In acid, aldehydes such as malondialdehyde (MDA) can react with acids to form a tiobarbituric pink complex that has a maximum absorbance at 535 nm.

All the samples were made in duble.

3. Results and discussions

The analysis of gastric pH values changes showed, in general, a downward trend (table 1).

The pH values determined after 15 minutes from the moment of food rations administration ranged around 6, the only exception was observed in the case of the samples colected from the mini pig E.

The maximum value was determined at the mini pig A at the sampling carried out at 45 minutes (6.67), while the minimum was 1.22 (240 minutes) at the animal B.

Table 1

Evolution of gastric pH

Time (min)	pH values				
	Mini pig A	Mini pig B	Mini pig C	Mini pig D	Mini pig E
15	6.6	5.82	6.1	5.64	4.19
45	6.67	4.97	6.05	4.0	4.64
90	6.41	3.47	5.84	3.77	3.49
150	6.33	1.93	5.41	2.63	3.16
240	5.3	1.22	5.06	1.82	3.14
330	4.6	2.02	4.94	4.11	3.03

As the duration of digestion increases up to 330 minutes, the pH decreases, except the values determined at 330 minutes at the mini pig B (2.02), which was higher than that obtained at 240 minutes after ingestion (1.22) and the one from 330 minutes from the mini pig D

(4.11) compared to the one from 240 minues (1.82).

Protein solubility is crucial in the processing of meat. The amount of soluble protein increases with the digestion period progress until a certain moment (90 minutes) after ingestion. After this moment it decreases, being recorded exceptions depending on the animal.

The maximum of this parameter was obtained at the mini pig C at 90 minutes after ingestion (0.62 mg/mL) and the minimum value was recorded at 330 minutes at the animal B (0.12 mg/mL) (table2).

Table 2

The soluble protein content evolution

Time (min)	Soluble protein content (mg/mL)				
	Mini pig A	Mini pig B	Mini pig C	Mini pig D	Mini pig E
15	0.24	0.27	0.27	0.23	0.21
45	0.26	0.24	0.17	0.28	0.21
90	0.26	0.34	0.62	0.33	0.29
150	0.22	0.31	0.28	0.3	0.26
240	0.31	0.19	0.21	0.2	0.22
330	0.22	0.12	0.21	0.2	0.2

It is generally observed that the soluble proteins are found in higher levels after 15 minutes of ingestion compared to the values determined at 330 minutes.

The quantity of oxidized lipids shows great variations dependind on the collection time and animal (table 3).

In general it can be observed the fact that the content of oxidezed lipids decreases with the digestion time progress. The animal factor plays a crucial role in the process.

Table 3

The oxidized lipid content evolution

Time (min)	Soluble protein content (eq MDA/g tissue)				
	Mini pig A	Mini pig B	Mini pig C	Mini pig D	Mini pig E
15	2.22	1.39	1.79	1.60	0.66
45	1.58	2.14	0.99	1.60	1.84
90	2.11	1.20	0.85	1.23	1.04
150	0.58	1.23	1.15	0.92	0.71
240	0.73	0.71	0.82	0.73	0.59
330	0.88	0.57	1.04	0.92	0.73

The minimum values was obtained at the mini pig B (0.57 eq MDA/g tissue) at 330 minutes after ingestion and the maximum was determined at the mini pig A at 15 minutes (2.22 eq MDA/g tissue).

4. Conclusion

With the progress of digestion time, the pH value of the stomach content drops to a certain point after which it increases moderately.

Soluble protein contents of the digesta, obtained by the administration of diets based on turkey meat, grows with the digestion time duration to a certain point and then decreases.

The content of oxidezed lipids decreases with the digestion time progress.

The animal factor has a great influence, being observed a variation of the indicators determined by it.

This study was performed using this biological material in order to observe the changes that occur in the stomach, being known that digestion in pigs is similar to that of humans.

5. References

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