SUMMARY

The importance of *Myocastor coypus* (nutria) breeding at a national level and the valorisation of the meat of these animals as the main product obtained can be highlighted by the following aspects:

– It can be reared in any region, being an animal generally resistant to disease but requiring certain rearing conditions relating to the absence of loud noise, temperatures below 0°C for long periods, strong air currents, and the provision of a predominantly moist diet.

– They reach sexual maturity early, at 4-6 months of age, and are highly prolific, capable of producing prolific offspring throughout the year.

– Carcass meat production differs according to age at slaughter and sex, with carcass weights of slaughtered animals ranging from 2.29 kg to 3.08 kg. From a nutritional point of view, the quality of the meat is not inferior to rabbit, beef, or poultry meat, with a high protein content of 80-82% complete protein and a low-fat content.

For these reasons, nutria can be an alternative or additional solution for livestock farmers to exploit a species of interest for both fur and higher meat value.

In this context, the research carried out was aimed at characterising the physiological status (haematological determinations) of the species *Myocastor coypus*, followed by the characterisation of the meat obtained from the specimens studied in terms of physical quality parameters and chemical parameters (to describe the nutritional value of the meat).

The PhD thesis entitled "*Characterisation of quality parameters and nutritional value of nutria meat (Myocastor coypus)*" is structured in two parts, totalling 9 chapters, containing 37 tables and 23 figures, ending with the conclusion section and the list of the bibliography studied comprising 196 bibliographical references.

The first part of the thesis, the bibliographical study, covers in its four chapters a synthesis of the national and international literature on the description of the species Myocastor coypus (chapter 1), general aspects of meat quality (chapter 2), and the qualitative characteristics of nutria meat from a technological, physicochemical and nutritional perspective (chapters 3 and 4).

The second part of the thesis, the personal contributions, presents in the five chapters the organisation of the research, the experimental design, the aim, the objectives and the framework in which the experiments and determinations were carried out (chapter 5). This part also presents the methodology of the research, starting from the biological material analysed to the methods of carrying out the analyses and determinations proposed in the study (chapter 6). The following chapters (chapters 7, 8 and 9) present the results obtained from the proposed determinations: results of the haematological examination, yields obtained at the slaughter of the nutria specimens, characterisation of the physical parameters of the nutria meat (determination of instrumental colour, determination of texture expressed through Warner-Bratzler shear force and textural descriptive parameters, dynamics of pH evolution), chemical composition and fatty acid content.

The biological material for the research was 10 males and 10 females of the species Myocastor coypus, reared in extensive systems in individual cages.

Regarding the results of ***haematological examination***, in the nutria blood samples erythrocyte sizes ranging from 4.72 - 5.23 µm were identified; neutrophils showed colourless or slightly eosinophilic cytoplasm, with multiple, small, fine, purple granules, with a nucleus consisting of 2 - 5 lobes and blood smear sizes ranging from 14 - 15 µm. Eosinophils ranged in size from 9 - 11 µm, with a bilobed nucleus and a cytoplasm filled with numerous large, bright orange-red granules, and ruptured eosinophils were recorded on the blood smear. As for the lymphocytes identified on the blood smear, two types were distinguished: large and small, the majority being represented by small lymphocytes. The results obtained from the haemogram of the nutria species (*Myocastor coypus*) showed haematocrit values of 39.15%, an erythrocyte count of 4.20 x 10^3 µl and 9.2 x 10^3 µl leucocytes. Blood haemoglobin was at a concentration

of 12.5 g/dl, with a mean erythrocyte volume (MEV) of 93 fl, a mean erythrocyte weight per amount (HEM) of 29.7 pg and a mean red blood cell concentration (RBC) of 31.9 g/dl.

The results for the ***instrumental colour*** of the meat samples showed for the anatomical region of the shoulder muscles very similar mean for lightness values (L*), 27.28 ± 0.98 for muscle samples from males and 27.33 ± 1.53 for females. The values recorded for the red-green coordinate (a*), were higher in meat samples from females, 11.02 ± 1.17, comparatively higher values in muscle samples from females were also found for the yellow-blue coordinate (b*). Analysing the results on colour expression in nutria meat from hind leg muscles, higher values in L* (lightness) were observed in females, 30.54 ± 3.60 compared to males 25.51 ± 0.16. Increased differential values were found in the b* coordinate for females 14.27 ± 1.29, compared to males 10.98 ± 1.09. Similarly in the case of red-green coordinate a*, higher values were recorded for the female samples, 12.77 ± 2.52, compared to males, 10.14 ± 0.67. In the expression of the colour of the *Longissimus dorsi* muscle, the values obtained were close between males and females concerning the three colour coordinates, the differences printed by the sex of the animal being maximum of 1.03 units in the case of the L* parameter.

Another parameter analysed was meat ***texture*** determined by applying Warner-Bratzler forces for all three anatomical regions of nutria meat, both male and female. The shoulder muscles showed higher Warner-Bratzler shear forces for females (20.515 N/cm^2) compared to males (17.351 N/cm^2), also in the *Longissimus dorsi* samples, where females showed higher shear forces (19.92 N/cm^2) compared to males (13.615 N/cm^2). At the opposite pole, the mean Warner-Bratzler forces obtained on the hind muscles in males, 17.896 N/cm^2, were close to those obtained in females, 17.206 N/cm^2.

In terms of describing the textural profile (hardness, cohesiveness, adhesiveness, gumminess, elasticity and chewiness) of nutria meat on the three anatomical regions, the shoulder muscle sampled from males and females showed average hardnesses of 29.99 ± 9.26 N and 15.70 ± 6.12N, respectively. The cohesivity of the samples from the hind muscles showed subunit mean values, higher in the case of samples from males (0.38 ± 0.11), compared to those from females (0.34 ± 0.13). In the textural profile of the hind muscles, a higher hardness was observed in the samples from the male carcass, 23.05 ± 5.16N, compared to the same region in the female carcass, 22.68 ± 9.48 N. Cohesivity showed relatively close values for the samples analysed from the two categories studied (males and females) for the anatomical hind leg region, with mean results of 0.43 ± 0.09 for females and 0.45 ± 0.05 for males. The musculature of the *Longissimus dorsi* region was described texturally by mean values for the hardness of 24.28 ± 9.70 N for male meat samples and 22.54 ± 3.64 N for female samples, while the cohesiveness showing subunit mean values, higher for female meat (0.47 ± 0.07) compared to males (0.43 ± 0.07).

A final physical parameter analysed was the acidity of the meat expressed in pH units. In males, at 0.25 hours post-slaughter, meat in the pre-rigour mortis phase, harvested from the anatomical regions of interest - hind leg, shoulder, *Longissimus dorsi* - was characterised by pH values averaging 5.72 ± 0.06, 5.90 ± 0.06 and 5.80 ± 0.06 respectively. The pH dynamics showed an increase at 12 and 24 hours in the muscles of the shoulder and *Longissimus dorsi*, while in the muscles of the hind leg, the pH decreased to 5.804 ± 0.09 at 24 hours after slaughter. The pH results for muscle samples from females were higher at 0.25 hours after slaughter compared to samples from males, ranging from 5.90 ± 0.08 (*Longissimus dorsi*) to 6.10 ± 0.06 (shoulder muscles). The pH dynamics showed a decrease in the first 12 hours after slaughter to pH values of 5.80 and 5.81, respectively, followed by a slight increase, with the ultimate pH recorded at 5.90 and 5.80, respectively.

The technological parameters monitored were yield after slaughter, boiling losses and water holding capacity. Slaughter yields were between the minimum and maximum ranges of 47.06 - 55.42% for females and 48.3 - 56.48% for males.

The boiling losses recorded for the nutria meat samples were described by mean values ranging from 13.66 ± 1.642% (hind muscle in males) to 20.26 ± 1.178% (*Longissimus dorsi* muscle in females). Compared by anatomical regions, the highest boiling losses were recorded for the *Longissimus dorsi* muscle, followed by the hind muscle and finally the shoulder muscle. The water holding capacity of nutria meat in the research was described by average values ranging from 48.08 ± 4.753% *(Longissimus dorsi*

musculature in females) - 74.51 ± 5.078% (*Longissimus dorsi* musculature in males). In comparison between batches, for all three anatomical regions studied (shoulder, hind leg, and *Longissimus dorsi*), the superiority of the mean values of water holding capacity was observed for meat from male specimens compared to meat from female nutrias.

The results on the chemical composition of nutria meat followed the moisture, protein, lipid, mineral, and fatty acid contents of the lipid composition. The moisture content of the samples of nutria meat was within the range 70.48 ± 0.263 - 73.05 ± 0.581%, with lower values in the *Longissimus dorsi* muscle in both male and female samples, followed in ascending order by the hind muscle and the shoulder muscle. The percentage of protein in nutria meat ranged from 20.85 to 23.65, with mean values ranging from 21.54 ± 0.466% to 22.21 ± 0.350%, with the *Longissimus dorsi* muscle having the highest protein content.

Another parameter determined was the percentage of fat, where higher values were observed in muscle samples from females (1.80 ± 0.098%) compared to males (2.22 ± 0.282%). The maximum fat content was determined in the shoulder muscles, with samples from females containing a higher amount of fat, followed in descending order by samples from females (hind muscle and *Longissimus dorsi*), and finally samples from males of hind leg and *Longissimus dorsi*. The mineral content determined in the analysed samples from the musculature of the nutria was in the range of 0.91 ± 0.056% and 1.08 ± 0.083%. As an overall picture, the meat of male nutria showed a higher content of mineral substances compared to muscle from females.

A final determination was the quantification of 12 fatty acids in the lipid composition (SFA: C14:0 = myristic acid; C16:0 = palmitic acid; C17:0 = heptadecanoic acid; C18:0 = stearic acid; NMFA: C15: 1 = 13-methyl tetra decanoic acid; C16:1 = palmitoleic acid; C16:1ω9 = 9-Hexadecenoic acid, methyl ester, (Z); C18:1ω9 = trans oleic acid; C18:1ω7 = cis vaccenic acid; AGPN: C18:2ω6 = linoleic acid; C18:3ω3 = α-linolenic acid; C20:4ω6 = arachidonic acid). Among the quantified saturated fatty acids in the lipid composition, the highest level was found for C16:0 (palmitic acid), followed by C18:0 (stearic acid). The range of mean values for palmitic acid was defined by a minimum limit of 35.888 ± 0.075% (shoulder muscle in males) and a maximum limit of 44.788 ± 0.072% (hind leg muscle in males). For stearic acid (C18:0), the range limits of the mean values for the samples analysed were represented by the minimum value of 8.040 ± 0.046% for the Longissimus dorsi sample in males and the maximum of 16.594 ± 0.055% in the hind leg muscle sample in females. At the opposite pole, heptadecanoic acid (C17:0) showed the lowest mean values quantified in the samples analysed, values in the range of 0.274 ± 0.037% (*Longissimus dorsi* in males) and 0.880 ± 0.048% (*Longissimus dorsi* in females).

As for the monosaturated fatty acids, the quantitative superiority of the monosaturated fatty acid C18:1ω9 among the five quantified MFAs was noted, with its values being within the range of 10.932 ± 0.038% (in leg muscles in males) and 17.954 ± 0.048% (in shoulder muscles in males). Quantitatively, it was followed by C16:1ω9 acid, which showed mean values in the range 4.268 ± 0.059 - 9.066 ± 0.048%, corresponding to samples of hind leg muscles in females and *Longissimus dorsi* muscles in females.

The highest proportion of polyunsaturated fatty acids determined was occupied by C18:2ω6 (linoleic acid), which recorded means defined by a range between a lower limit of 14.382 ± 0.057% of total fatty acids in *Longissimus dorsi* muscle in females and an upper limit of 20.476 ± 0.049% in shoulder muscle in females. At the opposite pole, the lowest amounts of PUFA were identified in C18:3ω3 (α-linolenic acid), i.e. predominantly in the hind leg muscles of both males (0.240 ± 0.037% of total fatty acids) and females (0.242 ± 0.037% of total fatty acids).