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Evaluation of Quality Characteristics of Rabbit (*Oryctolagus cuniculus*) Meat

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Authors' Contribution
AHS and MAJ conceived and designed the research experiment as part of the M.Phil degree study. GSB and GBK were responsible for compiling and organizing the research data. TAK performed the statistical analyses. HKK conducted the experimental work and trials under her M.Phil research program. AS and KBS assisted with the experimental procedures.

Key words
Rabbit meat, Meat quality, Physicochemical properties, Nutritional composition, Chicken meat comparison

ABSTRACT

Rabbit meat, recognized globally for its nutritional value, offers significant potential as an alternative source of animal protein, especially in the context of growing food demand. This study was conducted to evaluate the quality characteristics of rabbit (*Oryctolagus cuniculus*) meat and compare them with those of chicken meat. Meat samples from male (n=10) and female (n=10) rabbits, along with chicken meat samples (n=10), were randomly collected from the local market in Hyderabad and analyzed at the Department of Animal Products Technology, Sindh Agriculture University, Tandojam. The samples were assessed for physical properties (pH, water holding capacity, drip loss, cooking loss) and chemical characteristics (moisture, protein, fat, ash, glycogen). Dressing percentage was higher ($P<0.05$) in male (62.22%) and female (60.00%) rabbits compared to chicken (57.15%). Chicken meat showed significantly higher pH value, WHC, drip loss, and cooking loss than rabbit meat. Moisture content was significantly higher ($P<0.05$) in chicken (73.50%) than in rabbit meat (70.81% in males; 69.91% in females). However, protein, fat, ash, and glycogen contents were significantly higher in rabbit meat, with protein (23.15% in females; 22.90% in males), fat (4.08%; 3.29%), ash (1.64%; 1.56%), and glycogen (1.36%; 1.30%) compared to chicken meat (protein: 22.11%, fat: 2.15%, ash: 1.20%, glycogen: 1.00%). The calorific value of rabbit meat (134.52 kcal/100g in females; 127.77 kcal/100g in males) was also significantly higher than that of chicken meat (111.79 kcal/100g). These findings suggest that rabbit meat is a nutritionally superior and viable alternative to conventional poultry meat.

INTRODUCTION

Globally, meat forms a significant component of the human diet, with notable implications for health, economic development, and cultural practices (Pighin *et al*., 2016). Among the various sources of animal protein, the domestic rabbit (*Oryctolagus cuniculus*) has emerged as a promising candidate for sustainable meat production, especially in developing countries. Rabbit farming offers several advantages including low production cost, small body size, short gestation period, high reproductive rate, rapid growth, and adaptability to diverse environmental conditions.

Rabbit meat is highly nutritious (Zotte and Szendrő, 2011). Factors such as genetics, sex, age, maternal effects, and breeding systems, along with environmental influences like temperature, can significantly affect growth performance and carcass traits in rabbits. In many low-income countries, the high cost of conventional meats such as chevon, lamb, pork, and poultry limits accessibility for low economic population. Additionally, farm animal production often requires considerable investment in infrastructure and feed, further increasing the cost of animal protein.

Despite its nutritional benefits, rabbit meat is less commonly available in the market compared to beef, poultry, fish, lamb, and pork. However, there is growing interest in promoting rabbit farming as an economically viable source of meat, particularly in resource-poor communities (Abu *et al*., 2008). Rabbit meat is lean, rich in high biological value protein, and considered a healthy alternative due to its low sodium and high phosphorus

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content, as well as being an excellent source of B-vitamins (Zotte, 2014; Hernández and Gondret, 2007).

Meat consists primarily of protein, fat, water, minerals, and trace amounts of carbohydrates (Heinz and Hautzinger, 2007). However, its quality can deteriorate due to enzymatic activity, microbial spoilage, lipid oxidation, and degradation of proteins and other biomolecules (Berkel *et al*., 2004). The domestic rabbit, as a micro-livestock species, is capable of efficiently converting fibrous feedstuffs and organic waste into high-quality meat (Irlbeck, 2001; Finzi, 2008).

Carcass quality traits such as tenderness, colour, and juiciness are essential for consumer acceptance and are influenced by genetics, selection for growth, housing conditions, transport stress, and human-animal interactions (Piles, 2000; Maria *et al*., 2006; Verga, 2000). In developed countries, increasing meat consumption has led to a growing focus on the nutritional and functional properties of meat products (Alonso *et al*., 2006). Given its nutritional profile and adaptability, rabbit meat represents a valuable yet underutilized resource in meeting global protein demands.

MATERIALS AND METHODS

Raw material

Approximately six-month-old rabbits (*Oryctolagus cuniculus*) and broiler chickens (market age) were procured from the local market in Hyderabad, Pakistan. Rabbits and broilers were slaughtered following the Halal method. The carcasses were then kept under hygienic conditions (at 4 °C) in the Department of Animal Products Technology, Faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University, Tandojam, for further processing and analysis.

Sample preparation and analysis

All meat samples were divided into three groups i.e. Group-A (male rabbits), Group-B (female rabbits) and Group-C (broiler chicken) each groups has 10 samples. The meat samples were examined for physical parameters such as water holding capacity (WHC), pH value, drip loss and cooking loss. The macro-nutrients like moisture, protein, fat, ash and glycogen were also analyzed. Each meat sample was analyzed in duplicates.

Physical analysis

WHC, pH value, cooking loss, and drip loss of the meat samples were determined using the methods described by Wardlaw *et al*. (1973), Ockerman (1985), Kondaiah *et al*. (1985), and Sen *et al*. (2004), respectively. Each physical parameter was measured according to the specific protocols established in these references to ensure accuracy and reproducibility.

Chemical analysis

The chemical composition of the meat samples was analyzed for moisture content, total solids, protein, fat, and ash contents. Moisture, total solids and ash contents were determined following the standard procedures outlined by the Association of Official Analytical Chemists (AOAC, 2000), while, protein was analyzed using the Kjeldahl method and fat through ether extraction. Additionally, glycogen content in the meat samples was measured by the spectrophotometric method described by Kemp *et al*. (1953), which involves the preparation of the sample and subsequent absorbance reading for quantification.

Calorific value

The calorific value of the meat samples was calculated based on the proximate composition obtained from the chemical analysis. The calculation was done using following formula.

K.calories per 100 grams = ((% protein × 4) + (% fat × 9) + (% carbohydrates × 4))

This formula accounts for the energy contribution of proteins, fats, and carbohydrates to estimate the total caloric content of the meat.

Statistical analysis

The observed data was subjected to statistical analysis using Analysis of Variance (ANOVA) to compare the means among different groups. When significant differences was noticed, the least significant difference (LSD) test was applied as a post-hoc procedure to identify which specific groups differed significantly. The statistical analyses were performed using Student Edition of Statistix, version 8.1 software.

RESULTS

Physical characteristics

Table I shows the dressing percentage varied significantly among the three meat sources. Male rabbits showed the highest dressing percentage at 62.2%, followed by broilers at 60%, and female rabbits at 57.1%. Statistical analysis revealed a significant difference ($p<0.05$) between all groups, indicating that sex and species affect dressing percentage in meat animals.

The pH of meat samples showed significant variation among the three sources. Poultry meat recorded the highest pH at 5.94, which was significantly higher than both male (5.51) and female (5.55) rabbit meat. However, non significant difference in pH was found between male and female rabbit meats. This suggests species-specific differences in postmortem muscle metabolism affecting meat acidity.

WHC, an important attribute for meat juiciness, also varied significantly. Chicken meat exhibited the highest WHC (70.0%), while male and female rabbits showed similar values (66.33% and 66.15%, respectively), which were statistically lower than poultry meat but not different from each other.

Cooking loss percentages were significantly different among the meat types. Chicken meat experienced the greatest loss at 37.1%, whereas male and female rabbits lost 30.1% and 29.7%, respectively. The loss between the two sexes of rabbits was not statistically significant, but cooking loss in chicken meat was significantly higher.

Drip loss, which affects meat yield and appearance, was significantly higher in chicken meat (3.9%) compared to male (2.74%) and female (2.78%) rabbit meats. No significant difference was observed between male and female rabbits, indicating similar muscle fluid retention postmortem.

Table I. The values of meat of male rabbit, female rabbit, and chicken.

Parameters	Chicken (n=10)	Rabbit		
		Male (n=10)	Female (n=10)	SEM ± =
Dressing (%)	60.00	62.20	57.10	0.0324
pH	5.94	5.51	5.55	0.0255
WHC (%)	70.00	66.33	66.15	1.5565
Cooking loss (%)	37.10	30.19	29.66	2.5131
Drip loss (%)	3.90	2.74	2.78	0.1850
Moisture content (%)	73.50	70.80	69.90	0.5565
Protein content (%)	22.10	22.90	23.10	0.2565
Fat content (%)	2.15	3.29	4.08	0.2165
Ash content (%)	1.20	1.64	1.56	0.0456
Glycogen content (%)	1.00	1.36	1.30	0.0356
Calorific value (kcal. /100 g)	111.70	127.70	134.52	1.7565

Chemical characteristics

Table I also shows that moisture content was significantly higher in poultry meat (73.5%) compared to male (70.8%) and female rabbits (69.9%). The moisture content of male and female rabbits was statistically similar, showing consistent water content between sexes within the species.

Protein content was highest in female rabbit meat (23.1%), followed by male rabbit (22.9%) and poultry (22.1%). Although the difference between male and female rabbits was not statistically significant, poultry meat had significantly lower protein content compared to both rabbit groups.

The fat content showed significant variation across all meat types. Female rabbits had the highest fat percentage (4.08%), followed by male rabbits (3.29%) and chicken (2.15%), indicating sexual dimorphism in fat deposition in rabbits and generally leaner meat in poultry.

Ash content, reflecting total mineral content, was highest in male rabbits (1.64%), followed by female rabbits (1.56%) and chicken (1.2%). Statistically, male and female rabbits did not differ significantly, but chicken meat had significantly lower ash content.

Glycogen, an important energy reserve in muscles, was highest in male rabbits (1.36%) followed by female rabbits (1.30%) and lowest in chicken meat (1.0%). While the difference between male and female rabbits was not significant, chicken meat glycogen content was significantly lower than both rabbit groups.

Energy content, expressed as calorific value, differed significantly ($p<0.05$) among the meats. Female rabbit meat had the highest calorific value (134.52 Kcal/100g), followed by male rabbit meat (127.7 Kcal/100g) and chicken meat (111.7 Kcal/100g).

DISCUSSION

Human health primarily depends on the quality and nutritional status of food. In developing countries, the health status of the population remains unsatisfactory, often due to the consumption of poor-quality foods, including meat (Brown *et al*., 2000). Meat plays a critical role in the human diet by providing high-quality protein, essential minerals, trace elements, and B vitamins in a bioavailable form (Ponnampalam *et al*., 2001).

In the present study, the live weight of male rabbits (1.55 kg) was significantly higher than that of female rabbits (1.43 kg). In contrast, Omojola and Adesehinw (2006) reported higher body weights (2.15 kg, 2.20 kg, and 2.10 kg) in dressed, singed, and scalded rabbits, respectively. This variation could be attributed to differences in breed, feeding practices, and environmental conditions. Comparatively, live body weight in chickens (2.55 kg) also varied, with Milicevic *et al*. (2015) documenting an average live weight of 2.22 kg in broiler chickens.

Dressing percentage also varied between male (62.22%) and female rabbits (57.1%), and these values were lower than those reported by Omojola and Adesehinw (2006), who noted dressing percentages of 52.79%, 57.79%, and 55.32% for conventionally dressed, singed, and scalded rabbits, respectively.

The pH values of rabbit meat observed in this study were 5.51 in males and 5.55 in females, which differed from the findings of Saláková *et al.* (2009), who recorded higher pH values of 5.84 (male) and 5.82 (female) in biceps femoris and longissimus lumborum muscles. Bivolarski *et al.* (2011) also observed that weaning age influenced pH, reporting values of 5.49 (early-weaned) and 5.77 (normally-weaned) for longissimus lumborum, and 5.65 (early-weaned) and 5.83 (normally-weaned) for semimembranosus muscle. North *et al.* (2019) found breed and sex influenced meat quality, with pH values of 5.94 in New Zealand white and 5.97 in Phendula rabbits. In chicken meat, the current study recorded a pH of 5.94, aligning with Nazim *et al.* (2017), who reported 5.99 in broiler breast meat, and Milicevic *et al.* (2015), who reported pH values of 6.08 (male) and 5.97 (female) chicken breast meat.

WHC reflects the meat's ability to retain its water content. The present study showed WHC values of 66.33% in male and 66.15% in female rabbits, which were similar to those reported by Suradi *et al.* (2017), who found 58.5% and 59.77% in male and female rabbit meat, respectively. Hernandez and Gondret (2004) found significantly lower WHC (29.8%) in younger rabbits (9–13 weeks). In chicken meat, WHC was 70% in the present study, differing significantly from Milicevic *et al.* (2015), who recorded only 34.84% in breast meat.

Cooking loss, which refers to the shrinkage of meat during cooking, varies by breed. Lukefahr *et al.* (2007) reported cooking losses of 10.4% in Flemish Giant, 25.2% in New Zealand White, and 12.5% in terminal crossbred rabbits.

Drip loss, the high-protein fluid lost from fresh meat, was found to be 2.74% in male and 2.78% in female rabbits in the current study. These values were higher than those reported by North *et al.* (2019), who recorded 0.90% (male) and 0.97% (female) in New Zealand White and 0.96% (male) and 0.91% (female) in Phendula rabbits. In chicken meat, a drip loss of 3.90% was observed, consistent with the findings of Nazim *et al.* (2017), who reported 3.13% in broiler breast meat.

Moisture content, which reflects water presence in meat, was consistent with existing literature. Gasperlin *et al.* (2006) and Pascual and Pla (2004) documented 72.9% to 72.4% moisture in male and female rabbits. North *et al.* (2019) reported 73.58% (male) and 73.57% (female) in New Zealand White, and 73.50% (male) and 73.66% (female) in Phendula rabbits. Similarly, Zotte (2002) reported 72.2% moisture in chicken and 70.8% in rabbit meat. Cavani *et al.* (2009) observed 74.8% and 76.1% moisture in chicken breast and leg muscles, respectively, and 75% and 73.5% in rabbit loin and hind leg.

Protein content in the current study was 22.90% in male and 23.15% in female rabbits. These values agree with Hernandez and Dalle-Zotte (2010), who reported 20.3% protein in whole carcass rabbit meat. Zotte (2002) also stated protein contents of 20.0–21.9%, with no significant differences due to slaughter age or gender (Zotte *et al.*, 1996). In chicken, Xiong *et al.* (1993) reported protein levels of 20.7–24.6% in breast and 17.1–21.3% in thigh muscles. Chuaynukool *et al.* (2007) recorded 21.02–16.98% protein in breast and thigh muscles, supporting the current findings.

Fat content was observed at 3.29% (male) and 4.08% (female) in rabbits. These findings are consistent with Gasperlin *et al.* (2006), who reported 3.7% in males and 4.3% in females. Fat content also increased with age, with 77-days old rabbits having 3.9% fat compared to 4.2% in 90-days old rabbits. In chicken meat, fat content was 2.15%, aligning with Xiong *et al.* (1993), who reported 5.0–7.2% in thigh and 1.0–2.0% in breast muscles.

Ash content, indicative of total mineral concentration, was 1.64% in male and 1.56% in female rabbits. These values agree with Polak *et al.* (2006). However, Hernandez and Lozano (2001) reported higher ash contents of 4.44% and 4.49% in male and female rabbits, respectively. The same study found breed-related variation, with 4.44% ash in California rabbits and 4.52% in New Zealand rabbits. North *et al.* (2019) reported lower ash levels of 1.28% (New Zealand) and 1.27% (Phendula), which are closer to the current findings. Ash content in chicken was 1.20%, comparable to results from Suchy *et al.* (2002), who found 1.11–1.13% in breast and 0.97–0.98% in thigh muscles. Chuaynukool *et al.* (2007) also reported 1.44% in breast meat.

The energy required for muscle activity in live animals is primarily derived from sugars, particularly glycogen stored in the muscle tissues. In the present study, the glycogen content in chicken meat was found to be 1.00%, which is in agreement with the findings of Nazim *et al.* (2017), who reported glycogen content of 0.66% in the breast meat of broiler chickens.

The calorific value, which refers to the amount of energy released when meat is completely combusted in the presence of oxygen, was also evaluated. In the current study, the calorific values for male and female rabbits were recorded as 127.77 kcal/100g and 134.52 kcal/100g, respectively. These values are notably lower than those reported by Tomasz and Andrzej (2020), who found calorific values of 407 kcal/100g and 406 kcal/100g for male and female rabbit meat, respectively. This discrepancy may be attributed to differences in breed, diet, age, and analytical methods used.

In contrast, the calorific value of chicken meat in the present study was calculated as 111.79 kcal/100g, which aligns closely with the findings of Radu-Rusu *et al*. (2007), who reported a value of 106.74 kcal/100g for broiler chicken meat. These results indicate that rabbit meat possesses a slightly higher energy value than chicken meat in this study, which could be linked to differences in fat and protein composition.

CONCLUSION

The comparative analysis of rabbit and chicken meat revealed that rabbit meat possesses superior nutritional qualities, including higher dressing percentage, fat content, protein, ash, glycogen levels, and overall calorific value. These characteristics make rabbit meat a valuable source of high-quality nutrition. On the other hand, chicken meat exhibited significantly higher pH, moisture content, water-holding capacity, drip loss, and cooking loss, indicating differences in meat functionality and storage behavior. These results suggest that both rabbit and chicken meats offer unique advantages, and their selection may depend on specific dietary or culinary requirements.

DECLARATIONS

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IRB approval
The research work was approved by the Board of Studies (November 2019) at Department of Animal Products Technology, Faculty of Animal Husbandry And Veterinary Sciences, Sindh Agriculture University, Tandojam.

Ethical statement
The experiment was approved by the Ethical Committee of the Faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University,Tandojam before the practical execution of this research work.

Generative AI and AI-assisted technology statement
No generative artificial intelligence (AI) or AI-assisted technology was used in the preparation, data analysis, or writing of this manuscript. The entire content was prepared by the authors.

Statement of conflict of interest
The authors have declared no conflict of interest.

REFERENCES

Abu, O.A., Onifade, A.A., Abanikanda, O.T.F. and Obiyan, R.I., 2008. *Status and promotional strategies for rabbit production in Nigeria*. Proceedings of the 9th World Rabbit Congress, Verona, Italy, pp. 1499–1503.

Alonso, S.D., Mota-Rojas, M., Becerril, C., Lemus, P., Sánchez, M., González, S.A., Olmos, R. and Ramirez, M., 2006. Effects of mid-summer transport duration on pre- and post-slaughter performance and pork quality in Mexico. *Meat Sci.,* **73**: 404–412. https://doi.org/10.1016/j.meatsci.2005.11.012

AOAC International, 2000. *Official methods of analysis* (17th ed.). AOAC International.

Berkel, B.M., Boogard, B.V. and Heijnen, C., 2004. *Preservation of fish and meat*. Agromisa Foundation.

Bivolarski, B.L., Vachkova, E.G. and Ribarski, S.S., 2011. Effect of weaning age upon the slaughter and physicochemical traits of rabbit meat. *Vet. Arh.,* **81**: 499-511. https://hrcak.srce.hr/file/105597

Brown, M.., Gill, C.O., Hollingsworth, J., Nickelson, R., Seward, S., Sheridan, J.J., Stevenson, T., Summer, J.L., Theno, D.M., Usborne, W.R. and Zink, D., 2000. The role of microbiological testing in systems for assuring the safety of beef. *Int. J. Fd. Microbiol.,* **62**: 7–16. https://doi.org/10.1016/S0168-1605(00)00408-6

Cavani, C., Petracci, M., Trocino, A. and Xiccato, G., 2009. Advances in research on poultry and rabbit meat quality. *Ital. J. Anim. Sci.,* **8(Suppl. 2)**: 741-750. https://doi.org/10.4081/ijas.2009.s2.741

Chuaynukool, K., Wattanachant, S. and Siripongvutikorn, S., 2007. Chemical and physical properties of cooked spent hen, broiler, and thigh indigenous chicken muscles in mixed herbs acidified soup (Tom Yum). *J. Fd. Technol.,* **5**: 180–186.

Finzi, A., 2008. Rabbit production development: New strategies to avoid conflict between uses of natural resources for food and feed. In: *Proceedings of the international workshop on organic rabbit farming based on forages*. Can Tho University. pp. 1–6.

Gasperlin, L., Polak, T., Rajar, A., Skvarca, M. and Lender, B., 2006. Effect of genotype, age at slaughter and sex on chemical composition and sensory profile of rabbit meat. *World Rabbit Sci.,* **14**: 157–166. https://doi.org/10.4995/wrs.2006.558

Heinz, G. and Hautzinger, P., 2007. *Meat processing technology: For small- to medium-scale producers*. FAO Regional Office for Asia and the Pacific.

Hernández, P. and Gondret, F., 2007. Rabbit meat quality. In: *Recent advances in rabbit sciences* (eds. L. Maertens and P. Coudert). ILVO. pp. 269–290.

Hernández, P. and Dalle-Zotte, A., 2010. Influence of diet on rabbit meat quality. In: *The nutrition of the rabbit* (eds. C. de Blas and J. Wiseman). CABI Publishing, Oxon, UK. pp. 163–178. https://doi.org/10.1079/9781845936693.0163

Irlbeck, N.A., 2001. How to feed the rabbit gastrointestinal tract. *J. Anim. Sci.,* **79**: 343–346. https://doi.org/10.2527/jas2001.79E-SupplE343x

Kemp, A., Van Heijningen, K. and Heijnigen, A.J.M., 1953. A calorimetric micro-method for the determination of glycogen in tissues. *Biochem. J.,* **56**: 646. https://doi.org/10.1042/bj0560646

Kondaiah, N., Anjaneyulu, A.S.R., Rao, K.V., Sharma, N. and Joshi, H.B., 1985. Effect of salt and phosphate on the quality of buffalo and goat meats. *Meat Sci.,* **15**: 183–192. https://doi.org/10.1016/0309-1740(85)90036-1

Lukefahr, S.D., Hohenboken, W.D., Cheeke, P.R., Patton, N.M. and Kennick, W.H., 2007. *Carcass and meat characteristics of Flemish Giant and New Zealand White purebred and terminal cross rabbits*. Oregon State University.

Maria, G.A., Buil, T., Liste, G., Villarroel, M., Sanudo, C. and Olleta, J.L., 2006. Effect of transport time and season on aspects of rabbit meat quality. *Meat Sci.,* **72**: 773–777. https://doi.org/10.1016/j.meatsci.2005.10.012

Milicevic, D., Trbovic, D., Petrovic, Z., Jakovac-Strajn, B., Nastasijevic, I. and Koricanac, V., 2015. Food safety and meat quality. *Proc. Fd. Sci.,* **5**: 191–194. https://doi.org/10.1016/j.profoo.2015.09.054

Nazim, R.A., Zamri, A.N.M., Sabow, A.B., Kareem, K.Y., Nurhazirah, S., Ling, F.H., Sazili, A.Q. and Loh, T.C., 2017. Physico-chemical properties of breast muscle in broiler chickens fed probiotics, antibiotics or antibiotic–probiotic mix. *J. appl. Anim. Res*., **45**: 64–70. https://doi.org/10.1080/09712119.2015.1124330

North, M.K., Dalle Zotte, A. and Hoffman, L.C., 2019. Rabbit meat: From farm to fork. *S. Afr. J. Anim. Sci.,* **49**: 818–829. https://doi.org/10.4314/sajas.v49i5.4

Ockerman, H.W., 1985. *Quality control of postmortem muscle tissue* (13th ed.). The Ohio State University.

Omojola, A.B. and Adesehinwa, A.O.K., 2006. Meat characteristics of scalded, singed and conventionally dressed rabbit carcasses. *World J. Zool.,* **1**: 24–29.

Ortiz-Hernández, J.A. and Lozano, R., 2001. Effect of breed and sex on rabbit carcass yield and meat quality. *World Rabbit Sci.,* **9**. https://doi.org/10.4995/wrs.2001.445

Pascual, M. and Pla, M., 2004. Changes in collagen, texture and sensory properties of meat when selecting rabbits for growth rate. *Meat Sci.,* **78**: 375–380. https://doi.org/10.1016/j.meatsci.2007.07.009

Pighin, S., Savadori, L., Barilli, E., Cremonesi, L., Ferrari, M. and Bonnefon, J., 2016. The 1-in-x effect on the subjective assessment of medical probabilities. *Med. Dec. Making,* **31**: 721–729. https://doi.org/10.1177/0272989X11403490

Piles, M., 2000. Growth performance, carcass characteristics, meat quality and muscle amino-acid profile of different rabbit breeds and their crosses. *J. Fd. Anim. Sci.*, **134**: 430–487.

Polak, T., Gasperlin, L., Rajar, A., Skvarca, M. and Lender, B., 2006. Effect of genotype, age at slaughter and sex on chemical composition and sensory profile of rabbit meat. *World Rabbit Sci.,* **14**: 157–166. https://doi.org/10.4995/wrs.2006.558

Ponnampalam, E.N., Trout, G.R., Sinclair, A.J., Egan, A.R. and Leury, B.J., 2001. Comparison of the color stability and lipid oxidative stability of fresh and vacuum packaged lamb muscle containing elevated omega-3 and omega-6 fatty acid levels. *Meat Sci.,* **58**: 151–161. https://doi.org/10.1016/S0309-1740(00)00143-1

Radu-Rusu, R.M., Vacaru-Opriş, I., Usturoi, M.G. and Albu, A., 2007. Nutritional value of Ross-308 broiler chicken meat. *Univ. Agric. Sci. Vet. Med.,* **53**: 257–260.

Saláková, A., Straková, E., Válková, V., Buchtová, H. and Steinhauserová, I., 2009. Quality indicators of chicken broiler raw and cooked meat depending on their sex. *Acta Vet. Brno,* **78**: 497-504. https://doi.org/10.2754/avb200978030497

Sen, A.R., Santra, A. and Karim, S.A., 2004. Carcass yield, composition and meat quality of sheep and goats under semi-arid conditions. *Meat Sci.,* **66**: 757–763. https://doi.org/10.1016/S0309-1740(03)00035-4

Suchý, P., Jelínek, P., Straková, E. and Hucl, J., 2002. Chemical composition of muscles of hybrid broiler chickens during prolonged feeding. *Acta Vet. Brno,* **80**: 373-377. https://doi.org/10.2754/avb201180040373

Suradi, K., Tri, A., Yuniwati, F. and Husmy, Y., 2017. Rabbit meat potential in Indonesia. *Sci. Pap. Ser. D.*

Anim. Sci. LX, pp. 107–111.

Tomasz, D. and Andrzej, G., 2020. A comparison of the quality of meat from female and male Californian and Flemish Giant Gray rabbits. *Animals*, **10**: 2216. https://doi.org/10.3390/ani10122216

Verga, M., 2000. Intensive rabbit breeding and welfare: Development of research, trends and applications. In: *Proceedings of the 7th world rabbit congress*. Valencia, Spain. pp. 491–509.

Wardlaw, F.B., McCaskill, L.H. and Acton, J.C., 1973. Effect of postmortem muscle changes on poultry meat loaf properties. *J. Fd. Sci.,* **38:** 421–423. https://doi.org/10.1111/j.1365-2621.1973.tb01444.x

Xiong, Y.L., Cantor, A.H., Pescatore, A.J., Blanchard, S.P. and Straw, M.L., 1993. Variation in muscle chemical composition, pH, and protein extractability among eight different broiler crosses. *Poult. Sci.,* **72**: 583–588. https://doi.org/10.3382/ps.0720583

Zotte, A.D., 2002. Perception of rabbit meat quality and major factors influencing carcass and meat traits. *Livest. Prod. Sci.,* **75**: 11–32. https://doi.org/10.1016/S0301-6226(01)00308-6

Zotte, A.D., 2014. Meat quality of rabbits reared under organic production system. In: *Proceedings of the 53rd meat industry conference* (eds. G. Zhou and W. Zhang). Beijing, China. pp. 154–159.

Zotte, A.D. and Szendrő, Z., 2011. The role of rabbit meat as functional food. *Meat Sci.,* **88**: 117–132. https://doi.org/10.1016/j.meatsci.2011.02.017

Zotte, A.D., Ouhayoun, J., Parigi Bini, R. and Xiccato, G., 1996. Effect of age, diet and sex on muscle energy metabolism and on related physicochemical traits in rabbits. *Meat Sci.,* **43**: 15–24. https://doi.org/10.1016/0309-1740(95)00066-6