

Effect of age on meat quality attributes in wild red (*Cervus elaphus*) and fallow deer (*Dama dama*)

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Introduction

Game meat is gaining popularity among consumers for its unique flavor and strong nutritional profile. It is rich in protein, essential vitamins, and low in fat, making it a healthy choice [1]. Meat quality in wild deer is influenced by various factors [2], including age, which affects tenderness, water-holding capacity, and color. **This study aimed to investigate how age impacts meat quality traits in wild red and fallow deer, and to estimate the age of an unknown sample using instrumental measurements.**

Methodology

Wild red deer (*Cervus elaphus*) and fallow deer (*Dama dama*) meat samples were collected from local hunters in Western Hungary. *Semimembranosus* muscle samples were taken from deer aged **7-48 months**, along with one sample of unknown age.

Instrumental analyses were conducted to evaluate the effect of age on meat quality. The following parameters were assessed:

- ✓ **Water Holding Capacity (WHC)**
- ✓ **pH**
- ✓ **Instrumental Color Measurement**
- ✓ **Instrumental Texture Measurement**

Results

1. WHC: Significantly differed among age groups, ranging from 0.00039 g/mm² in younger deer to 0.00082 g/mm² in older animals. The unknown sample showed low WHC, similar to younger deer.

Table 1. Physicochemical Properties of Deer Meat Samples of Different Ages (Mean±SD)

Sample	pH	L*	a*	b*	Shear Force (N)
R7	5.63±0.01 ^a	35.1±4.59 ^a	11.2±2.54 ^a	4.0±0.80 ^{ab}	32.38±11.23 ^a
F8	5.79±0.19 ^{ab}	37.2±1.34 ^a	10.2±1.00 ^a	2.6±0.37 ^a	39.99±9.66 ^a
R9	5.57±0.01 ^a	41.6±4.59 ^b	14.6±1.54 ^a	3.5±0.50 ^a	37.57±2.96 ^a
F12	6.09±0.03 ^c	35.8±4.59 ^a	10.4±1.30 ^a	4.6±0.31 ^b	39.83±6.76 ^a
R18	5.64±0.03 ^a	33.2±1.20 ^a	9.9±1.00 ^a	5.0±0.17 ^b	48.89±3.33 ^b
F32	5.83±0.01 ^b	35.3±4.59 ^a	10.6±2.54 ^a	3.3±0.47 ^a	42.43±3.65 ^b
F36	5.84±0.14 ^b	37.0±2.34 ^a	9.3±1.00 ^a	3.7±0.22 ^a	49.53±3.39 ^b
R37	5.61±0.11 ^a	41.8±4.59 ^b	11.4±2.54 ^a	4.9±0.60 ^b	56.70±11.02 ^c
R48	5.52±0.01 ^a	36.0±3.67 ^a	12.0±3.08 ^a	4.6±0.40 ^b	60.80±8.18 ^c
RU	5.87±0.01 ^b	37.0±2.46 ^a	13.4±1.00 ^a	2.8±0.17 ^a	53.75±10.83 ^c

Note: R = Red deer, F = Fallow deer, RU = Red deer of unknown age. The number following the letter indicates the animal's age in months. Different superscript letters within a column indicate statistically significant differences ($p < 0.05$).

Results

2. pH: Significant differences observed among samples ($p < 0.05$). The highest pH was found in F12, while the unknown sample showed a mid-range pH, similar to F32 and F36.

3. Surface color: L^* , a^* , and b^* values varied among samples, with R9 and R37 showing significantly higher L^* , and F12, R18, R37, and R48 displaying higher b^* values ($p < 0.05$). No significant differences were observed in a^* values across age groups.

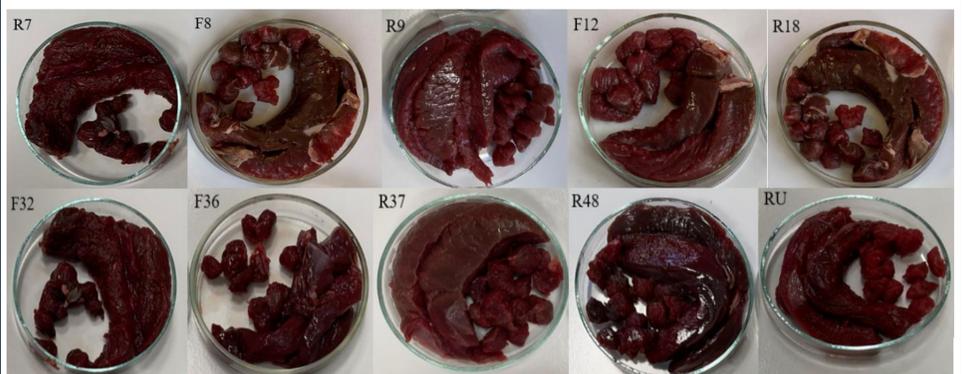


Figure 1. Visual Appearance of Deer Meat Samples of Different Ages

4. Texture analysis: Parameters varied significantly with age. Older deer (e.g., R37, R48) exhibited higher shear force, hardness, and chewiness, while younger animals showed more tender meat with lower resistance and structural firmness ($p < 0.05$). Texture analysis suggests RU likely came from a mid-range deer.

Conclusion

Age had a clear impact on deer meat quality, particularly affecting texture, pH, and WHC. Instrumental measurements suggest the unknown sample likely originated from a mid-age animal.

Future studies should include larger sample sizes, different muscles, and seasonal effects to refine age prediction models.

References

- [1] Demartini, E. et al. (2018) Consumer preferences for red deer meat: a discrete choice analysis considering attitudes towards wild game meat and hunting, *Meat Science*, 146, pp. 168–179.
- [2] Lorenzo, J.M. et al. (2019) Effect of age on nutritional properties of Iberian wild red deer meat, *Journal of the Science of Food and Agriculture*, 99(4), pp. 1561–1567.

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