

## STUDIES UPON THE COMPOSITION OF KANGAROO MEAT

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### Summary

Georgiev, L., A. Pavlov, D. Dinkov, 2001. Studies upon the composition of kangaroo meat, *Bulg. J. Vet. Med.*, 4, No 2, ... - ...

The studies were performed on 8 samples of fillets and boneless leg kangaroo meat. It was found out that the kangaroo fillet contained 19.03% protein, 0.65% fat and 0.99% minerals while the boneless leg – 20.5% protein, 0.53% fat and 0.98% minerals. The kangaroo filet is an important source of K, P, Mg, Zn, Ca and Mn while the boneless leg – of Na, Fe and Cu. The content of 17 amino acids in kangaroo meat (fillet and boneless leg) was also determined.

**Key words:** kangaroo meat, mineral composition, amino acids

### INTRODUCTION

Kangaroo meat is a traditional food for Australian population. In this connection, the number of kangaroos in Australia is progressively increasing: from 14 millions in 1987 their number reached 100 millions in 1993 (Grigg, 1993). Kangaroo meat is exported in 11 European countries, including Bulgaria. For the purposes of industrial meat production, the Red kangaroo (*Macropus rufus*) and Grey kangaroo (*Macropus giganteus*) are used (Corrigan, 1998).

Kangaroos could be affected by almost all diseases encountered in domestic animals, but in fact, the disease rate in this species is very low. According to the data of Andrew (1988), 99.3% of slaughtered kangaroos are suitable for consumption.

The same author reports that the yield of kangaroo meat is high. The carcass contains 80% muscles, 14% bones and 6% waste. The meat is tender and easily digestible. It has a low connective tissue (collagen) content (1.25%) and about 1% fat content (Kaloyanov et al., 1998; Necidova and Pazout, 1996) with prevalence

of the unsaturated fatty acids (O'Dea, 1988; Sinclair and Mann, 1996). The data for the qualitative and quantitative composition of this kind of meat are yet incomplete and scarce.

The aim of the present study was to perform widened studies upon the composition of kangaroo meat for consumption.

### MATERIALS AND METHODS

The study was performed on 8 samples of fillets and boneless leg kangaroo meat, provided by Bulgarkonserv Ltd. The samples were vacuum-packed in plastic bags of about 1 kg each, arranged in cardboard boxes and stored freezed at  $-18^{\circ}\text{C}$ .

The tests were carried out within a month after sample collection. The analyses included determination of total protein, water, fat and mineral content according to the official methods; the glycogen content – according to Seifer (1950); the specific mineral content – by an atomic absorbtion spectrophotometer AAS-1N (Carl Zeiss Jena, Germany),

amino acids – by an automated analyser AAA 339-M (Microtechna).

The results were statistically processed and presented as mean values and the standard deviations.

## RESULTS AND DISCUSSION

The principal composition of kangaroo meat is presented in Table 1. The water content of fillet was 76.06%, higher than that of boneless leg (72.04%) by 4.02%. The proportion of protein content is the opposite: 19.03% for fillet and 20.50% for the boneless leg. The other parameters had higher values for kangaroo fillet: 0.65% fat vs. 0.53% in boneless leg; 0.99% mineral content vs. 0.98% in bone-

fat content is similar to that in bison, deer and rabbit meat (O'Dea, 1993; Sinclair and Mann, 1996).

The data for the specific mineral content in kangaroo meat are shown in Table 2. Compared to boneless leg, the fillet is richer in K (by 2660,51 µg/g), P (by 467,37 µg/g), Mg (by 94,25 µg/g), Zn (by 14,62 µg/g), Ca (by 12,12 µg/g) and Mn (by 0,04 µg/g) and poorer in Na (by 24 µg/g), Fe (by 4,92 µg/g) and Cu (by 0,45 µg/g). These results are similar although relatively lower to those reported by Kaloyanov et al. (1998).

The data about the amino acid content in kangaroo fillet and boneless leg (Table 3) showed that the highest levels were

**Table 1.** Principal composition of kangaroo meat. Data are presented as mean ± SD

| Specimens          | Parameters   |                   |             |              |                |
|--------------------|--------------|-------------------|-------------|--------------|----------------|
|                    | Humidity (%) | Total protein (%) | Fat (%)     | Minerals (%) | Glycogen (mg%) |
| Fillet (n=8)       | 76.06 ± 0.52 | 19.03 ± 0.63      | 0.65 ± 0.16 | 0.99 ± 0.04  | 144.32 ± 64.57 |
| Boneless leg (n=8) | 72.04 ± 0.75 | 20.50 ± 0.65      | 0.53 ± 5.17 | 0.98 ± 2.74  | 126.03 ± 21.74 |

less leg; 144.32 mg% glycogen content vs 126.03 mg% in the other type of meat.

The protein content of kangaroo fillet is close to that of beef fillet (19.2%) while that of boneless leg meat – to rabbit meat (20.8%) (Tashev and Shishkov, 1975). The most remarkable is the low fat content, as stated also by others (Sinclair and Mann, 1996; Necidova and Pazout, 1996); Kaloyanov et al., 1998). Kangaroo meat

those of glutamic acid (296.59 mg% and 283.66 mg% respectively). Then followed (in descending order) lysine, alanine, leucine, asparaginic acid, glycine, valine, threonine, arginine, serine, isoleucine, proline, histidine, phenylalanine, tyrosine and cystine (7.52 mg% and 6.53 mg% respectively). According to Kaloyanov et al. (1998) kangaroo meat contained also 250 mg% tryptophan.

**Table 2.** Specific mineral content ( $\mu\text{g/g}$ ) in kangaroo meat. Data are presented as mean  $\pm$  SD

| Parameters | Fillet (n = 8)        | Boneless leg (n = 8) |
|------------|-----------------------|----------------------|
| Iron       | 155.91 $\pm$ 20.40    | 160.83 $\pm$ 15.28   |
| Copper     | 7.70 $\pm$ 0.66       | 8.15 $\pm$ 1.33      |
| Zinc       | 136.18 $\pm$ 14.9     | 121.56 $\pm$ 18.26   |
| Manganese  | 2.37 $\pm$ 0.40       | 2.33 $\pm$ 0.49      |
| Lead       | Traces                | Traces               |
| Cobalt     | Traces                | Traces               |
| Calcium    | 401.12 $\pm$ 53.35    | 389.00 $\pm$ 90.81   |
| Phosphorus | 8343.37 $\pm$ 542.66  | 7876.00 $\pm$ 659.44 |
| Magnesium  | 1056.75 $\pm$ 119.41  | 962.50 $\pm$ 105.31  |
| Potassium  | 12185.30 $\pm$ 604.78 | 9524.87 $\pm$ 2326.6 |
| Sodium     | 1223.25 $\pm$ 80.96   | 1247.25 $\pm$ 285.51 |

**Table 3.** Amino acid composition of kangaroo meat (mg%). Data are presented as mean  $\pm$  SD

| Parameters       | Fillet (n = 8)     | Boneless leg (n = 8) |
|------------------|--------------------|----------------------|
| Asparaginic acid | 165.52 $\pm$ 17.17 | 167.59 $\pm$ 28.62   |
| Threonine        | 94.18 $\pm$ 5.32   | 94.66 $\pm$ 9.49     |
| Serine           | 78.11 $\pm$ 11.17  | 75.41 $\pm$ 15.01    |
| Glutamic acid    | 296.59 $\pm$ 66.18 | 283.66 $\pm$ 81.04   |
| Proline          | 67.28 $\pm$ 4.40   | 73.93 $\pm$ 12.85    |
| Cystine          | 7.52 $\pm$ 2.18    | 6.53 $\pm$ 3.09      |
| Glycine          | 151.52 $\pm$ 13.17 | 147.27 $\pm$ 15.60   |
| Alanine          | 184.17 $\pm$ 29.50 | 191.10 $\pm$ 34.91   |
| Valine           | 96.75 $\pm$ 11.74  | 96.31 $\pm$ 10.73    |
| Methionine       | 42.21 $\pm$ 7.44   | 51.90 $\pm$ 5.34     |
| Isoleucine       | 77.15 $\pm$ 5.50   | 79.58 $\pm$ 11.01    |
| Leucine          | 181.79 $\pm$ 12.56 | 184.96 $\pm$ 25.74   |
| Tyrosine         | 37.56 $\pm$ 7.09   | 39.15 $\pm$ 6.38     |
| Phenylalanine    | 47.33 $\pm$ 4.36   | 54.25 $\pm$ 3.85     |
| Histidine        | 66.00 $\pm$ 4.63   | 62.21 $\pm$ 4.43     |
| Lysine           | 184.29 $\pm$ 15.66 | 182.97 $\pm$ 19.62   |
| Arginine         | 87.65 $\pm$ 7.60   | 8.85 $\pm$ 8.53      |

## CONCLUSIONS

Kangaroo fillet contained 19.03% proteins, 0.65% fat and 0.99% minerals while kangaroo boneless leg meat – 20.5% protein; 0.53% fat and 0.98% minerals.

Kangaroo fillet contained more K, P, Mg, Zn, Ca and Mn and less Na, Fe and Cu than boneless leg meat.

The amino-acid content in kangaroo meat (fillet and boneless leg) in descending order was as followed: glutamic acid, lysine, alanine, leucine, asparaginic acid, glycine, valine, threonine, arginine, serine, isoleucine, proline, histidine, phenylalanine, tyrosine and cystine.

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Paper received 23.11.2000; accepted for publication 11.04.2001

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