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Strengthening the Regional Veterinary Education and Research for the Future Excellent Veterinary Graduates

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PROCEEDING

INTERNATIONAL SYMPOSIUM IN VETERINARY SCIENCE

Strengthening the Regional Veterinary Education and Research for the Future Excellent Veterinary Graduates

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Faculty of Veterinary Medicine
Universitas Gadjah Mada
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Abstract

Bali as one of the tourist destination in Indonesia is not only required to provide interesting sights but also demanded to provide the best service including in the provision of food for the consumption of tourists. Bali cattle as germ plasma from Bali are required to play an important role to meet the beef standards, and so far the need for beef with excellent quality is still imported from Japan and Australia in the form of wagyu beef. This study attempts to reveal the comparison of beef quality between bali beef and wagyu especially in terms of their protein and amino acids. The results showed protein profile of bali beef and wagyu beef has slightly different. Based on SDS-PAGE analysis, the protein of bali beef showed 15 bands and 14 bands for Wagyu cattle, respectively. The concentration of amino acids also different. Essential amino acids of Bali cattle 26.80% were lower than wagyu beef 30.18%. This result was opposite with non-essential amino acids i.e. 29.84% for Bali beef compare with 28.92% for wagyu beef.

Keywords: Bali cattle, beef, quality, proteine

Introduction

Bali cattle are known as cattle pioneer as one of the local cattle with its genetic characteristic that can live by utilizing forage that are less nutritious, not selective for the food and have a higher digestibility against fiber foods [1-2]. According to the study of Arka which found the nutrition status has significant effect to the quality of bali cattle including color, marbling, chemical composition (moisture, protein, fat, and ash). Furthermore, marbling of bali cattle was found more affected by high energy ration and castration status [3]. Until now, bali cattle has not yet considered having best quality for tourist consumption. On the other hands, Bali as one of tourist destination in Indonesia is need to produce of beef with prime quality for tourist who come to Bali. In order to fulfill of that needed, the tourist management and goverments of Bali have been import wagyu beef from the other country like Japan and Australian. Wagyu that means Japanese produced beef cattle contains a higher percentage of omega-3 and omega-6 fatty acids than typical beef [4]. Some studies have been conducted by several researchers to promote Bali cattle as a source of beef with prime quality. Based on background above, the study about characteristic of protein and amino acids of Bali beef and Wagyu beef as a early step to promote of Bali cattle as a source of beef with prime quality is interesting to be presented.

Objective

The objectives of the study were to determine the characteristic of protein and amino acids both Bali beef and Wagyu beef and to evaluate the prospects of Bali cattle as source of beef in order to fulfill the beef with prime quality for tourist who come to Bali.
Methods

Samples
Samples of study were Bali beef and Wagyu beef that were taken from supplier in Bali.

Protein analysis
Protein characteristic of beef both Bali cattle and Wagyu beef was analyzed by using SDS-PAGE (Sodium Dodecyl Sulphate Polyacrylamide Gel Electrophoresis) method according to standard procedure [5] and amino acid was analyzed by using AOAC (Association of Official Analytical Chemist) procedure [6]

Data analysis
Data of study were analyzed descriptively

Results

Protein profile both Bali beef and Wagyu beef showed characteristic as bellow (Fig.1)

![Protein profile image](image)

Fig.1 Protein profile of beef originated from Bali cattle and Wagyu by using SDS-PAGE analysis. (M: marker; B3, B7, B14: Bali beef with the 3rd, 4th, and 14th of preservation, respectively; W3, W7, W14: Wagyu beef with the 3rd, 4th, and 14th of preservation, respectively; B0: Bali beef control; W0: Wagyu beef control).

According to the data above shows the amount of beef protein from bali and wagyu does not show the change of the number of bands until the 3rd day of preservation i.e 15 bands for Bali beef and 14 bands for Wagyu beef, respectively. The number of protein bands appears to shrink on the 14th day of observation. Bali beef shows 13 bands and Wagyu beef 12 bands. These results indicate the presence of amount of protein has been denaturation in both Bali beef and Wagyu beef. Further analysis of the amino acids of Bali beef and Wagyu beef compounds as presented in Table 1 and Table 2.
Table 1. Concentration of essential amino acids between Bali beef and wagyu beef on different time of observation at 4°C.

| Essential amino acids | Bali beef (%) | | | | | Wagyu beef (%) | | | |
|-----------------------|---------------|---|---|---|---|---|---|---|---|---|
|                       | Preservation (day) | 0 | 3 | 7 | 14 | 0 | 3 | 7 | 14 | 0 |
| Histidine             | 6.57 | 6.00 | 4.68 | 1.06 | 5.67 | 5.67 | 4.67 | 1.10 | 0.90 | 0.69 |
| Threonine             | 2.17 | 1.76 | 1.57 | 1.57 | 2.31 | 2.31 | 1.57 | 1.09 | 1.09 | 1.09 |
| Arginine              | 2.57 | 1.95 | 1.61 | 1.26 | 2.67 | 2.67 | 2.50 | 1.25 | 1.25 | 1.25 |
| Methionine            | 3.24 | 1.52 | 1.17 | 0.76 | 3.67 | 3.67 | 2.35 | 1.50 | 1.50 | 1.50 |
| Valine                | 3.08 | 1.23 | 1.09 | 0.63 | 1.22 | 1.22 | 0.69 | 0.40 | 0.40 | 0.40 |
| Phenylalanine         | 2.72 | 2.38 | 1.69 | 0.89 | 4.15 | 4.15 | 2.21 | 2.09 | 2.09 | 2.09 |
| Isoleucine            | 2.88 | 2.09 | 1.37 | 1.08 | 2.92 | 2.92 | 1.19 | 1.02 | 1.02 | 1.02 |
| Leucine               | 1.81 | 1.54 | 1.50 | 0.75 | 3.66 | 3.66 | 1.70 | 1.58 | 1.58 | 1.58 |
| Lysine                | 3.57 | 3.53 | 2.44 | 1.90 | 3.91 | 3.91 | 3.52 | 3.40 | 3.40 | 3.40 |
| Total                 | 28.60 | 22.00 | 17.12 | 9.89 | 30.18 | 30.18 | 20.38 | 13.43 | 0.90 | 0.69 |

Table 2. Concentration of non-essential amino acids between Bali beef and wagyu beef on different time of observation at 4°C.

| Non-essential amino acids | Bali beef (%) | | | | | Wagyu beef (%) | | | |
|---------------------------|---------------|---|---|---|---|---|---|---|---|---|
|                           | Preservation (day) | 0 | 3 | 7 | 14 | 0 | 3 | 7 | 14 | 0 |
| Aspartic acids            | 4.01 | 2.88 | 2.84 | 2.13 | 4.74 | 4.74 | 2.39 | 2.33 | 0.90 | 0.69 |
| Glutamic acids            | 9.68 | 5.70 | 5.35 | 2.98 | 5.84 | 5.84 | 5.54 | 3.55 | 0.90 | 0.69 |
| Serine                    | 9.91 | 1.82 | 1.18 | 1.07 | 11.16 | 11.16 | 1.58 | 1.11 | 0.90 | 0.69 |
| Glycine                   | 0.73 | 0.73 | 0.38 | 0.34 | 0.81 | 0.81 | 0.57 | 0.57 | 0.57 | 0.57 |
| Alanine                   | 2.10 | 1.41 | 1.26 | 0.87 | 1.70 | 1.70 | 1.50 | 0.55 | 0.55 | 0.55 |
| Tyrosine                  | 3.42 | 2.41 | 1.38 | 1.00 | 4.68 | 4.68 | 2.02 | 1.53 | 0.90 | 0.69 |
| Total                     | 29.84 | 14.95 | 12.39 | 8.38 | 28.92 | 28.92 | 13.60 | 9.31 | 0.90 | 0.69 |

Data in Table 1 shows concentration of essential amino acids of Bali beef is lower than wagyu beef and those concentrations were decrease while preservation on 4°C. The protein concentration of Bali beef is decrease from 28.60% on day 0 to 9.89% on day 14. Similarity with Bali beef, essential amino acids concentrations of wagyu beef also decrease from 30.18% on day 0 to 13.43% on day 14. Different with data in Table 1, the data in Table 2 shows non-essential amino acids concentration of Bali beef was higher than wagyu beef. In line with preservation time, the protein also decrease while preservation at 4°C.

Some of the essential amino acids on Bali beef and wagyu beef i.e Histidine, Arginine, Methionine, Phenylalanine, and Isoleucine showed significant decrease. Furthermore, non-essential amino acids also showed decrease i.e. amino acids Glycine, Alanine, and Tyrosine. The concentration of amino acid Threonin, Valin, Leusin, Lisin, Acid Aspartate, Glutamic Acid and Serine was relatively unchanged during preservation. The decrease of amino acids concentration during preservation is caused by the presence of decay bacteria that are still life on preservation. The results of this study were supported by some studies which found the protein decreases during preservation was resulted by denaturation, and also by degradation of molecular complex into simple molecule. Furthermore, Koswara (1995) in Toldra [7] reveals that such change was caused by enzyme activity that degrade proteins. Ekop [8] also stated the decline of amino acid was significantly influence by the quality of foodstuffs.
Conclusion

The result of study showed protein profile of bali beef and wagyu beef has slightly different. Based on SDS-PAGE analysis, bali beef showed 15 bands and 14 bands for Wagyu beef, respectively. The concentration of amino acids also different. Essential amino acids of bali beef 26.80% were lower than wagyu beef 30.18%, opposite with non-essential amino acids as much as 29.84% for bali beef compare with 28.92% for wagyu beef.

References

The collaboration between Indonesia and Japanese Veterinary School

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February 28th, 2018

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