

THE INVESTIGATION OF SOME PROPERTIES OF MEAT FROM WATER BUFFALO (BUBALIS BUBALIS) FED WITH TWO DIFFERENT FEED.

TÖMEK S.O., BULGAY A., SERDAROĞLU M. and DEMYRTAŞ S.

Ege University, Engineering Faculty, Food Engineering Department Bornova, İzmir, TURKEY

S-IVA.36

SUMMARY

In this research, some properties of meat from water buffalo fed with two different types of feed was investigated. For the study, two groups of water-buffalo each consisting of five animals were used. The first group was fed with a mixture of 50 % straw, 50 % concentrated feed, whereas the second group was fed with a mixture of 70 % straw and 30 % concentrated feed until the age of 24 months. All animals were slaughtered at the same day and after 24 hrs of slaughter the Psoas major, Longissimus dorsi and Semitendinosus muscles were dissected. The pH, Hunter color, total water content, pressjuice, protein, fat, ash, connective tissue, TBA content, Warner-Bratzler shear force, and sensory properties were determined. The first group showed higher values for pH and fat content than the second group in all three muscles. There were no significant differences between two groups in other properties. All muscles are found to be acceptable in sensory properties, although differences were found between the three different muscles, but not (within muscles) between treatment groups.

Introduction Water buffalo is a useful animal for mankind in providing labour, meat, milk and leather. They can be kept under bad conditions because they are easy to breed and low in susceptibility to diseases and extreme climatic conditions (Müller et al., 1993). Therefore, a future increase in the population of the water-buffalo in suitable regions of Türkiye is considered of importance. Physical and chemical properties and quality characteristics of meat from buffalo which are grown in Türkiye are unknown.

In literature there were some studies about physical and chemical properties of buffalo meat. Anjaneyulu et al. (1990) stated that buffalo meat is good and suitable to use in meat products compared with beef. In the study of Romunno et al. (1984), beef and buffalo meat were compared and it was found that buffalo meat is less tender and has more water holding capacity. However Grasso et al. (1984) was stated that buffalo meat is more tender and has more water holding capacity. Parabhakar and Narayana (1985) stated that pressible juice of buffalo meat is higher than beef. In the research of Lapitan (1977), it was stated that, there is no important differences between buffalo meat and beef.

In this research, physical, chemical and sensory properties of meat from water-buffalo fed with two different types of feed was investigated. By doing so it is aimed to aid animal breeding and meat processing industry.

Material and Methods

Ten native race male water buffaloes (*Bubalis bubalis*) were used as the material of this study. Infant buffaloes were fed with buffalo milk in the first three months and after that, they were divided to two groups each containing five buffalo. First group was fed a mixture of 50 % straw and 50 % concentrated feed whereas the second group was fed a mixture of 70 % straw and 30 % concentrated feed until the age of 24 months. All animals were slaughtered at the same day and carcasses were stored at +4 °C until the end of the rigor mortis. After 24 hours of slaughter, carcasses were separated into two parts and the cross sectional area of the 13th and 14th vertebrae was marked and the area was calculated with planimeter. Afterwards, Longissimus dorsi (LD), Psoas major (PM) and Semitendinosus (ST) muscles were dissected and the pH values were determined with penetrometer type pH electrode. The Hunter color, total water content (Anon, 1974), pressible juice content (Sanderson and Vail, 1963), protein (Anon, 1974), fat (Flayn and Bramblett, 1975), ash (Anon, 1974), TBA number (Tarlacis et al. 1960), and Hydroxyproline content (Reuterswärd et al. 1982) were determined and the sensory properties of fresh and cooked samples were evaluated by five panel members with 5 point scaled scoring method. The Warner-Bratzler shear force of the samples having a diameter of 2 cm taken parallel to the fibre direction from cooked meat were determined. Result and

Discussion

The pH values and the fat content of buffalo muscles for two groups are given on Table 1. In both groups, ST muscles which have a highest activity have a lower pH and fat content than the other muscles. However these differences are not significant. It is observed that the first group has the higher pH values and fat content than the second group significantly ($P < 0.05$) for all muscles. This result shows the increasing of the concentrated feed percentage of the diet causes the higher pH value and fat content on the muscles. The TBA number which is the indicator of the oxidation degree of fat were very low in all samples. According to the results of pressible juice content, there is no significant difference between two groups in all muscles. But it was seen that the diet which contains more straw increases the pressible juice content a little bit in all muscles. There was an opposite relationship between pressible juice content and the pH value of muscles. The pH values were higher but the pressible juice contents were lower in the first group than the second one. The reason of this expected result is that, the pressible juice contents of the samples were determined just after the completion of pH decrease and low pressible juice indicates high water holding capacity. Same relationship was also observed between muscles in each treatment group. There were no significant differences in total water, ash and protein content between two groups and muscles in each group. The hydroxyproline content of the muscles of two groups were given on Table 1. In both groups ST contains slightly more hydroxyproline than LD and PM but it was not significant. Hydroxyproline content of beef is 520-610 for LD, 350 for PM and 870 for Sartorius as $\mu\text{g/g}$ (Lawrie, 1976). The determined values of buffalo muscles are approximately same for PM muscles, lower than for PM muscles and higher than Sartorius for ST muscles. The result of the cross-sectional area of the 13th and 14th vertebra shows that there were significant differences between two groups and the group fed with the diet contains concentrated feed has the larger cross-sectional area. This means that it is well-fed. The results of the Hunter color measurement are also given on Table 1. When it is converted to the CIE system the color of the all samples were pink. According to the (L) values, muscles are significantly different ($P < 0.05$) from each other. The lightest color was found in ST and the darkest was PM. When the muscles of two groups were compared, there is no significant difference between PM muscles but the LD and ST muscles in two groups have the lighter color than the second group significantly ($P < 0.05$). According to the (a) values, all samples have the light red color. Redness of LD is lower than the others. There is no significant difference between PM and ST muscles. Warner-Bratzler shear force values of muscles in two groups are approximately close to each other. There is no significant difference for PM and LD muscles in both groups but ST muscle has greater values than the others so tenderness is lower in ST muscles. This is also observed from the panel results of the tenderness property. Results of the sensory evaluations are given on Table 2. All evaluations of PM and LD muscles of two groups scored as between good and very good (4-5 point). The ST muscles which have a light red color and low tenderness took a lower result that is between moderate and good (3-4 point) than the other muscles. There is no significant difference between two groups for all muscles in sensory properties.

References

- Anjaneyulu, A.S.R., Lakshmanan, V., Sharma, N. and Kondaiah, N. (1990). Buffalo meat production and meat quality: a review. *Indian Food Packer* 44 (4) 21-31.
- Anon, (1974). TS 1743 Et ve et ürünlerinde nem tayini. TSE Ankara.
- Anon, (1974). TS 1746 Et ve et ürünlerinde kül tayini. TSE Ankara.
- Anon, (1974). Tecator Manuae Kjeltac System. Distilling unit 1002.
- Flaynn ve Bramblett V.D. (1975). Effect of frozen storage, Cooking Method and Muscle Quality on Attributes of Pork loins. *J. of Food Science*, 40:631.
- Grasso, F., Colatruglio, P. and Gambacorta, E. (1984). Comparative studies on meat quality of buffaloes and cattle feed hay and concentrates. *XIII. Produzione Animale* 3(1/2) 23-28.
- Lapitan, J.E. (1977). Physical, chemical and sensory properties of beef and carabeef. Unpub. undergraduate thesis, UPLB Collage of Agric.
- Lawrie, R.A. (1976). Meat Science. 2nd Ed. Pergamon Press.
- Müller, L., Aguirre, L.F., Feijo, G.L. ve Perobelli, Z. (1993). Buffalo (*Bubalus bubalis*) meat quality when submitted to three feeding regimes. 39th ICMST s2p15.
- Parabhakar, K. and Narayana, Rao P.L. (1986). Comparison of organoleptic and related characters of buffalo meat with beef. *J. of Food Sci. and Tech. India*. 23 (2) 90-93.
- Reuterswaid, A.L., Asp, N.G., Björ, I. and Ruderus, H. (1982). Effect of collagen content and heat treatment on protein digestibility and biological value of meat products. *J. Food Tech.*, 17, 115-123.
- Ramunno, L. (1984). Comparative studies on meat quality of buff. and cattle feed hay and concent. *XI. Prod. Animale* 3(1/2) 9-14.
- Sanderson, M. and Vail, G.E. (1963). A method for determining press fluid in cooked beef. *J. of Food Sci.* 28:596.
- Tarladgis, B.G., Watts, B.M. and Younathan, M.T. (1960). A distillation method for the quantitative determination of malonaldehyde in rancid foods. *The J. of A.O.C.S.* 37: 44-48.