BIOSCIENCES BIOTECHNOLOGY RESEARCH ASIA, April 2014. Vol. **11**(1), 349-351

Effect of Nitrite and Turmeric as Curing Ingredients on Microbial Quality and pH of Meat

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dx.doi.org/10.13005/bbra/1280

(Received: 12 November 2013; accepted: 24 January 2014)

Meat is the most perishable of all important foods since it contains sufficient nutrients needed to support the growth of microorganisms. Meat is susceptible to bacterial decomposition, which results in the production of off odours, followed by slime production and structural breakdown. Curing of meat is done to stop this decomposition of meat caused by microorganisms and to retain the colour of meat. Meat is considered to be spoiled when it is unfit for human consumption and is subjected to changes by its own enzymes, by microbial action and its fat may be oxidized chemically by microorganisms which grow on it causing visual, textural and Organoleptic change when they release metabolites. Mutton sample procured from local market were subdivided into three parts. One part was treated with turmeric and a part with turmeric+ Nitrite and rest was kept as control i.e. without any treatment. All the three samples were kept in low density polythenes and were analyzed 0, 15 and 30 days after storage.

Key words: Bacterial Decomposition, Curing, Slime Production, Metabolites, Microbial load.

The dietary habits of food are varied .Humans have taken both animals and plants as food throughout recorded history. Most human societies have preferred animal foods and have been willing to expand the greater effort generally required to satisfy the appetite when possible.

Meat is the flesh and organs of animals and fowls. There are various legal definitions of meat in different countries designed to control the composition of products made with meat (Johnson,1964). The flesh of cattle, pigs and sheep is distinguished from that of poultry by the term red meat, while the flesh of poultry (chicken, turkey, duck, pigeon, and guinea fowl) is termed white meat. In addition to the common domestic animals a wide variety of wild animals are eaten - possum, deer, rabbit, moose, caribou, bear, polar bear, seals, walruses depending on availability and local custom, as well as horse, camel, buffalo, goat, dog and rodents (Newbold,1966). The chemistry and functional behavior of meat as a raw material for processing is derived from the characteristics of muscle (Reece and Hird, 1967). Muscle is a very highly organized biological tissue with an intricate, complex structure, a unique composition and very active biochemical capability and all these characteristics are carried over to the meat and used for further processing and imparting specific and sometimes variable properties to meat (Cassens, 1970).Meat is susceptible to bacterial decomposition, which results in the production of off odours, followed by slime production and structural breakdown. Meat is cured is to prevent or delay this natural process of decomposition.

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Curing can be done by three methods, dry curing, wet curing and combination curing (Ranken, 2000). Nitrates and nitrites must be used with caution during curing as they are toxic when used in large amounts (Lambre and Lawrie,1981). Nitrate was present originally as a natural impurity in the salts used in curing but, unknown to the users, was a key ingredient in the curing process (Oelofsen,1983). Nitrites stabilize the colour of myoglobin and also retard the development of rancidity (Kairuz et al.,1992). Nitrites also add their flavour to the meat and have got a significant bacteriostatic effect particularly against *Clostridium botulinum.* (Haldane and Halgado, 1983). The other ingredients used in meat curing include turmeric, phosphates, gums, starches, flavorings and various spices. Turmeric is used to reduce the microbial load of the meat and also helps in maintaining the pH of the meat (Kenner *et al.*,1998).The research was carried out to prevent the quality of meat from microbial decomposition by keeping the following objectives in mind.

1. To see the effect of turmeric and nitrite on the microbial load and pH of meat.
2. To see the effect of turmeric and nitrite on storage stability of meat.

MATERIAL AND METHODS

The Study was conducted in the department of Food Technology, Food Analytical Laboratory of Islamic University of Islamic University of science and Technology, Awantipora, Kashmir, India in 2011. Fresh mutton samples were procured from local market of Awantipora. The samples were divided into three groups namely Control, treated with turmeric and treated with turmeric + Nitrite. Samples were kept at room temperature (28±2°C). These samples were separately analyzed to see the effect of treatments on pH and microbial load of meat after 0,15,30 days after storage. The pH was determined by pH meter (Make: Tanco,B-1011) (Rangana,1997).Microbial analysis included enumeration of total microbial counts. Serial dilutions were prepared. Pour plate technique was used with appropriate selective media (Nutrient Agar) for enumeration of microorganisms. The plates were incubated at 35±2°C and counted after 24 hrs. The same analysis was repeated 15 and 30 days after storage.

RESULTS AND DISCUSSION

The pH of meat decreased significantly with increase in the storage days .The average pH of Turmeric+ Nitrate (T_1) sample was 6.21% which was less than the pH of control sample (T_0) 6.34% where as the pH in turmeric treated sample (T_1) was 6.47% .Studies also revealed that pH decreased with increase in the storage period (Table-1). The decrease in pH of meat is because of conversion of some of the glycogen in the muscles to lactic

Table 1. Effect of Turmeric and Nitrite on pH (%) of Meat

Treatments	Storage days			
	0 days	15 days	30 days	Treatment mean
Control	6.5	6.35	6.18	6.34
Turmeric+Nitrite	6.36	6.21	6.05	6.21
Turmeric	6.75	6.42	6.25	6.47
Storage mean		6.54	6.32	6.16

Table 2. Effect of Turmeric and Nitrite on pH (%) of Meat

Treatments	Storage days			
	0 days	15 days	30 days	Treatment mean
Control	5.93	8.51	10.96	8.46
Turmeric+ Nitrite	3.58	4.51	6.29	4.79
Turmeric	3.58	6.52	8.52	6.21
Storage mean		4.36	6.51	8.59

acid. This decrease in pH of meat is controlled by curing ingredients.

The microbial load of meat decreased significantly with increase in storage days. The average microbial load of turmeric+ Nitrite sample (T_1) was 4.79 log cfu/g which was less than the control sample (T_0) 8.46 log cfu/g, where as the microbial load of turmeric treated sample (T_2) was 6.21 log cfu/g. Studies also showed that microbial load increased with increase in the storage period (Table-2). The decrease in microbial load in Turmeric+Nitrite treated sample is because nitrites does not favour the growth of microorganisms as it affects their cell wall.

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