THE EFFECT OF BRINE INJECTING, TUMBLING, AND CURING TREATMENT ON THE QUALITY OF THE DRIED SHREDDED PORK

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Introduction

This experiment will utilize such processing method as brine injecting, vacuum tumbling, and sample the meat at different salting point, in order to prolong the ATPase activity of myofibrilar, and thereby prompt the softening effect on the raw meat. Moreover, during the process of water cooking, form fixing, seasoning, and drying, it is hoped that the temperature of shrinking protein can be raised, with an eye on strengthening the softness of the products. In other words, it is our wish that, by so doing, the improved dried shredded pork will become more attractive to the consumers.

Materials and Methods

I. Experiment Materials:

1. Source: The hind legs of pork, refrigerated at once for 18-22 hours, were purchased at a meat retailer in Chiayi.
2. The dried shredded pork:
   (1) The formula for making salting solution , seasoned with great amount of sugar: The salting solution is designed to have the same weight as the meat , which is counted as 100%: Salt 6%, sugar 6%, sodium tripolyphosphate(STPP) 1.8%, $NaNO_2$ 0.12%, Na-erythorbate 3%, iced water 85.78%.
   (2) Tumbling massaging and salting solution treating.
   The amount of salting solution injected is 20% that of the hind legs.
   First , the salting solution was injected into the meat , using brine injector, and then the meat was tumbled and massaged for 40 minutes by vacuum tumbler. Afterward, the processed meat was refrigerated at 4□ for 7 days, during which time it was sampled , tested , and analyzed on the first , third , fifth , and last day to see the changing pattern of its quality, Meanwhile, the raw meat was used to make dried shredded pork in a traditional fashion, drying at 35□-40□, with 15-20% of water capacity for the same purpose.

II. Experiment method:

Items for analyzing in salting raw meat: (1) During the salting period, the raw meat was sampled and then analyzed on such items as pH, color, TPC and ATPase (Lin et al., 1999). (2) Items for analyzing in dried shredded pork: The salting dried shredded pork , selected on the third storing day , was the object of this experiment. The item to be analyzed was pH, moisture, color, shear value, and water activity. Same as the one mentioned above. (3) Statistical analysis: The statistical analysis of the data was carried out by applying Duncan's new multiple range test using the statistical analysis system (SAS,1991).

Result and Discussion

I. The effect of brine injection, coupled with tumbling, on the quality of the raw meat for dried shredded pork

The changing pattern of pH value during the 7 days' experimental period is shown in Table 1.As the figure indicates, the processed raw meat enjoys a higher pH value at 6.0~6.7 than the reference set with pH value at 5.6~6.0.Two factors, among others, are presumed to be responsible for the resultant statistics. One is, the textural integrity of myofibrilar is compromised and the cell membrane of muscle damaged due to the disconnected and disrupted nature, under the impact of tumbling massaging. The other is, the enzyme in the meat itself, by its own digesting process, enables the injecting brine to penetrate the raw meat more with ease, as the ageing progressed. And while the untreated set started to show sign of decay on the fifth day of cold storing, the treated remained intact even on the seventh. As for the *L* and *a* value the treated set has a higher value of *L* at about 43~47, and 13~15,as apposed to the untreated, which has a lower value of both *L* and at 35~38 and 10~11.5, respectively. The total plate count (TPC) was controlled and maintained at below log CFU/g 5.0, even on the seventh day of ageing, owing to the salting effect and the increasing pH value. By comparison, the TPC of the untreated set surpassed log CFU/g 6.0 on as early as the third day.

Table 1 Changes on the Quality of Dried Seasoned Shredded Pork processed with and without Injection and tumbling. Both samples were then cured for 7 days at 4℃ .

Items / weeks	Control					Injection & Tumbling				
	0	1	3	5	7	0	1	3	5	7
pH	5.89^{c}	5.76^{c}	6.00^{bc}	_	_	6.00^{bc}	6.20^{b}	6.40^{ab}	6.50^{a}	6.65^{a}
L	38^{b}	36^{b}	37^{b}	_	_	43^{ab}	45^{a}	44^{a}	46^{a}	47^{a}
a	10.00^{b}	11.00^{b}	11.50^{b}	_	_	12.50^{ab}	13.00^{a}	14.00^{a}	14.50^{a}	14.80^{a}
TPC※(log CFU/g)	3.50^{b}	4.80^{ab}	5.90^{a}	_	_	3.60^{b}	4.30^{b}	4.50^{ab}	4.80^{ab}	5.20^{a}
ATPase activity	0.32	0.36	0.35	_	_	0.33	0.34	0.37	0.36	0.34

※:TPC:Total plate counts

1.Mean±SD 2.^{a,b}Mean within the same row without the same superscripts differ significantly($P<0.05$)

The ATPase activity of the processed raw meat, valued at about 0.35~0.33, shows no more significant difference than that of the untreated set, valued at 0.32~0.35 on the third day. Besides, in my early reports(Huang et al., 2002), we learned that, by using the SDS-PAGE Electrophoresis, the α-actin in protein, during the salting period, will show signs of proteolysis. And it is presumed that the myofibrils lost its textural integrity, resulting from the disconnected and disrupted nature of myofibrils, after the tumbling process.

II. The effect of brine injection and tumbling on the quality of dried shredded pork

As shown in Table 2, this trial product has L value at 47.6 and a value at 17.4 , and as compared with the reference set with L value at 5.5,and a value at 15.2,it shares a lower L value, yet a higher a value.

This conclusion may have something to do with the water capacity contained, and the deep dark tone may become even more obvious as the water contained decreases. On the other hand, the value of water activity and pH between these two compared sets shows no significant difference. As for the shear value and moisture, the experimental set has a lower value on both items. This result is consistent with the previous report. According to Ockerman and Kuo (1982), the more the water is contained, the tenderer the meat will become. By contrast, this experiment shows different result. The report by Theno et al. (1978) further indicates that the myofibrilar loses its textural integrity, because of the separated, disrupted and twisted nature of myofibrilar from the effects of tumbling. Hence, the result of this experiment can be attributed to the phenomeon mentioned earlier. And that may also serve as a reasonable explanation why this experimental dried shredded pork has a lower shear value.

Table 2. Effect of Brine Injection and Tumbling on the Quality of Dried Seasoned Shredded Pork

Items	Control	Injection & Tumbling
pH value	6.05^{a}	6.10^{a}
Moisture (%)	20.20^{a}	18.60^{b}
L value	55.10^{a}	47.60^{b}
A value	15.20^{a}	17.40^{b}
b value	20.80^{a}	18.80^{a}
Shear value(Kg/cm^{2})	8.60^{a}	6.20^{b}
Water activity	0.79^{a}	0.74^{a}

1. Each treatment with two replications, each mean was averaged from three determinations.

2. Mean±SD 3. ^{a,b} Mean within the same row without the same superscripts differ significantly($P<0.05$)

Conclusion

To sum up, the treated dried shredded pork made from the raw pork, which has undergone the treatment of curing ,injecting and trumbling, combined with the ageing procedure at low temperature, has shown a sharply reduced shear value, with the lower moisture contained, which in turn will sharply lower its shear value. And the lower moisture and water activity will, to be sure, benefit the products in preserving their own stability. Nevertheless, how to strike a balance between the stability and quality, in order for the products to be more acceptable to the consumers, remains a thorny issue facing us all, for there is, undoubtedly, still ample room for improvement in this respect.

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