BIOCHEMICAL AND MICROBIAL CHANGES OF DRY CURED DUCK MEAT DURING RIPENING

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Background

Mule duck is a special hybrid specie of meat duck and a large numbers were raised in Taiwan due to it's delicious flavor and texture and fast growth. Dry cured duck meat is a popular poultry processed poultry meat in France. Its processing steps are similar to dry pork ham manufacture. The proceeding steps included curing, washing, drying and ripening. In this study, two different breeds of duck breast meat were used as raw material, one is mule duck, another is Pekin duck. The two ducks have different carcass quality; the latter has higher fat amount on the carcass than that of the former (Szasa, 1997).

Objectives

The purpose of this study was to develop dry cured duck meat according to the procedure of dry cured ham and to investigate the changes of its biochemical properties such as salt, moisture, water activity, pH value as well as microbial quality.

Methods

Frozen ducks breast meat from pekin and mule ducks were thawed at 4 C for 24 hr before curing in this study. Raw material were cured with salt, sodium nitrite, sodium nitrate and geranium at 4 C for 36hr then washed by flowing water for 30 min, finally dried at 45C for 30 min. The dry cured duck meat were ripened at 15C, 60-85%RH for 16 weeks. Salt content and moisture of internal and external meat were determined by AOAC (1990)'s method. Water activity was measured by a fast Aw instrument (AQAU-Lab CX-2). PH value was determined according to Ockerman (1972)'s description. The microbial quality of the samples were evaluated by FDA's BAM (1996). The color of final products were expressed by Hunter L, a and b values.

Results and Discussion

The results showed that pH value of the external part of mule and Pekin dry cured duck meat significantly increased ($p<0.05$) but that of the internal was not significantly change during ripening. Water activity and moisture of mule and Pekin dry cured duck meat significantly decreased ($p<0.05$) during ripening (Table 1,2). The nitrosohematin content of mule and Pekin dry cured duck meat significantly increased during ripening ($p<0.05$). The salt content of the mule and Pekin dry cured duck meat significantly increased ($p<0.05$) with ripening time increasing (Table 3). The external and internal part of all dry cured duck meats reached stable after 4 weeks during ripening. In the visual color, the mule and Pekin dry cured duck meat showed red color before 4 and 8 weeks during ripening and then they became dark red color at the end of ripening. In the aspect of microbial flora, the total plate count of the external part of mule and Peikin duck meat was significantly increased during ripening ($p<0.05$), but that of internal part meat was decreased after 2 and 1 week during ripening, individually. The change of Micrococcaceae count of the products was the same as total plate count. With ripening time ncreasing, the mold/yeast number of external and internal part of dry cured duck meat was significantly increased ($p<0.05$) but that of the external and internal part of meat were decreased after 4 and 2 during ripening. The number of enterobacteria count of external part of meat was showed unstable change, and didn't be found in internal part of mule and Peikin meat after 8 and 12 weeks during ripening. The number of lactic acid bacteria count of external part of mule and Peikin duck meat was significantly increased with ripening time increasing, before 8 and 16 week then the numbers were significantly declined. After 8 week ripening, the number of internal part of mule dry cured meat was not detected. However, the number of Peikin dry cured meat was about 3 log CFU/g (Fig 1, 2).

References

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Table 1 The change of water activity and moisture of dry cured mule duck meat during ripening

	Aw		Moisture (%)	
Time (weeks)	External	Internal	External	Internal
0	0.88^{az}	0.90^{ay}	66.77^{az}	67.12^{az}
1	0.89^{bz}	0.89^{bz}	61.91^{bz}	64.33^{by}
2	0.83^{cz}	0.84^{cy}	58.63^{cz}	62.66^{cy}
4	0.81^{dz}	0.83^{dy}	59.07^{cy}	60.99^{cy}
8	0.79^{ez}	0.80^{ez}	54.30^{dy}	55.70^{dy}
12	0.78^{fz}	0.78^{fz}	52.97^{ez}	57.27^{cdy}
16	0.79^{ez}	0.79^{ez}	52.00^{ez}	55.47^{dy}

[a-f]: Means within the same column without the same superscript are significantly different ($p<0.05$).
[y-z]: Means within the same row and item without the same superscript are significantly different ($p<0.05$).

Table 2. The change of water activity and moisture of dry cured Pekin duck meat during ripening

	Aw		Moisture (%)	
Time (week)	External	Internal	External	Internal
0	0.89^{az}	0.89^{az}	69.31^{az}	69.37^{az}
1	0.88^{aby}	0.89^{az}	66.69^{bz}	67.58^{abz}
2	0.87^{bz}	0.88^{bz}	65.24^{bcz}	66.49^{bcz}
4	0.86^{cz}	0.86^{cz}	63.90^{bcz}	66.20^{bcz}
8	0.86^{cz}	0.86^{cz}	62.16^{cz}	65.15^{cy}
12	0.85^{dz}	0.85^{dz}	59.15^{dz}	62.09^{dy}
16	0.83^{ez}	0.84^{ez}	56.09^{ez}	59.51^{ey}

[a-e]: Means within the same row without the same superscript are significantly different ($p<0.05$).
[y-z]: Means within the same column and item without the same superscript are significantly different ($p<0.05$).

Table 3. The change of salt content of dry cured mule and pekein duck meat during processing and ripening

	Processing**			Ripening time (weeks)						
	BC	AC	AW	0	1	2	4	8	12	16
Mule duck										
External	1.08^{ez}	14.18^{ay}	7.43^{dz}	8.36^{dz}	10.76^{bcz}	10.29^{cz}	11.09^{bcz}	12.05^{bz}	11.39^{bcz}	11.06^{bcz}
Internal	1.12^{ez}	10.69^{abz}	7.25^{dz}	7.63^{dz}	10.27^{cz}	10.40^{abz}	10.73^{abz}	11.14^{abz}	11.27^{az}	10.87^{abz}
Pekein duck										
Externa	1.05^{ez}	14.02^{ay}	7.87^{dz}	7.34^{dz}	8.06^{cdz}	8.81^{bcz}	8.95^{bz}	9.11^{bz}	9.49^{bz}	9.63^{bz}
Internal	1.10^{ez}	7.19^{bcz}	6.42^{cz}	6.72^{cz}	8.05^{bz}	8.10^{bz}	9.11^{az}	9.15^{az}	9.88^{az}	9.84^{az}

Unit: %. **: BC Means before curing; AC: Means the end of curing; AW: Means after washing.
[a-e]: Means within the same row without the same superscript are significantly different ($p<0.05$).
[y-z]: Means within the same column without the same superscript are significantly different ($p<0.05$).

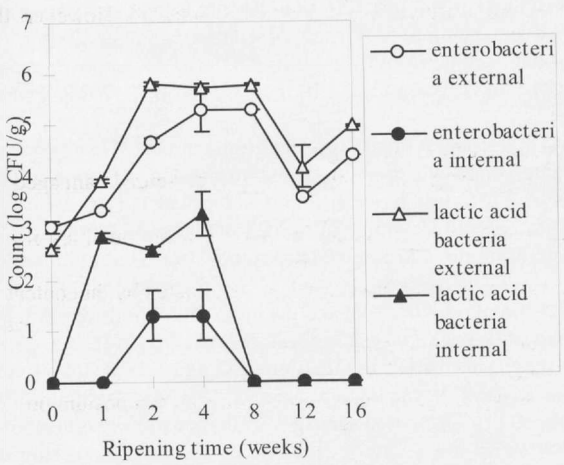

Fig. 1. The change of enterobacteria and lactic acid bacteria counts of dry cured mule duck meat during ripening.

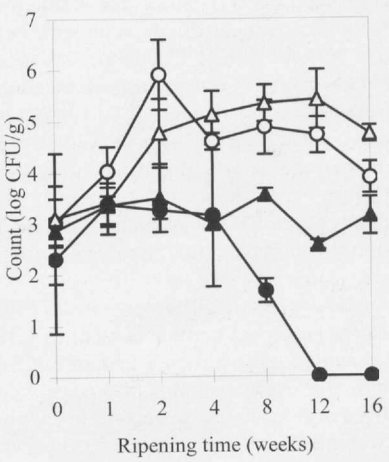

Fig. 2 The change of enterobacteria and lactic acid bacteria counts of dry cured mule duck meat during ripening.