PRESERVATION OF THE NAN-AN PRESSED SALT DUCK WITH THE TECHNIQUE OF OXYGEN SCAVENGER AND SEAL

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Nan-An pressed salt ducks are selected from about three month old ducks.The processing technoloogy of the Nan-An pressed salt ducks mainly includ fattening, slaughtering, cutting outer five pieces, opening its chest and cutting off the internal orgens,salting and exposing in sun light.Nan-An pressed salt duck comes from a place byname in DaYu county,Jiangxi province ,China, so it is called Na-An pressed salted duck.it is more than one hundred years old and is renowned at home and abroad as a traditional export commodity.But from august to october,the early processing pressed salted ducks , which are produced under higher temperature and high moisture, have a shorter shelflife and easily result producing spoilage.At the meantime, Nan-an pressed salted ducks easily undergo oxidative deterioration, because the fat content in them reaches much higher than 30%. It has objectively restricted the development and discourased its production enthusiasm. Studing the Nan-an pressed salted duck's preservation is a scientiific research subject which has obvious economic social benefits.In order to solve this problem, we used the technique of oxygen scavenger and seal since 1986.The tests had been proved that the effect was observable under the normal temperature after storing 90 to 100 days.

The preservation principle of the oxygen scavenger: oxygen scavenger is a kind of obsorbed particle which mainly contains $FeSO_4.7H_2O$ 55%,$Ca(OH)_2$10%,$NaHCO_3$ 8%,$Na_2SO_4.7H_2O$ 15%,and active carbon 12%.The oxygen scavenger is sealed in a multiplastic bag. Each bag has 4 gram oxygen scavenger. The oxygen scavenger has a noposioupous,safe and available character. During food storing, the oxygen scavenger reacts as following: $FeSO_4+Ca(OH)_2$----------$Fe(OH)_2+CaSO_4$

$2Fe(OH)_2+O_2+H_2O$----------$2Fe(OH)_2$-------$FeO_3.H_2O$ $2NaHCO_3+Ca(OH)_2$---------$CaCO_3+CO_2+H_2O+2NaOH$

Active carbon has the function of absorbed off-flavor and moisture.

Nan-an pressed salted duck was sealed together with the oxygen scavenger in the polypropylene compound plastic bag. After about one or two days,the oxygen scavenger can absorb most of the oxygen in the bag. The abnormal environment inhibts the mould growing. In the meantime, the oxygen scavenger can absorb the oxygen which penetracts into the bag during the storing.Because of its keeping oxygen out of the bag,the oxygen scavenger can prevent Nan-an pressedsalted duck from mouldy, pest, fat oxydative rancidity,off-odour,and keep its original colour, flavor,odour and nutrient,so it can reach the effect of prolonging preservative time.

Oxygen scavenger was first used in Japan in 1976. Now it is widely used in japan,U.S.,Germany,France and other countries for preservation of food stuff, animal product and other kinds of food. Meanwhile ,oxygen scavenger is still in the experimental stage in china.Although it has been used in cake product, peanut and some kinds of food in china,it is not reported that the oxygen scavenger is used in pressed salted duck. The present study in this report shows the effect of the oxygen scavenger in the pressed sailted duck in our experimental.

Materials and Methods

First test samples : 80 second grade Nan-an pressed salted ducks were selected in the Lao-Fong pressed salted duck factory in Sep. 1986. Average weight of each duck was 0.8Kg.

Second test samples: 80 second grade Nan-an pressed salted ducks were selected in the Long-Hui pressed salted duck factory in Sep.1987.Average weight of each duck was 0.8Kg.In Sep.1988,Nan-an pressed salted ducks were selected for the repeated test.

First test, second test and repeated test samples were each divided in two groups(treatment group and control group).There were 40 pressed salted ducks in each group.

The treatment group: every duck was held in 40 times 40 cm polypropylene compound plastic bag which contained no taste or poisoning ,and was transparent and airtight.Meanwhile two tablet oxygen scavengers(Made in Japan) were held in the same bag. Then the mouth of the bag was packed by a heat sealing engine under normal pressure.

The control group: 40 pressed salted ducks were stored in the tradional method without any treatment.

The experimental condition : the pressed salted ducks were stored under normal conditionin a general room. The pressed salted ducks were observed and tested at regular interals.The temperature in the room was record three times every day.

The determining content:

(1)Sensery test: the colour and the mouldy changes were observed by ocular estmate.

(2)moisture: mearsured when baked 5 hours at 105℃.

(3)TVB-N:it was an index of protein disposition in muscle.It was measured by the kjeldahl method of nitrogen determination and expressed by mg/100g pressed salted duck.

(4)Peridoxie value: it expressed the degree of oil-fatty oxidation, with percent of I.

(5)Acid value: the quality of free fatty acid separating from oil-fatty was represented by KOH mg.

(6)Microbial Index: determinated by the National Food Micrologic Standard Method.

(7)Amino Acid:measured by Japan 835-50 Amino Acid auto-analyticl instrument.

thirtieth day, the sixtieth day and the one hundred first day.

Results and Analysis

1. The temperature changes in the test site(table 1).

TABLE 1: the storage temperatures of the pressed salted ducks.

MONTH	9	10	11	12
MEAN TEMPERATURE	25.3	19.6	13.1	4.8
HIGHEST TEMPERATURE	36.6	34.6	22.4	17.5

2. sensory test----mouldy changes state(Table 2)

It was know from the table 2 that the treatment group was not spoiled from begin to end except one duck which got mouldy because of a the mouth of the bag bad seal.The experimental indicated that the oxygen scavenger had an effect on the mould, while the control had 80% spoilage in 15 days and the changes increased as the time priloged.The spoilage reached 100% in 30 days.

Group	storage days	Light spoilage (%)	Heavy spoilage (%)	Spoilage) efficiency (%)	Normal efficiency (%)
Contral group	15	8.6	71.4	80	20
	30	20.7	79.3	100	0
	60	12.5	87.5	100	0
Treatment group	15	0	0	0	100
	30	2.7	0	2.7	97.3
	60	2.7	0	2.7	97.3
	101	0	2.7	2.7	97.3

3. physicochemical deterimenation:physicochemical index determination mainly reflected the index of the pressed salted duck freshness. The result of the physicochemical determination index of the pressed salted duck storage test.&

INDEX	GROUP	15DAYS	30DAYS	60DAYS	101DAYS)
MOISTURE (%)	control	38.81	38.94)	35.33	30.97
	treatment	38.96	40.58	41.14	41.75
TVB-N (%)	control	6.31	9.27	15.19	22.67
	treatment	3.97	4.43	5.02	9.74
Peridoxie value(%)	control	0.17	0.35	0.39	0.43
	treatment	0.16	0.18	0.21	0.24
Acid value (%)	control	0.92	1.93	2.37	3.73
	treatment	0.71	0.76)	0.89	1.21

Compared to the related country Food Hygine Standard, all the items of the treatment group were in correspondence with the standard.significant difference test: the treatment group compared to the control group was significant at the 0.01 level($p<0.01$). The treatment group had an effect on maintaining the original weights of the pressed salted ducks,whereas the weights were reduced as the moisture evidently decreased in control , and thus the economic benefit reduced.&

4. Microbial index showed the following table 4.

It was discovered from the table 4 that the bacteria counts (3.6×10^5g) after preserving 101 days in the treatment group were four times that as in the beginning , while the bacteria counts(819×10^5g)were 1000 times that initially in the control

group. It was demonstrated that the oxygen scavenger could inhibited bacteria.

Table 4: the pressed salted duck's microbial assessing result in the storage test.

INDEX	control group		Treatment group	
	inital	101days	inital	101days
Bacteria counts (num/g)	$0.8x10^5$	$819x10^5$	$0.8x10^5$	$3.6x10^5$
bacillus coli counts(num/g)	<30	<30	<30	<30
pathogenic bacteria	no	no	no	no

5. Nutritive index: deterimination of the Amino Acid showed in TABLE 5.

TABLE 5: the content of Amino Acid in the pressed salted ducks(mg/100g):

Amino Acid	Begining	End	Amino Acid	Begining	End
ASP	5.63	5.40	TLE	1.96	1.99
THR	2.78	2.67	IEV	5.12	4.90
SER	2.69	2.47	TYR	2.15	2.09
GLU	11.04	10.50	PHE	2.49	2.37
GLY	2.73	2.62	LYS	3.44	3.38
ALA	4.28	3.72	HIS	1.41	1.48
CYS	0.76	1.28	ARC	3.77	3.55
VAL	2.17	2.16	PRO	2.25	2.25
MET	0.76	0.69	TOTAL	55.43	53.52

It was known from the table 5 that the total content of the amino acid in the pressed salted ducks with the oxygen scavenger lossed only 1.91% after storing 90 days.The difference test was not significant($p<0.05$).The nutrient basic content had not been changed.

6. The test was repeated respectively in 1987 and 1988(Table 6).

Table 6:the result of repeated preservative test.

Group	control group		treatment group	
test time	1987 year	1988 year	1987 year	1988 year
sensory test	mouldy,fat yellowish	mouldy,fat yellowish rancidity	normal	normal
TVB-N	55.13	56.46	38.59	28.23
ACID VALUE	3.28	2.11	2.03	1.72
BACTERIA COUNTS	20000			<10
BACILLUS COLI COUNTS	<30			<30

It could be seen from the Table 6 that the sensory indexes and physico-chemical indexes in the treatment group corresponded to the National Health Standard(GB2723-81 and GBn138-81),but in the control group they did not correspond to the standard.

7.Weight loss results of the pressed salted ducks in the repeated test after storing for three months(from Sep. to Dec. in 1988) was seen in table 7.

Table 7: The weight losses result in the preservative test.

GROUP	DUCKS	MEAN BEGINING WEIGHT(g)	MEAN END WEIGHT(g)	MEAN WEIGHT LOSSES(g)	LOSS RATE (%)
CONTROL GROUP	20	585.35	494.58	90.77	15.51
TREATMENT GROUP	33	713.52	710.76	2.76	0.39

The result indicated that the weight losses in the treatment group were 15.12% less than those in the control group,and was significant at the 0.01 level($p<0.01$).

Conclusion and Discussion

The processing season of the early Nan-an pressed salted duck is in the seasons of high temperature (more than 25℃),so it is easy to get mouldy and fat oxidative rancidity.It is also the main factory of the pressed salted duckspoilage. Oxygen scavenger can change the air content in the sealed bag,so it can keep in no oxygen and produce CO_2 in the bag. It is beneficial to inhibit the mould and aerobic bacteria growing and repriducing and to prevent fat oxidation.

It is not reported that the oxygen scavenger used in the pressed salted ducks at present. The oxygen scavenger was first used in the pressed salted ducks. The original color, flavor, ordor and nutrient content remained unchanged after storing 90 days. The quality indexes were all in correspondence with the National Hygienic Standard. The experiment was successful and had a great significance.

It was known from the test that the spoilage of the pressed salted ducks could be inhibited by the oxygen scavenger. The oxygen scavenger could prolong the processing time of the pressed salted ducks. It also could prevent the weight losses of the pressed salted ducks, so it had obvious economic social benefits and great significance in accelerating the raising of poultry and increasing export foreign exchanges.

The oxygen scavenger used for preservation in the pressed salted ducks was also safe, non-residual and pollution-free, so the new technology of food preservation has broad prospects.

References

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