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PROGRESS REPORT

Aug 5, 1988-April 1, 1989

EXTENDED SHELF-LIFE OF UNREFRIGERATED PRERIGOR COOKED MEAT

PSTC NO. 6.474, Grant No. DPE-5542-G-SS-8021-00.

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EXTENDED SHELF-LIFE OF UNREFRIGERATED PRERIGOR COOKED MEAT

Development of polarographic oxygen sensor system

An accomplishment in the beginning of this project is the development of a polarographic oxygen sensor system. One of the specific objectives of this project is to combine the beneficial effects of aerobic packaging of meat with other treatments. The oxygen sensing system is needed to evaluate the packaging by mapping an oxygen profile of packaged muscle samples.

A Clark-style needle oxygen sensor which is designed specifically for obtaining oxygen measurements in tissue is utilized (Diamond General Corp., Ann Arbor, MI). This electrode has a gold plated cathode and an internal Ag (AgCl - Ag₂S) anode. The theory of this polarographic electrode is that when two electrodes (i.e. cathode and anode) are polarized with a potential of slightly less than -1.0 volt in an electrolytic solution containing dissolved oxygen, current will flow as a result of the reduction of oxygen at the cathodic (negatively polarized) surface. The chemical activity of oxygen as measured by an electrode chemical sensor is proportional to the concentration of dissolved oxygen.

An oxygen needle probe Amp unit has been constructed in our Physics Department to pick up the oxygen reduction reaction at the cathode of the electrode as a current in picoAmps. After calibrating the electrode using a zero oxygen solution and a 21% oxygen solution for adjusting the instrument at zero and 100% respectively, oxygen concentration readings are displayed as percentage of atmospheric oxygen.

A calibration unit has also been developed in our laboratory. This calibration unit consists of a water bath for maintaining the desired calibration temperature (temperature of the samples) nitrogen gas, an air pump, and a strip chart recorder. Water is saturated with nitrogen or air to give zero oxygen concentration and atmospheric concentration respectively.

Packaging experiments

Simultaneously with the development of the oxygen equipment, preliminary experiments on processing and packaging have been conducted. Packaging material was obtained from American Can Company consisting of oriented poly propylene bags (opp). These bags are of high permeability to oxygen. Saran bags, which have poor permeability to oxygen, were used as controls. The experiments were performed to study the effect of cooking and the integrity of seals on the bags. The experiments performed consisted of preparing prerigor samples in uniform shapes ($2 \times 3 \times 5 \text{cm}^3$), then sealing them in the two types of bags (opp and saran). The samples were then cooked to an internal temperature of 65°C . Temperatures were monitored using a digital temperature recorder. After cooking, the samples were cooled to and stored at room temperature. The stored samples were examined visually and microbiologically at different storage periods. During storage the integrity of the seal was examined.

These experiments were designed to evaluate the effects of precooking and aerobic packaging on microbial populations. The microbiological analysis was performed on fresh prerigor samples and on samples immediately after cooking and during storage. The results show that some samples may be stored for eight days and remain microbiologically safe and organoleptically acceptable. They had microbial loads lower than those of fresh prerigor samples.

FINANCIAL STATUS REPORT

(Follow instructions on the back)

3. RECIPIENT ORGANIZATION (Name and complete address, including ZIP code)

Purdue Research Foundation
Hovde Hall
West Lafayette, IN 47907

1. FEDERAL AGENCY AND ORGANIZATIONAL ELEMENT TO WHICH REPORT IS SUBMITTED

Agency for International Development

2. FEDERAL GRANT OR OTHER IDENTIFYING NUMBER

DPE-5542-G-SS-8021-00

OMB Approved
No. 30-R0180

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4. EMPLOYER IDENTIFICATION NUMBER

5. RECIPIENT ACCOUNT NUMBER OR IDENTIFYING NUMBER

550 1151-0765

6. FINAL REPORT

YES NO

7. BASIS

CASH ACCRUAL

8. PROJECT/GRANT PERIOD (See instructions)

FROM (Month, day, year)
08/05/88

TO (Month, day, year)
02/04/91

9. PERIOD COVERED BY THIS REPORT
FROM (Month, day, year)
08/05/88

TO (Month, day, year)
02/28/89

PROGRAMS/FUNCTIONS/ACTIVITIES ▶	STATUS OF FUNDS						TOTAL (g)
	(a)	(b)	(c)	(d)	(e)	(f)	
a. Net outlays previously reported	\$ 0.00	\$	\$	\$	\$	\$	\$ 0.00
b. Total outlays this report period	21,779.79						21,779.79
c. Less: Program income credits	0.00						0.00
d. Net outlays this report period (Line b minus line c)	21,779.79						21,779.79
e. Net outlays to date (Line a plus line d)	21,779.79						21,779.79
f. Less: Non-Federal share of outlays	0.00						0.00
g. Total Federal share of outlays (Line e minus line f)	21,779.79						21,779.79
h. Total unliquidated obligations	492.84						492.84
i. Less: Non-Federal share of unliquidated obligations shown on line h	0.00						0.00
j. Federal share of unliquidated obligations	492.84						492.84
k. Total Federal share of outlays and unliquidated obligations	22,272.63						22,272.63
l. Total cumulative amount of Federal funds authorized	150,000.00						150,000.00
m. Unobligated balance of Federal funds	127,727.37						127,727.37

11. INDIRECT EXPENSE

a. TYPE OF RATE

(Place "I" in appropriate box)

PROVISIONAL PREDETERMINED FINAL FIXED

b. RATE

46%

c. BASE

MTDC

d. TOTAL AMOUNT

6,862.13

e. FEDERAL SHARE

6,862.13

13. CERTIFICATION

I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays and unliquidated obligations are for the purposes set forth in the award documents.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL:

Mike R. Ludwig

TYPED OR PRINTED NAME AND TITLE

Mike R. Ludwig

DATE REPORT SUBMITTED
03/31/89

TELEPHONE (Area code, number and extension)
317/494-1075

12. REMARKS: Attach any explanations deemed necessary or information required by Federal sponsoring agency in compliance with governing legislation.