行政院國家科學委員會專題研究計畫成果報告

市售油炸豆皮商品壽命之研究及其檢定

Shelf Life of Commercial Fried-topie and Its Assessment

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一. 中文摘要

油炸豆皮以聚乙烯袋包裝分別貯存於 4℃、25℃及 37℃。結果顯示貯存於 25℃，6 週之樣品，其 TBA 值、顏色及品評分數皆與新鮮者具顯著性差異，且經貯存 14 週之油炸豆皮之黴菌數為 5.8X10^6(cfu/g)。以近紅外線光譜技術建立之品質分析模式，經可性度測試結果顯示，可有效的區別品質較差之油炸豆皮產品。

關鍵詞: 油炸豆皮，聚乙烯，近紅外線光譜技術

Abstract

The fried-topie, packed with polyethylene bag, incubated at 4, 25, and 37°C, respectively. Samples stored at 25°C for 6 weeks were found that the TBA(thiobarbituric acid) value, color and sensory score was significant different with fresh samples. Furthermore, the samples stored for 16 weeks were found the number of mold was 5.8X10^6(cfu/g). Evaluation model using near infrared spectroscopy(NIRS) were developed for the quality of stored fried-topie samples. Simulation experiments demonstrated that model were able to identify the sample quality. Statistical analysis suggested that models could be used as a rapid analytical technique for assessment of commercial fried-topie products.

Keywords: Fried-topie, Polyethylene, Near Infrared Spectroscopy

二. 緣由與目的

市售油炸豆皮之保存期限標示不當，又未建立其商品壽命，且因保存不當，致嚴重油脂氧化．因此，這類高油脂油炸食品多具強烈油耗味，影響消費者健康頗鉅．本研究旨在探討傳統油炸豆皮貯存期間之品質劣變，並建立其商品壽命，且應用近紅外線光譜術快速預測市售油炸豆皮之品質及其商品壽命．方法上將油炸豆皮貯存於不同溫度，評估其脂氧化程度、一般及感官品質，建立其商品壽命，並以近紅外線光譜技術作光譜比對，作為快速預測之用．此研究及技術除了可建立傳統油炸豆皮商品壽命之外，也可應用於其他相似之傳統油炸食品．

三. 結果與討論

貯存於 25℃ 之油炸豆皮中油脂之 TBA 值，貯存至 6 週為 3.3(OD/100g) 貯存至 8 週為 6.20(OD/100g)(圖一)，兩者具顯著性差異此結果顯示，油炸豆皮貯存於 25℃ 至 8 週後脂質氧化顯著。

貯存於 25℃ 之油炸豆皮之顏色 L 值隨貯存時間而降低(圖二)，此外 b 值(圖三)與 L 值相似，而 a 值於貯存 4 週內幾乎無變化，於貯存 4 週後則顯著地降低(圖四)。此現象之主因之一是於貯存中脂質氧化產物與蛋白質行非酵素褐變反應所致。

總生菌數於 25℃ 貯存初期已含 10^3(cfu/100g)，貯存 8 週後增加至 104。貯存至 14 週後，增加至 106 黴菌數，於貯存初期已含 10^3(cfu/100g)，貯存 8 週後，增加至 10^4(cfu/100g)，貯存至 14 週後增加至 10^6(cfu/100g)，且兩者皆隨貯存時間而不斷上升，而貯存至 14 週後，肉眼已可察覺發黴現象。

官能品評結果顯示，貯存於 25℃ 油炸豆皮之風味，於，而顏色於貯存至 10 週後，才具顯著性差異(表二)。而總接受性方面，貯存於 25℃ 油炸豆皮，貯存至第 6 週後，既呈顯著性差異。此結果顯示，不論是豆皮顏色或風味，品評員皆較分析值早品評出貯存豆皮之差異性。

應用近紅外線光譜儀建立貯存油炸豆皮樣品之光譜資料庫，配合主成分及鑑別統計分析法，依據品評品質結果分成兩類(具接受性及不具接受性)統計結果之變異係數為 0.91。以此模式測試市售油炸豆皮商品 10 件，結果發現其中 2 件被檢定為不具接受性此結果與官能品評結果相同。因此，此快速分析模式可作為市售油炸豆皮品質之快速檢定之工具。

四. 計劃成果自評

本計劃完成傳統油炸豆皮於貯存期間之品質劣變分析，並確定其商品壽命。且建立以近紅外線光譜技術建立品質快速分析模式，可作為市售油炸豆皮品質之檢定。已完成計劃內容並達預期目標。

五. 參考文獻

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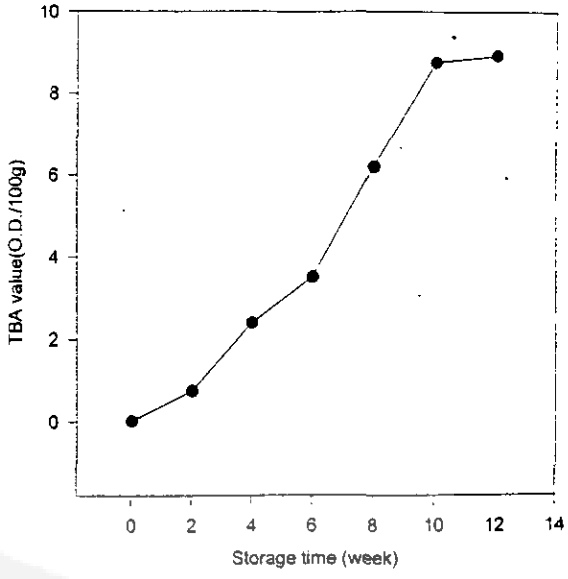

Fig.1. TBA value of fried-topie during storage at 25C

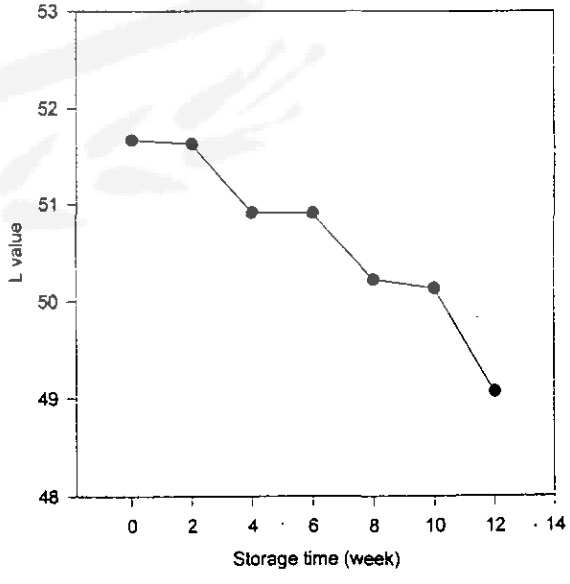

Fig. 2. The L value of fried-topie during storage at 25C

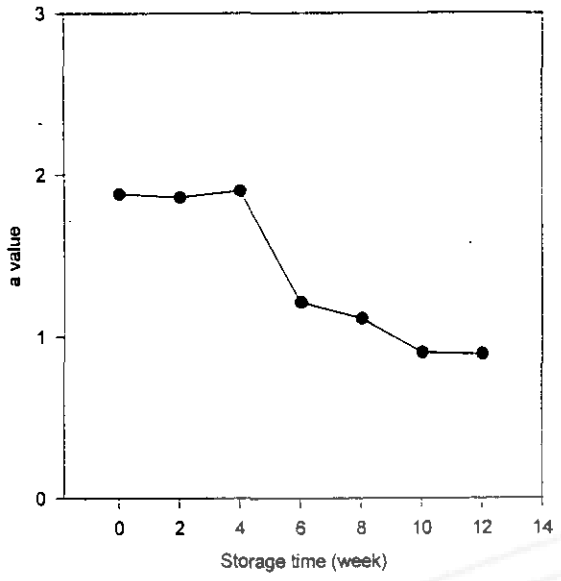

Fig. 3. The a value of fried-topie during storage at 25C

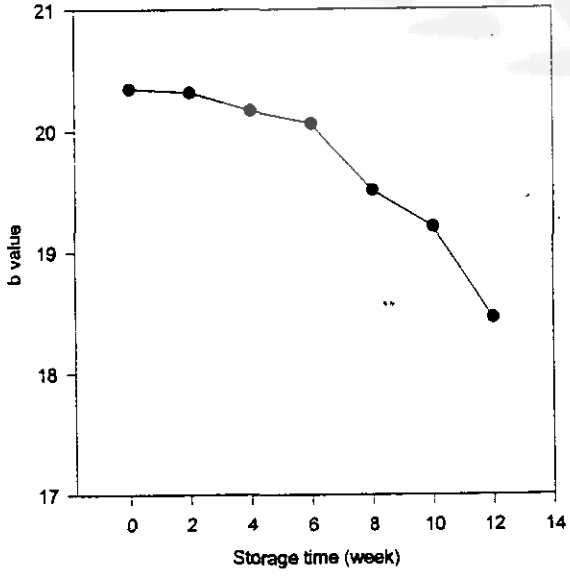

Fig. 4. The b value of fried-topie during storage at 25C

Fig. 2. Sensory score of fried-topie during storage at 25℃

Storage time(week)	color	flavor	Overall aceptance
0	8[a]	8[a]	9[a]
2	7[b]	8[ab]	9[a]
4	8[a]	7[b]	8[a]
6	5[bc]	5[cd]	6[b]
8	5[bc]	4[d]	6[b]
10	4[d]	3[d]	5[b]
12	4[d]	4[d]	3[c]

[1] Any two values not followed by the same letter are significantly different at 5% level

Fig. 1. Total count and mold count of fried-topie during storage at 25℃

Item	Storage time (week)							
	0	2	4	6	8	10	12	14
Total count (cfu/g)	1.5× 10^2	2× 10^2	8.5× 10^2	6.5× 10^4	1.1× 10^6	2.05× 10^6	8× 10^6	2.45×10^6
Mold(cfu/g)	1× 10^1	2.5× 10^1	1.8× 10^2	3.1× 10^4	2.25× 10^4	6.75× 10^4	1.53× 10^5	5.8× 10^5

Fig. 3 Assessment of quality of the commercial fried-topie by near infrared spectroscopy

Sample	Identification by NIRS model	Sensory evaluation
1	Acceptance	Acceptance
2	Acceptance	Acceptance
3	Non-acceptance	Non-acceptance
4	Acceptance	Acceptance
5	Acceptance	Acceptance
6	Acceptance	Acceptance
7	Acceptance	Acceptance
8	Acceptance	Acceptance
9	Acceptance	Acceptance
10	Non-acceptance	Non-acceptance