# タイ発酵型米麺の液状化及び予防のためのpH管理の経営的評価

## Cost accounting for evaluating liquefaction of Thai fermented rice noodles and its prevention focusing on pH management

タイをはじめ大メコン圏で広く生産、消費される伝統食品である発酵型米麺は、製造後に急激に麺の形が崩れ液状化する場合があり、生産・流通上の問題となっている。近年、食品化学的研究により、液状化の要因の一つとして麺のpH上昇が示唆されているため、タイにおいて代表的な、小規模な発酵型米麺工場の経営的評価を行う。分析の結果、麺の液状化は大幅な減収と経営の不安定化をもたらし得ること、製造工程におけるpHの計測・管理と、酸性の洗浄水による麺の洗浄は費用が限定的であり、コストの観点から導入が比較的容易であることが示唆される。

Traditional Thai fermented rice noodles, *khanom jeen*, are produced and consumed widely in the nation as well as the Greater Mekong Subregion. A well-known problem with noodle production is the sudden liquefaction of noodles soon after production, severely affecting business and undermining buyer confidence. A recent study found that the increased pH level of *khanom jeen* noodles induced liquefaction. Thus, we conducted cost accounting focusing on pH management. The results show that the noodles' liquefaction severely affect producers' profitability, while pH monitoring and management has minimal impact on the cost, implying that this method is relatively easy for small businesses to introduce.

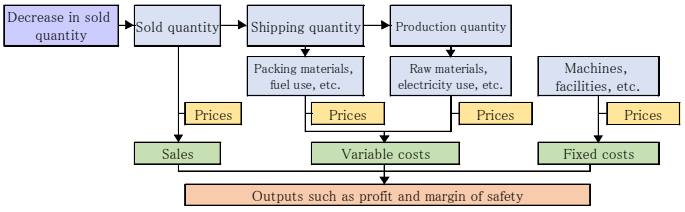


図1　経営的評価のためのモデル概念図
Fig. 1. Conceptual chart of the simulation model

聞き取り調査によって得られた経営データを基に、発酵型米粉・米麺両方の製造業者についてモデルを構築した。図で示されているのは、米粉と米麺に共通するフローチャート。
Models for production of both the fermented rice flour and noodles are built based on the survey. The figure shows the common diagram for both processes.

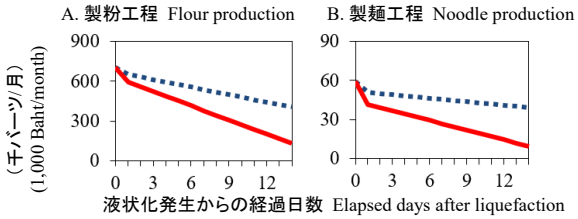


図2　麺の販売不能による減収額（推計値）
Fig. 2. Estimated profit according to the decrease in sold quantity

実線は日販売量が全量、点線は50%販売不能となった場合の予測値。製麺工程は製麺工程は原料発酵米粉を全量購入する場合の値。タイ政府工業省に登録されている発酵型米麺関連企業の平均値と同等の小規模生産者を想定（製粉作業員13人、原料米5.5トン/日、製麺作業員6人、原料発酵米粉0.6トン/日）。
Solid line = 100% reduction in daily sales volume. Dotted line = 50% reduction in daily sales volume. "Noodle production" assumes that the process only uses purchased flour. It also assumes small businesses, an average size of fermented rice flour, and noodles producers registered with the Department of Industrial Works, Ministry of Industry (flour production: laborers = 13, raw material rice = 5.5 tons/day; and noodle production: laborers = 6, raw material flour = 0.6 tons/day).

表1 pHに着目した発酵型米麺液状化予防にかかる費用
Table 1. Monthly average costs for preventing liquefaction focusing on pH management

| | | For the surveyed company | For further pH management |
|---|---|---|---|
| A. Costs for measuring pH in the flour and noodle production processes by indicator papers | Measuring points (point/day) | 10 | 20 |
| | Costs (Baht/month) | 373 | 746 |
| | Percentage of total cost (%) | 0.01 | 0.03 |
| B. Costs for washing noodles by the water containing acetic acid | Volume of acetic acid (L/day) | 0.2 | 1 |
| | Costs (Baht/month) | 216 | 1,083 |
| | Percentage of total cost (%) | 0.01 | 0.04 |

事例調査を行った企業は標準的な小規模生産者。麺の洗浄量は、約830kg/日（1台の製麺機を8時間/日稼働させた場合の生産量）を想定。事例調査を行った企業の総費用は282万バーツ/月（うち製粉工程268万バーツ/月、製麺工程14万バーツ/月）。（参考）pH計による費用は、耐用年数6年を仮定した場合、電池の消耗を加味しても431バーツ/月。法定量上限まで麺に一般的な保存料を添加した場合の費用は2,647バーツ/月。
The surveyed company is the representative small-scale noodles producer, which uses a noodle-making machine that operates for 8 hours and produces 830 kg/day. The total cost for the surveyed company is 2.82 million Baht/month, with flour and noodle production accounting for 2.68 million Baht/month and 0.14 million Baht/month, respectively. The cost of measuring by pH meter is 431 Baht/month, assuming 6 years of durability. The cost of adding the maximum level of a common food preservative to noodles is 2,647 Baht/month.

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